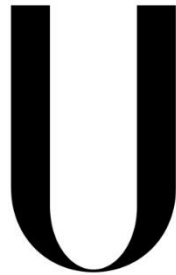


UNIVERSIDADE DE LISBOA

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**Implementing Screening and Brief Interventions for Excessive Alcohol
Consumption in Primary Health Care**

Frederico Miguel Bento do Rosário

Orientadores: Professora Doutora Cristina Maria Pires Ribeiro Gomes
Professora Doutora Niamh Mary Fitzgerald

Tese especialmente elaborada para obtenção do grau de Doutor em Medicina, na
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2019

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As opiniões expressas nesta publicação são da exclusiva responsabilidade do seu autor.

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Preface

*“Two roads diverged in a wood, and I –
I took the one less travelled by,
And that has made all the difference.”*

Robert Frost

This project started in 2012, two years after I have concluded my training as a family physician. I have always liked to challenge myself and pursuing a PhD after having completed my vocational training as a family physician made all the sense to me as the next step to be taken. I have started working on the field of alcohol-related harm a couple of years before, which included: the Portuguese translation of the “Alcohol and Primary Health Care: Clinical Guidelines on Identification and Brief Interventions”, a document stemmed from the PHEPA (Primary Health Care European Project on Alcohol) project; the elaboration of the Portuguese Guideline “Screening and Brief Intervention for Excessive Alcohol Consumption”, issued by the Portuguese Directorate-General of Health; and working as a researcher on the ODHIN (Optimizing Delivery of Health Care Interventions) project. Looking back to my own training, first as a medical student, then as a family medicine resident, I realized that managing patients with alcohol problems was a neglected area in clinical practice in Portugal; the experience I gained working on the field of alcohol-related harm, particularly on the ODHIN project, showed me that this was the rule rather than the exception. Therefore, choosing to investigate how to implement screening and brief interventions in primary health care came on naturally as the research area for my PhD.

I started planning my PhD with a clear idea in mind: I wanted it to change something! I remember saying to Professor Cristina Ribeiro, my soon-to-be PhD supervisor “I do not want to do this only to end stored in a drawer.” Therefore, I hope that this dissertation reaches a wider audience than just both my supervisors and the jury to whom I am submitting it for evaluation. I truly believe that this work approaches, in an innovative way, the multiple challenges researchers face when trying to implement screening and brief interventions for excessive alcohol consumption in primary health care. If nothing else, change is already happening where I presently work as a family physician. The results of this project are being used to implement these good practices

in everyday work at the Agrupamento de Centros de Saúde Dão Lafões. Hopefully, the results of this thesis will also be useful to change the *status quo* in other settings as well.

Acknowledgements

The road travelled during a PhD is most of the time a lonely one. The path I took was filled with unexpected twists and turns, slippery rocks, and narrow bridges which could have easily made me fall into the abyss. Fortunately, I could always count with the support of my supervisors, friends, colleagues and family; they were my compass throughout this adventure, showing me north when I was heading south. Therefore, I would like to say thanks to all who helped me in my journey.

I would like to thank my supervisor, Professor Cristina Ribeiro. She truly was my mentor from the start, pushing me to pursue my PhD. She always expressed her utmost trust in my work and helped me overcome many obstacles in my way.

Another thank you goes to my co-supervisor, Professor Niamh Fitzgerald. I was constantly amazed by the way she helped me analyze my work and by her scientific rigour.

I would also like to express my gratitude to all the other co-authors in the papers included in this thesis (in alphabetical order): Kathryn Angus; Lodewijk Pas; Marcin Wojnar; Maria Inês Santos; Milica Vasiljevic. Your insights concerning the design of the protocols and your critical appraisal of the reports of the studies were invaluable.

A word of appreciation is also due to the board of the Agrupamento de Centros de Saúde Dão Lafões, especially to Dr Lino Ministro, Dr Luís Soveral Botelho, and more recently to Dr António Grade, for having the audacity to think out of the box and to support this project.

I am also extremely grateful to the Instituto de Medicina Preventiva e Saúde Pública, namely to Professor José Pereira Miguel and to Professor António Vaz Carneiro for having believed in my research idea right from the start and for the continuous support provided.

Last but not least, I would like to dedicate this thesis to the four most important persons in my life: my wife, my son, my daughter, and my mother.

List of abbreviations and acronyms used

AAPPQ	Alcohol and Alcohol Problems Perception Questionnaire
AIDS	Acquired Immunodeficiency Syndrome
APC	Alcohol per Capita Consumption
AUC	Area Under the Curve
AUDIT	Alcohol Use Disorders Identification Test
BCTs	Behaviour Change Techniques
BCW	Behaviour Change Wheel
CAGE	Cut down on drinking, Annoyed by criticism, Guilty feelings, and Eye-opener
CASP	Critical Appraisal Skills Programme
CENTRAL	Cochrane Central Register of Controlled Trials
CINAHL	Cumulative Index to Nursing and Allied Health Literature
COM-B	Capability, Opportunity, Motivation – Behaviour System
DNA	Deoxyribonucleic acid
FP	Family Physicians
GABA	Gamma-aminobutyric acid
GPs	General Practitioners / Family Physicians
HIV	Human Immunodeficiency Virus
MAST	Michigan Alcoholism Screening Test
MEDLINE	Medical Literature Analysis and Retrieval System Online
MeSH	Medical Subject Headings
NIH	National Institutes of Health
NMDA	N-methyl-D-aspartate

ODHIN	Optimizing Delivery of Health Care Interventions
OR	Odds Ratio
PHC	Primary Health Care
PHCU	Primary Health Care Unit
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
PROSPERO	International prospective register of systematic reviews
Q-F	Quantity-Frequency questions
RCT	Randomized Controlled Trial
ROC	Receiver Operating Characteristic
SAAPPQ	Short Alcohol and Alcohol Problems Perception Questionnaire
SBI	Screening and Brief Interventions
TDF	Theoretical Domains Framework
UK	United Kingdom
US	United States of America
WHO	World Health Organization

SUMMARY

Alcohol use is among the leading risk factors for the global burden of disease and premature death. People who drink alcoholic beverages are at risk of developing more than 200 diseases and injury conditions. Most of the impact of alcohol consumption on human health and well-being is determined by two dimensions of drinking: the total volume of alcohol consumed and the pattern of drinking. Several effective strategies exist to reduce the harmful use of alcohol, which includes screening and brief interventions for excessive alcohol use in primary health care. The majority of primary health care providers agree that the excessive consumption of alcohol is an important health issue and express their support to policies for reducing the impact of alcohol on the health of their patients. Notwithstanding, implementation of screening and brief interventions is low at the primary health care level. Therefore, the overall aim of this thesis is to investigate how to implement screening and brief interventions for excessive alcohol consumption in primary health care.

This thesis reviewed the barriers of, and facilitators for, the implementation of alcohol screening and brief interventions in primary health care. Behaviour change theory was used to understand how these factors linked to the determinants of behaviour change and how they could be addressed in order to change primary health care providers' behaviour, i.e. to increase the delivery of alcohol screening and brief interventions. A comprehensive theory-based implementation programme was designed and tested in a cluster randomized controlled trial.

This thesis identified several barriers to implementation which were mapped to all the theoretical domains of behaviour change. Primary health care providers concerns about their ability to deliver alcohol screening and brief interventions and to help patients to cut down, lack of alcohol-related knowledge, lack of time, lack of materials and support, and providers' attitudes towards at-risk drinkers were among the most commonly cited barriers. This thesis found evidence that the attitudes of family physicians could be used to divide practitioners into two distinct groups, one with more positive and the other with more negative attitudes towards at-risk drinkers. This thesis also found that a behaviour change theory-based programme, tailored to

the barriers for, and facilitators of, the implementation of screening and brief intervention in primary health care is effective in increasing alcohol screening rates.

This thesis contributed to the evidence base by providing researchers with practical evidence on how to address the factors influencing the implementation of screening and brief interventions in primary health care. This thesis also provides researchers with insight into the behavioural mechanisms mediating primary health care providers' decision to deliver alcohol screening and brief interventions. The results of this thesis could be used by researchers and policymakers to inform the design of novel theory-oriented interventions to support the implementation of alcohol screening and brief interventions in primary health care.

Keywords

Alcohol-related problems; Primary health care; Screening and brief interventions; Barriers and facilitators to implementation; Behaviour change theory.

SUMÁRIO

O consumo de bebidas alcoólicas é um dos principais fatores de risco da morbidade e mortalidade prematura a nível mundial. As pessoas que consomem este género de bebidas têm um risco aumentado de vir a desenvolver mais de 200 problemas de saúde diferentes. A maioria do impacto do consumo de álcool na saúde humana é determinado por duas dimensões: o volume total de álcool consumido e o padrão de consumo. Existem várias medidas com comprovada eficácia que podem ser empregues para reduzir o risco associado ao consumo de álcool, entre as quais se encontra a deteção precoce e intervenção breve ao nível dos Cuidados de Saúde Primários. A maioria dos profissionais de saúde neste nível de cuidados considera o consumo de álcool como um importante problema de saúde e manifesta o seu apoio a medidas que visem reduzir o seu impacto. No entanto, poucos são os profissionais dos Cuidados de Saúde Primários que de forma sistemática identificam e aconselham os seus doentes relativamente aos seus hábitos etílicos. Como tal, o objetivo geral desta tese foi investigar como implementar a deteção precoce e intervenção breve no consumo excessivo de álcool nos Cuidados de Saúde Primários.

Foi realizada uma revisão sistemática das barreiras e facilitadores à implementação da deteção precoce e intervenção breve no consumo excessivo de álcool nos Cuidados de Saúde Primários. As barreiras e facilitadores identificados nesta revisão foram analisados à luz da teoria de modificação comportamental para compreender a ligação destes fatores aos determinantes da mudança de comportamento, e para identificar as estratégias conceptualmente mais eficazes para abordar as barreiras e facilitadores à mudança de comportamento dos profissionais dos Cuidados de Saúde Primários no sentido de aumentar as taxas de deteção precoce e intervenção breve no consumo excessivo de álcool. Esta metodologia foi utilizada para desenhar um programa de implementação com base em pressupostos teóricos que foi testado num estudo experimental randomizado e controlado em *clusters*.

Esta tese identificou diversas barreiras à implementação, ligadas a todos os domínios teóricos da mudança comportamental. As barreiras mais frequentemente mencionadas pelos profissionais foram: preocupação sobre as suas competências e eficácia para realizar a deteção precoce e intervenção breve; falta de conhecimento específico sobre

o consumo de álcool; falta de tempo; falta de materiais; falta de apoio; e atitudes para com o doente com consumos excessivos de álcool. Esta tese mostrou também a existência de dois grupos distintos de médicos de família com base nas suas atitudes para com estes doentes, um com atitudes mais positivas, o outro com atitudes mais negativas. Esta tese mostrou ainda que um programa de implementação da deteção precoce e intervenção breve, desenhado com base em pressupostos teóricos de modificação comportamental, adaptado às barreiras e facilitadores da implementação, aumenta de forma significativa as taxas de identificação precoce dos consumos de álcool.

Esta tese contribui para aumentar o conhecimento atual no sentido em que põe à disposição dos investigadores evidência prática sobre como abordar os fatores com influência na implementação da identificação precoce e intervenção breve para o consumo de álcool ao nível dos Cuidados de Saúde Primários. Esta tese contribui também para um melhor entendimento dos mecanismos subjacentes à resistência e à mudança de comportamento dos profissionais dos Cuidados de Saúde Primários no que respeita à implementação da deteção precoce e intervenção breve do consumo de álcool. Os resultados desta tese poderão ser usados por investigadores e decisores políticos para desenhar novos programas de implementação tendo como objetivo modificar esta prática clínica ao nível dos Cuidados de Saúde Primários.

Palavras-chave

Problemas ligados ao álcool; Cuidados de Saúde Primários; Deteção precoce e intervenção breve; Barreiras e facilitadores à implementação; Teoria de modificação comportamental.

SUMÁRIO EXTENSO

O consumo de álcool é, mundialmente, um dos principais fatores de morbimortalidade, estimando-se ser a causa de três milhões de mortes evitáveis por ano. O consumo de álcool é causa direta e indireta de mais de 200 doenças e condições de saúde. Na Europa, o consumo de álcool é responsável por uma em cada dez mortes, e por 10,8% do número de anos de vida perdidos ajustados à incapacidade.

A detecção precoce do consumo excessivo de álcool, seguida de uma intervenção breve, é uma das atividades com melhor relação benefício-custo ao nível dos Cuidados de Saúde Primários, sendo esta prática fortemente recomendada pela Organização Mundial da Saúde e por várias normas de orientação a nível nacional e internacional. Contudo, verifica-se uma baixa implementação destas atividades, fruto da existência de múltiplas barreiras sentidas pelos profissionais dos Cuidados de Saúde Primários quando tentam implementar esta atividade na prática clínica. A informação acerca das barreiras a esta prática encontra-se dispersa pela literatura científica pelo que se torna necessária a realização de uma revisão sistemática da literatura.

Uma das barreiras mais importantes à implementação da detecção precoce e intervenção breve no consumo de álcool são as atitudes dos médicos de família para com estes doentes. A evidência mostra que os médicos com atitudes mais positivas abordam esta problemática com maior frequência, passando-se o oposto naqueles com atitudes mais negativas. Apesar de isto sugerir a existência de uma tipologia de médicos de família com atitudes distintas para com os doentes com consumo excessivo de bebidas alcoólicas, esta hipótese nunca foi demonstrada. A identificação desta tipologia pode ser útil no desenho de estratégias de intervenção para melhorar as atitudes dos médicos de família, facilitando assim a implementação destas boas práticas.

Inúmeros estudos procuraram melhorar a implementação da detecção precoce e intervenção breve para o consumo de álcool nos Cuidados de Saúde Primários. Em média, os programas de implementação até hoje testados conseguiram aumentos não significativos de 11% na taxa de rastreio e de 17% na de intervenções breves. Uma das limitações destes programas é o facto de não terem sido concebidos com base em ciência de mudança comportamental. A evidência mostra que os programas de

modificação da prática clínica concebidos com base nos pressupostos teóricos da teoria de mudança comportamental são mais eficazes do que outros que não fazem uso de tais pressupostos.

Esta tese aborda estas lacunas na evidência ao estudar as barreiras e facilitadores à implementação da deteção precoce e intervenção breve no consumo de álcool nos Cuidados de Saúde Primários à luz dos pressupostos teóricos da *Behaviour Change Wheel/Theoretical Domains Framework*. Este modelo permite ligar os fatores condicionantes da implementação aos seus domínios e constructos teóricos, o que, por sua vez, permite a identificação das técnicas de modificação comportamental com maior probabilidade de modificar a prática clínica. As técnicas tidas como mais eficazes podem posteriormente ser operacionalizadas num programa coerente visando a modificação da prática clínica.

O objetivo geral desta tese foi investigar como implementar a deteção precoce e intervenção breve no consumo excessivo de álcool nos Cuidados de Saúde Primários mediante resposta a três perguntas de investigação: 1) quais são os fatores condicionantes da implementação da deteção precoce e intervenção breve no consumo de álcool por médicos e enfermeiros dos Cuidados de Saúde Primários; 2) existe evidência de uma tipologia de médicos de família tendo por base as suas atitudes para com os doentes com consumo excessivo de álcool; e 3) qual o impacto de uma intervenção de modificação da prática clínica concebida com base em pressupostos teóricos de modificação comportamental na implementação da deteção precoce e intervenção breve no consumo de álcool nos Cuidados de Saúde Primários.

Para responder à primeira pergunta foi realizada uma revisão sistemática da literatura nas bases MEDLINE, CINAHL, CENTRAL, and PsycINFO. Dois autores abstraíram os dados e avaliaram a qualidade dos estudos de forma independente. Os resultados foram agrupados tematicamente, estruturados em torno dos fatores identificados, e analisados à luz dos pressupostos teóricos do modelo *Behavioural Change Wheel/Theoretical Domains Framework*. Para responder à segunda pergunta foi realizado um estudo transversal numa amostra aleatória de 234 médicos de família portugueses. Os participantes no estudo responderam a um questionário que recolheu informação sobre aspetos demográficos, prática clínica relacionada com consumos de álcool, conhecimento sobre limites ao consumo de álcool, barreiras e facilitadores à

abordagem aos problemas ligados ao álcool, e atitudes dos médicos de família para com os doentes com consumos excessivos de álcool. As atitudes dos médicos foram medidas através do *Short Alcohol and Alcohol Problems Perception Questionnaire*, e submetidas a análise de *clusters* e regressão logística para identificar a presença de grupos e validar um modelo de predição dos mesmos. Para responder à terceira pergunta foi realizado um estudo experimental aleatorizado e controlado. Foram aleatorizadas seis unidades de saúde para cada um dos braços do estudo: intervenção e controlo (lista de espera). Todos os médicos, enfermeiros e administrativos das unidades de saúde em estudo foram convidados a participar. A intervenção consistiu num programa de formação e apoio à prática clínica, ajustado às barreiras à implementação da deteção precoce e intervenção breve, concebido à luz do modelo de mudança comportamental *Behaviour Change Wheel/Theoretical Domains Framework*, e a partir do qual se escolheram as técnicas de mudança comportamental com maior probabilidade de ultrapassar essas barreiras e alterar a prática clínica.

A revisão da literatura encontrou 84 artigos que faziam menção a pelo menos um fator influenciador da implementação da deteção precoce e intervenção breve no consumo de álcool nos Cuidados de Saúde Primários. A maioria dos estudos (n=49) utilizou uma metodologia quantitativa. Foram abstraídas 660 referências sobre barreiras à implementação, tendo estas sido agrupadas em 47 temas distintos. Os temas mais frequentemente referidos foram: preocupação sobre competências e eficácia para realizar a deteção precoce e intervenção breve; falta de conhecimento específico sobre o consumo de álcool; falta de tempo; falta de materiais; falta de apoio; e atitudes para com o doente com consumos excessivos de álcool. Os 47 temas identificados foram mapeados a pelo menos um dos 14 domínios do modelo *Behavioural Change Wheel/Theoretical Domains Framework*. Os três domínios com maior número de referências foram: “Contexto de Trabalho e Recursos” (n=158); “Crenças sobre Capacidades” (n=134); e “Competências” (n=99).

A análise das atitudes dos médicos de família mostrou a presença de dois grupos distintos, um com atitudes mais positivas (adequação=10,8±1,6; legitimidade=11,8±1,7; motivação=9,8±1,7; satisfação=8,1±1,9, autoestima=9,7±2,1) e outro com atitudes mais negativas (adequação =8,9±1,8; legitimidade=11,0±1,8; motivação=7,8±1,6; satisfação=5,7±2,0; autoestima=6,8±1,7). Foi derivado um modelo

com excelentes propriedades preditivas para determinar o grupo de pertença de cada médico de família (precisão=90,4%; área debaixo da curva=0.96). O modelo foi validado numa amostra independente (precisão=93,6%; área debaixo da curva=0.97). O grupo com atitudes mais positivas tinha mais horas de formação pós-graduada relacionada com problemas ligados ao álcool ($p<0,001$) e sentia-se mais preparado para, e mais eficaz a, aconselhar os doentes a reduzir o consumo de álcool ($p<0,001$). Foi encontrada uma maior percentagem de médicos no grupo com atitudes mais negativas que considerou que os médicos não são capazes de identificar doentes assintomáticos com consumo excessivo de álcool ($p=0,01$) e que considerou que aconselhar estes doentes é uma tarefa difícil ($p=0,005$).

O estudo experimental que testou o novo programa de implementação concebido com base em pressupostos teóricos mostrou que a intervenção aumentou de forma significativa a taxa de rastreio (diferença absoluta intervenção vs. controlo: 21,5%; $p=0,016$) e de forma não significativa a taxa de intervenções breves (diferença absoluta intervenção vs. controlo: 22,0%; $p=0,46$). O programa de implementação mostrou efeitos significativos: na melhoria das atitudes dos profissionais de saúde; na diminuição da importância da maioria das barreiras à prática clínica; e no aumento do seu nível de conhecimento sobre como detetar o consumo de álcool.

Esta tese identificou uma panóplia de potenciais fatores condicionantes da implementação da deteção precoce e intervenção breve no consumo de álcool nos Cuidados de Saúde Primários. O mapeamento das barreiras aos constructos teóricos do modelo *Behavioural Change Wheel/Theoretical Domains Framework* permitiu a seleção das medidas com maior possibilidade de auxiliar na implementação destas boas práticas. Muitas barreiras foram mapeadas a mais do que um domínio do modelo, o que implica que estas barreiras poderão necessitar de uma abordagem multifatorial para serem ultrapassadas.

O programa de implementação testado neste estudo foi eficaz no aumento da taxa de rastreio do consumo de álcool, sendo a sua eficácia sensivelmente o dobro da reportada na literatura. O programa também aumentou a taxa de intervenção breve, ainda que de forma não significativa, com uma diferença absoluta superior em 5% em relação ao reportado na literatura.

Os resultados desta tese poderão servir de base para outras intervenções que tenham como objetivo implementar a detecção precoce e intervenção breve no consumo de álcool nos Cuidados de Saúde Primários, e lançam novas pistas sobre um dilema com mais de 30 anos: quais são as estratégias mais eficazes para implementar estas boas práticas nos Cuidados de Saúde Primários.

CHAPTER 1

GENERAL INTRODUCTION

1. General Introduction

This thesis focuses on the implementation of screening and brief interventions for excessive alcohol use in primary health care. It presents new evidence on how behaviour change theory can be used to design alcohol-specific implementation programmes and also reviews barriers and facilitators to implementation.

I organized this thesis in six chapters. The first chapter provides the background by presenting a comprehensive review of the problem. The second chapter describes the aims of the thesis. The third chapter contains the results of a systematic review of the literature about the factors influencing the implementation of screening and brief interventions for excessive alcohol consumption in primary health care. The methodological contents of the third chapter are based on the research protocol published in an indexed journal while the results are based on a manuscript that will be submitted for publication. The fourth chapter presents evidence of the existence of two distinct groups of family physicians based on their attitudes towards working with at-risk drinkers and will be based on two papers published on two indexed journals. The fifth chapter provides the results of a cluster randomized controlled trial that tested the efficacy of a behaviour change theory-based programme to implement screening and brief interventions for alcohol use in primary health care. The methodological contents of the fifth chapter are based on the research protocol published in an indexed journal while the results are based on a manuscript that will be submitted for publication. Finally, the sixth chapter contains a general discussion of the findings.

1.1. Alcohol and mankind: a brief historical perspective

Alcohol is a toxic substance. As such, it may be puzzling why references to humans drinking alcoholic beverages can be found since the dawn of mankind and why humans possess the ability to metabolize alcohol. This section provides a brief explanation of these riddles. The main form of alcohol consumed by humans is ethanol. Therefore, alcohol will herein be used interchangeably with ethanol.

1.1.1. Alcoholic beverages: when, where and how did humans start producing it?

Humans started drinking and producing alcoholic beverages millennia ago. In Europe, archaeologists found Stone Age jugs from the Neolithic period (c. 10000 BC) in *Göbekli*

Tepe, Turkey, which is thought to have been used to intentionally produce beer from fermented grains¹. Through chemical analysis, researchers found evidence of wine in ancient pottery from *Gadachrilli Gora* and *Shulaveris Gora*, Georgia, dating back to 6000-5800 BC². In Asia, jars from *Jiahu*, China (c. 7000 BC), contained traces of rice wine, which was produced by fermenting rice and grapes³. In other continents, evidence of the development of alcoholic beverages is much more recent. For example, evidence dating to 200 AD shows that the Native American civilizations produced *Pulque*, an alcoholic beverage made from fermented maguey juice⁴. Therefore, we can trace wine and beer production to the dawn of human civilization. Spirits, however, came much later. The first shred of evidence of distilled alcoholic beverages dates from 800 BC, a liquor made by distilling fermented rice and mare milk⁵. Notwithstanding, it is thought that the effective distillation of alcohol was discovered by Abu Musa Jabir ibn Hayyan, an Arabic alchemist who lived in the 8th century after Christ⁵, and introduced in Europe four centuries later.

1.1.2. Why do humans drink alcoholic beverages?

Humans started drinking alcohol in search for its flavour and especially for its mood-lifting effects. The Sumerians (c. 4000 BC – 1950 BC) described the alcohol-induced feeling as “*exhilarated, wonderful, and blissful*”⁶. Over the years, alcohol was also sought by its hypothetical life-extending properties. Arnaud de Villeneuve, a French professor who lived in the 13th century wrote: “*We call it aqua vitae, (...) a water of immortality. (...) It prolongs life, clears away ill humors, revives the heart, and maintains youth*”⁶. As it will be shown later, we now know that alcohol is a toxic substance with no safe threshold.

If alcohol is a toxic substance, why do humans drink it? Simply put: because we can! To understand this, we must go back in time 80 million years. It is thought that, at that time, angiosperm plants started producing fleshy fruits and that these fruits could have been infested by yeast capable of producing alcohol through fermentation⁷. Therefore, primates ingesting these fruits started being exposed to alcohol. Back then, the alcohol dehydrogenases – the enzymes that metabolize alcohol – of our ancestors were quite inefficient. Such an inefficient system leads to the rapid accumulation of acetaldehyde,

whose toxicity causes nausea, headache and other unpleasant symptoms. The amount of alcohol-containing fruit that our ancestors could eat was therefore limited. But approximately 10 million years ago, a single mutation in the alcohol dehydrogenase gene originated a much more efficient enzyme system⁷. This mutation occurred at the same time primates were leaving trees and adopting a more terrestrial lifestyle where fruit fallen from the trees, which was highly fermented due to yeast infection, was easily available. Therefore, a single mutation in primate evolution 10 million years ago could well be responsible for the burden of disease due to alcohol we witness today.

1.2. Alcohol consumption

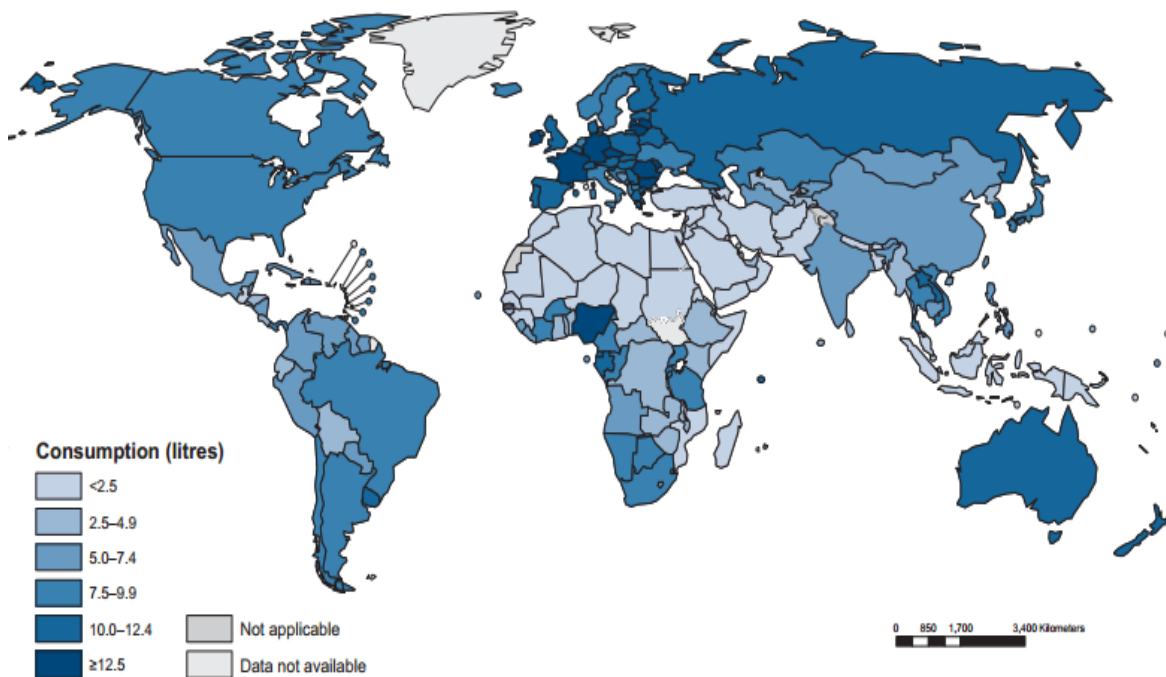
Whilst alcohol is consumed worldwide, striking differences exist in the prevalence of drinkers across continents, and across countries within the same continent. The way people use alcohol is influenced by several factors such as age, gender, socio-economical level, predominant beverage type, religion and alcohol-related policies⁸. For instance, the prevalence of women that abstain from alcohol is higher than the prevalence found in men. One example related to religion could be the low prevalence of alcohol consumption found in Muslim-majority countries. Detailing all these factors and the complex interaction between them in influencing the way people use alcohol would be out of the scope of this thesis. Notwithstanding, two main factors – levels of consumption and patterns of drinking – need to be detailed in order to provide a clear picture of the way people use alcohol.

1.2.1. Levels of consumption

There are several indicators to measure the level of alcohol consumption. One frequently used indicator is the total alcohol per capita consumption (APC). Total APC includes the consumption of both recorded and unrecorded alcohol. Recorded alcohol consumption refers to any alcoholic beverage registered in the official statistics of each country, which includes production, import, export, and sales or taxation data^{8,9}. Unrecorded alcohol consumption refers to alcoholic beverages that are produced, distributed and sold outside government control (for example, homemade or smuggled alcohol)^{8,9}. Total APC is defined as the sum of the recorded and unrecorded amount of

alcohol consumed by people who are 15 years of age or older during a calendar year and is measured in litres of pure alcohol. According to the World Health Organization (WHO), the world total APC in 2016 averaged 6.4 litres (or 13.9 grams of pure alcohol per day). Figure 1 shows a substantial variation in total APC between countries. Total APC measures the average amount of alcohol consumed in the population aged 15 or more. However, this does not reflect the average alcohol consumption of current drinkers as this depends on the prevalence of those who abstain from alcohol (which could be lifetime abstainers or former drinkers). Figure 2 shows the relation between lifetime abstainers, former drinkers and current drinkers per WHO region.

Figure 1. Total alcohol per capita consumption by people who are 15 years of age or older, in litres of pure alcohol, in 2016

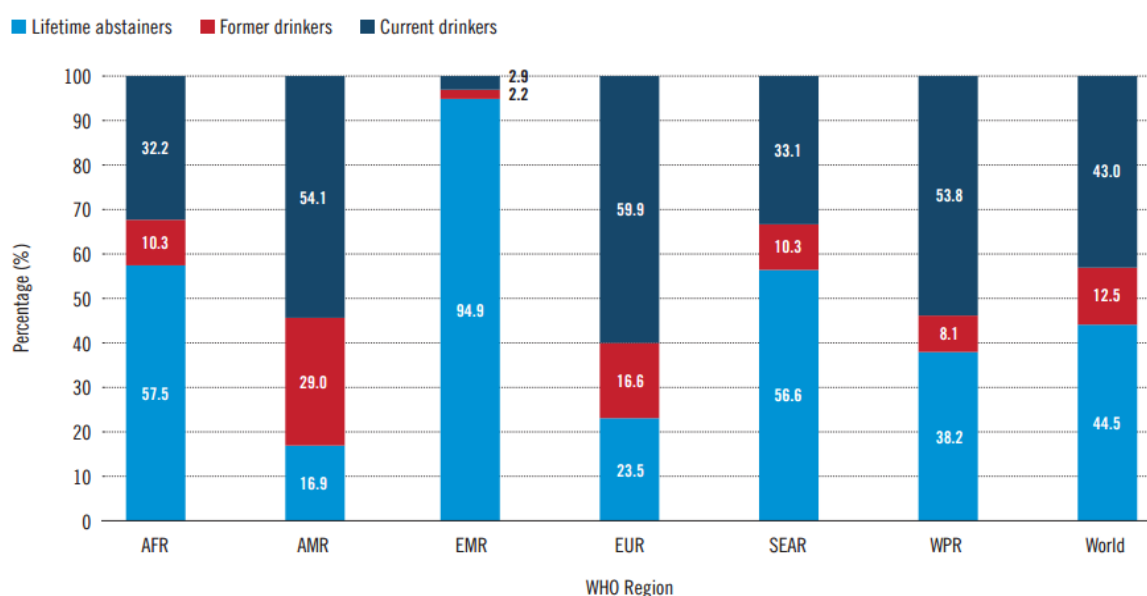


Source: WHO⁸, reprinted with permission.

Although, on average, 44.5% of the world population aged 15 years or more are lifetime abstainers, these figures vary substantially between WHO regions. The lowest percentage of lifetime abstainers are found in the Region of the Americas (16.9%) and in the European Region (23.5%) and the highest in the Eastern Mediterranean Region (94.9%). In respect to current drinkers (defined as those aged 15 or more who have drink alcohol in the previous 12-month period)⁸, the European Region has the highest

percentage with nearly 6 in 10 Europeans being classified into this category; conversely, the Eastern Mediterranean Region has the lowest prevalence with less than 3% being classified as current drinkers. Notwithstanding, the highest total APC among current drinkers is found in the Eastern Mediterranean Region (21.2 litres), followed by the African Region (18.4 litres) and the European Region (17.2 litres)⁸. This means that current drinkers, even from countries in which prevalence is low, are consuming alcohol at a level that puts them at high risk of developing alcohol-related health and social problems.

Figure 2. Percentage of lifetime abstainers, former drinkers and current drinkers per WHO region and the World in 2016



AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region.

Source: WHO⁸, reprinted with permission.

1.2.2. Drinking patterns

The pattern of drinking, i.e. how people use alcohol instead of how much they drink, and also the most consumed beverage type in a particular region, can have a substantial impact on the health outcomes of a given population.

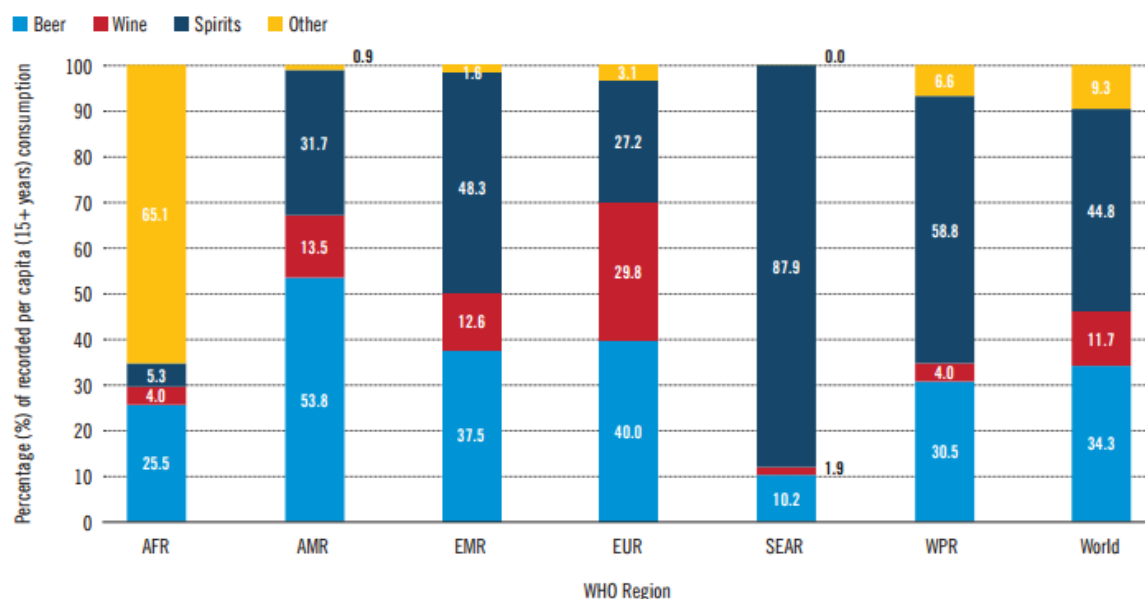
Total APC measures the average amount of alcohol consumed in the population. However, it does not provide a clear picture of how alcohol is being used. Aspects related to frequency (i.e. whether alcohol is being consumed on a regular basis or at specific time points), quantity (i.e. the amount of alcohol ingested per drinking occasion), and circumstances in which alcohol is used (for example, drinking with meals, in public places, or at fiestas) affect the impact of alcohol on health outcomes¹⁰. For example, *"the same overall average volume of alcohol (2 drinks a day) can be consumed in relatively small quantities regularly with meals (e.g., 2 drinks a day with meals) or in large quantities on a few occasions (e.g., two bottles of wine on a single occasion every Friday)"*¹⁰. Although the overall average volume of alcohol is the same in both cases, the former, more regular pattern of drinking (i.e. 2 drinks a day with meals) is associated with a much lower risk than the latter (i.e. 2 bottles of wine on a single occasion every Friday). The latter pattern, also known as heavy episodic ("binge") drinking, is a pattern of drinking associated with several negative health outcomes¹¹, such as unintentional injuries, violence, foetal alcohol spectrum disorders, or digestive cancers¹¹⁻¹³. Although there is no internationally agreed definition¹⁴, the WHO defines heavy episodic drinking as the consumption of 60 or more grams of pure alcohol on at least one single occasion at least once per month⁸. It is estimated that nearly 1 billion people around the world drink heavily. This drinking pattern is typical in many Eastern European countries, in the Russian Federation, and in some African countries (e.g. Angola, Gabon, Congo)⁸. It is also a frequent drinking pattern among young people, who often use alcohol as an aid for having fun, to feel accepted by their peers, or to get drunk^{12,13}. Alcoholic beverages differ not only in flavour but also in their alcohol content. Therefore, the predominant beverage type consumed also influences the total APC⁸. According to the WHO, spirits are the world's most consumed form of alcoholic beverage, accounting for 44.8% of total recorded alcohol, followed by beer (34.3%), and wine (11.7%)⁸ (Figure 3).

Remarkable differences can be found in the distribution of the most consumed alcoholic beverage between regions. For instance, spirits are the most consumed beverage type in the South-East Asia Region and Western Pacific Region, while beer is the most consumed beverage type in the Region of the Americas and the European Region.

1.3. Alcohol and health

Alcohol is a psychoactive substance with dependence-producing properties¹⁵. Alcohol ranks fifth among the leading risk factors for the global health burden, ranking above other well-known risk factors such as obesity, high fasting plasma glucose and physical

Figure 3. Percentage (in %) of recorded alcohol per capita consumption (APC) (15+ years) in the form of beer, wine, spirits and other types of alcoholic beverages by WHO region and the world, 2016



AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region.

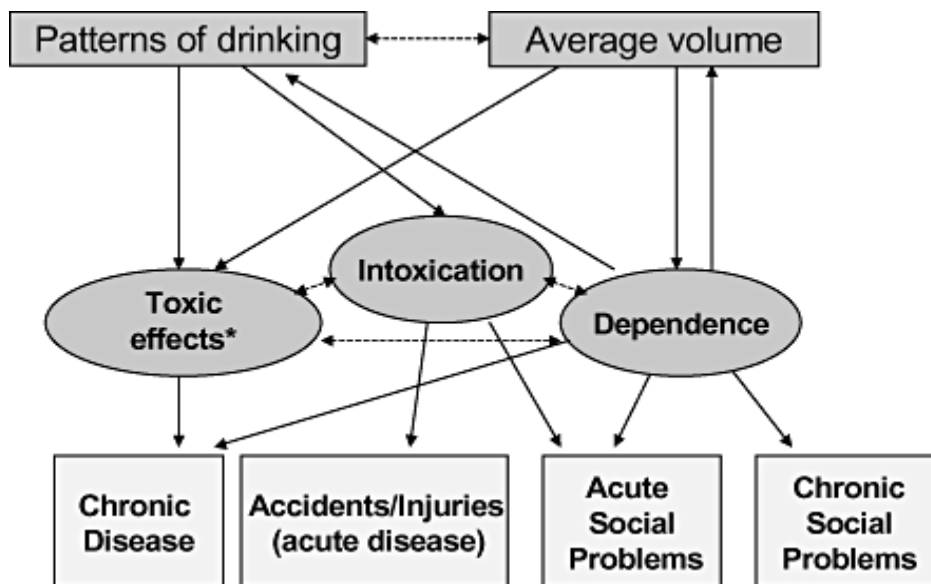
Source: WHO⁸, reprinted with permission.

inactivity¹⁶. Alcohol consumption is linked to more than 200 health conditions¹⁷ and the number is growing. Alcohol can exert its harmful effects on many aspects of human life, ranging from the drinker himself (for example, malignant neoplasms, cardiovascular diseases, digestive diseases, mental disorders) to the drinkers' family (for example, family dysfunction, violence, child abuse) and to society (for example, injuries to others due to traffic accidents, crime, loss of productivity at work)^{18,19}. Alcohol causes more harm to others than to the drinker himself¹⁹. Recent data from the WHO show that, worldwide, an estimated three million people died prematurely in 2016 due to the harmful use of alcohol⁸. This represents 5.3% of all deaths, i.e. around one in every 20 deaths are attributable to alcohol. These figures already take into

account both the detrimental and beneficial health effects of alcohol. Alcohol has a higher impact on mortality than diabetes, HIV/AIDS or hypertension⁸. Alcohol was also responsible for 132.6 million disability-adjusted life years (5.1% of total) in 2016, 107.7 million of which were due to premature mortality⁸. These figures assume dramatic proportions in Europe, where it is estimated that 10.1% of all deaths and 10.8% of all disability-adjusted life years are due to alcohol.

There are three main mechanisms to explain alcohol's ability to cause medical, psychological and social harm: physical toxicity; intoxication; and dependence²⁰ (Figure 4).

Figure 4. Relationships among alcohol consumption, mediating factors and alcohol-related consequences.



Source: Babor et al.²⁰, reprinted with permission

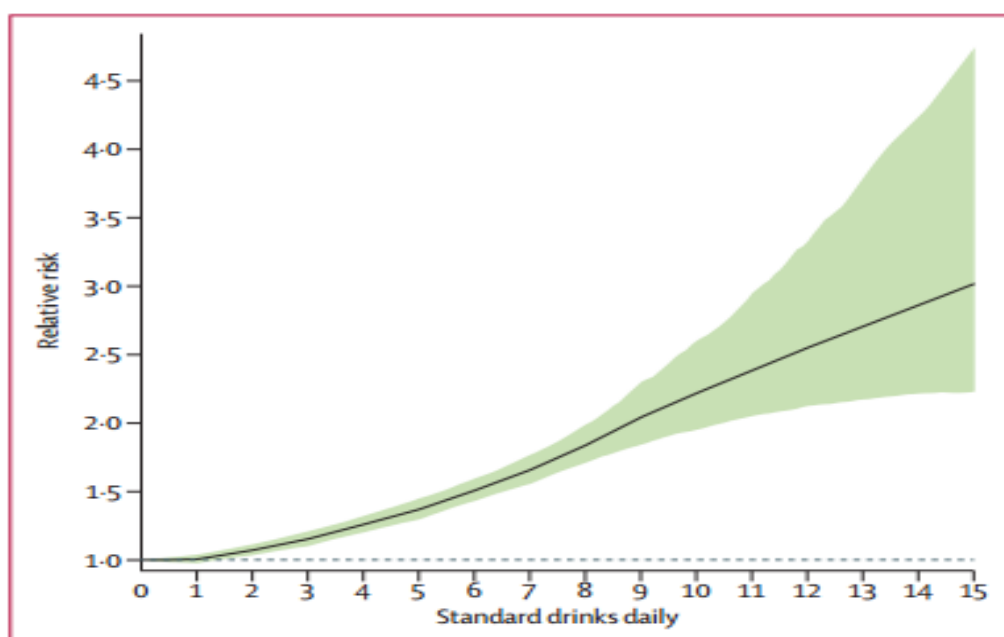
Physical toxicity: those who frequently consume high quantities of alcoholic beverages are at high risk for developing chronic diseases, such as cancer, liver cirrhosis, pancreatitis, type II diabetes, osteoporosis, depression, anxiety, cognitive impairment, hypertension, stroke, and cardiac arrhythmias¹⁸. The molecular pathways by which alcohol causes such diseases are complex and vary greatly according to the organ being affected. A good example of this complexity is the mechanisms by which alcohol causes cancer. Alcohol was classified in 1988 as a group 1 carcinogen by the International Agency for Research on Cancer²¹, a category only used by this agency when there is

sufficient evidence of carcinogenicity in humans. Since then, evidence linking alcohol to cancer has increased substantially^{22,23}. Alcohol acts directly on liver cells through the production of reactive oxygen species, which can lead to liver cirrhosis and hepatocellular carcinoma²⁴. Alcohol also increases the risk of breast cancer, probably by increasing the levels of circulating estrogens. Acetaldehyde, the first metabolite of the metabolism of alcohol, is also a group 1 carcinogen²¹. Acetaldehyde interferes with DNA to cause breaks in the DNA double-strand that lead to deletions and rearrangements during the repair process^{23,24} which in turn can lead to cancer. Acetaldehyde is thought to be associated with neoplasms of the upper and lower gastrointestinal tract, such as oropharyngeal cancer and colorectal carcinoma.

Alcohol has also been linked to having a few protective effects, the most publicized one being cardiovascular protection with moderate use of alcohol. In 1981, Richard and colleagues formulated the so-called “French paradox”²⁵, after having observed that people in France presented low coronary heart disease mortality rates despite having a diet that was rich in saturated fat. Ten years later, Renaud and Lorgeril conducted a regression analysis and found an inverse association between the mortality rate from coronary heart disease and consumption of wine²⁶. The authors concluded that the “French paradox” could be explained by the high consumption of wine. Since then, a swarm of studies were published associating moderate alcohol intake to cardiovascular protection which led many health professionals to actually recommend their patients to drink alcoholic beverages²⁷ in order to improve their health^{28,29}. Notwithstanding, the quality of the evidence supporting this claim is highly contested^{30,31}. For instance, many of these studies are observational and their conclusions are based on correlational analysis. There are two main limitations to such studies: firstly, no causal effect can be established between exposure and disease; and secondly, they are limited in their ability to control for confounding factors. One study found that, of 30 potential confounders for ischemic heart disease, 27 (90%) were more prevalent among abstainers than among moderate drinkers³². Furthermore, variations in the definition of what is considered an abstainer (the usual comparator group) across the studies contribute to confounding in these studies. Fillmore and colleagues reported that the evidence in favour of ischemic heart disease protection was limited when former and occasional drinkers are excluded from the abstainer category³³. Other methodological limitations have been found that could have biased

the results^{34,35}. A meta-analysis published in 2016 found no significant reduction in mortality risk for moderate drinkers after adjusting for abstainer biases and quality-related study characteristics³⁶. Finally, a recently published meta-analysis found that the level of alcohol consumption that minimizes health loss is zero (Figure 5)³⁴ even after accounting for the supposed cardiovascular protective effects of alcohol. Alcohol-related harm increases exponentially with the level of consumption³⁷. Therefore, even small reductions can have substantial effects on population health outcomes.

Figure 5. Relative risk of alcohol for all attributable causes, by daily intake of standard drinks.



Source: Griswold et al.³⁴, reprinted with permission

In light of the most recent evidence, no safe threshold can be established concerning alcoholic beverages; recommendations in favour of moderate consumption should, therefore, be abandoned.

Intoxication: heavy episodic drinking, also known as binge drinking, leads frequently to intoxication, which in turn is associated with acute diseases and conditions, such as car accidents and violence. Knowing how alcohol interacts with the central nervous system is key for understating the link between alcohol and acute diseases. Alcohol is a small molecule that easily crosses the blood-brain membrane barrier. Alcohol interacts with neurons in several ways. For example, alcohol disrupts the excitatory effects of glutamate by inhibiting the function of glutamate receptors³⁸. Alcohol also interacts with gamma-aminobutyric acid (GABA) receptors, enhancing the inhibitory

effects of the GABA neurotransmitter³⁹. These effects contribute to the inhibitory effects of alcohol in the brain. Initially, alcohol inhibits the cerebral cortex where the behavioural inhibition centres are located. This makes socializing easier for some people but it also facilitates people to engage in altercations and violence. At the same time, alcohol slows down the processing of information from the senses, such as the eyes and ears. This leads to impaired reaction time, planning and thought processes, which increases the chances of accidents. With increasing blood alcohol concentrations, other parts of the brain start being affected, such as the cerebellum or the medulla, where several key control centres are located (for example, the respiratory centre). Inhibition of these centres can lead to stupor, coma, respiratory depression and, ultimately, death.

Alcohol Dependence: in 1849, the physician Magnus Huss introduced the term “alcoholic” to describe an individual with alcohol dependence⁴⁰. Alcohol dependence is defined as a set of physical, behavioural and cognitive symptoms in which alcohol consumption takes on a much higher priority for the individual than prior behaviours that once had greater value⁴¹. The term “alcoholic” soon gave rise to the term “alcoholism”, coined by the same Magnus Huss in 1852, to mean what now we would call “alcohol poisoning”⁴². Over time, the term “alcoholism” started being used interchangeably with alcohol dependence and alcohol abuse. Due to the inexactness of the term, the WHO advise abandoning the term in favour of “alcohol dependence”¹⁸. The mechanisms by which alcohol causes dependence are not fully understood. As mentioned above, alcohol inhibits the function of glutamate receptors³⁸. Blockage of one of these receptors, the N-methyl-D-aspartate (NMDA) receptor, leads to the release of dopamine in the *nucleus accumbens*. Dopamine is a key element in identifying natural rewards and in the unconscious memorization of signs associated with these rewards. The *nucleus accumbens* plays a central role in the reward circuit and communicates with other centres in the brain involved in the mechanisms of pleasure. Chronic exposure to alcohol over time can disrupt the normal regulation of these mechanisms, driving the individual to repeat the drinking behaviour. For some individuals, this drive goes beyond their control to a point at which alcohol dependence, whether psychological or physical, ensues. Notwithstanding, not all drinkers develop alcohol dependence. Genetic, physiological and environmental factors mediate the path towards alcohol dependence. For example, genetic polymorphisms comprising several

neurotransmitter pathways (which include the dopaminergic, serotonergic, GABAergic and glutamatergic systems) factor into the individual's predisposition to dependence⁴⁰. Alcohol can induce changes in the regulation of gene expression. These changes, designated as epigenetic modifications, can occur, for example, via DNA methylation and histone modification⁴⁰. Recent research found alcohol-induced epigenetic changes in the human brain that could lead to alcohol dependence^{43,44}. There are two main clinical features of alcohol dependence: tolerance and withdrawal⁴⁵. Sustained alcohol intake can lead to a reduced neurotransmitter response, which in turn leads the individual to increase its alcohol intake in search of the same effect (tolerance). The sudden removal of the stimuli, such as abrupt abstinence, may produce a rebound effect (withdrawal). The initial symptoms of withdrawal are due to hyperactivity of the nervous autonomic system resulting in restlessness, fine tremor, tachycardia, sweating, nausea and vomiting⁴⁶. One in ten individuals may experience tonic-clonic seizures. If left untreated, withdrawal seizures may progress to *delirium tremens*⁴⁶, a potentially life-threatening condition. Alcohol dependence is linked to both acute and chronic diseases and conditions, which includes social problems.

1.4. Alcohol control policies

Restrictions to alcohol consumption started being imposed millennia ago. For instance, regulations on the price of wine can be found in the ancient Code of Hammurabi (c. 2250 BC)⁴⁷. However, over the years, it became clear that alcohol control policies are difficult to implement. Marketing and lobbying from the alcohol industry shaped the drinking culture in many countries, which included attempts to influence policy^{48,49}. Until the 1970s, the focus was on alcohol dependence which affected a relatively small part of the population. However, most of the harm related to alcohol was attributable to a group of people drinking excessive amounts of alcohol but who did not meet the criteria for dependence. In 1975, a new era on alcohol control policies ensued thanks to the report of Bruun and colleagues⁵⁰. The report led to the development of a new public health model for alcohol in which the risk associated with the consumption of alcohol started being viewed as a *continuum* of risk at the population level and not only associated with alcohol dependence. The focus started, therefore, to change from

alcohol dependence to hazardous and harmful use of alcohol, and to the responses that could be given to them. Hazardous alcohol use is a level of alcohol consumption or a pattern of drinking that increases the risk of harm if current drinking habits persist^{18,51}. Harmful alcohol use is a pattern of drinking that is already causing damage to health (either physical or mental, although sometimes social consequences are included)^{18,51}. Since the report from Bruun and colleagues, several measures have been proposed, covering a range of areas. The following were recently considered the “5 best buys” by the WHO, which led to the launch of the SAFER initiative⁵²: 1) Strengthen restrictions on alcohol availability; 2) Advance & enforce drink driving counter-measures; 3) Facilitate access to screening, brief interventions & treatment; 4) Enforce bans/comprehensive restrictions on alcohol advertising, sponsorship and promotion; 5) Raise prices on alcohol through excise taxes & pricing policies. Recent developments on the implementation of these measures show that improvements in health outcomes shortly follow. For instance, Lithuania was in 2016 the country with the highest total APC in the European region. In the same year, the Lithuanian government boldly passed several legislative measures linked to the above mentioned “5 best buys”⁵³. Since the introduction of these measures, Lithuania lost the pole position in the European total APC ranking⁵⁴. This reduction in the total APC was accompanied by reductions in hospitalizations due to toxic effects of alcohol, mental illness caused by alcohol and alcohol psychosis, suicides, number of deadly traffic accidents, and workplace accidents⁵⁴. Conversely, liberalization of alcohol control policies in Finland in 2017 was followed by a 200% increase in sales of strong beer and ciders over the first seven months of 2018, accompanied by a formidable rise in the number of police interventions and by a 65% increase of assaults/violence between 5am and 6am when compared with the previous year⁵⁵.

1.5. Alcohol Screening and Brief Interventions

Among the “5 best buys” recently endorsed by WHO in the SAFER initiative⁵² to change drinking behaviour is the provision of screening and brief interventions for people with hazardous and harmful drinking. These concepts started to emerge after the above-mentioned report by Bruun and colleagues in 1975⁵⁰. Back then, alcohol drinking was inflicting considerable health and social costs to individuals, families and national

economies⁵⁶. Intervention for alcohol problems was still focused on treating alcohol dependence despite the general dissatisfaction with treatment options that were available. Therefore, there was a need to detect hazardous and harmful alcohol consumption before the appearance of irreversible health and social consequences, and to invest in cost-effective strategies that could be implemented in primary health care.

1.5.1. Screening

Screening for alcohol consumption refers to the use of a test to estimate the probability of unrecognized risky drinking in individuals without signs or symptoms of an alcohol-related problem. There are several methods available to identify at-risk drinkers:

a. Quantity-frequency (Q-F) questions. This requires patients to summarize the amount of alcohol they consume and the frequency with which they drink¹⁸. Q-F questions are easy and quick to ask, making them a popular screening method. However, Q-F questions have important limitations that impact the ability to detect at-risk drinkers⁵⁷. For instance, they tend to describe the most common rather than the average behaviour. Q-F questions also have limitations in measuring the within-patient variability in drinking patterns¹⁸;

b. Screening Instruments. There is a range of screening instruments available for detecting at-risk drinkers¹⁸. Two examples of commonly used screening tests are the Cut down on drinking, Annoyed by criticism, Guilty feelings, and Eye-opener (CAGE) questionnaire and the Michigan Alcoholism Screening Test (MAST). However, these screening tools were designed to screen for alcohol abuse and alcohol dependence and were found to have low sensitivity to identify less severe alcohol problems⁵⁷. The Alcohol Use Disorders Identification Test (AUDIT) was developed by the WHO to screen for individuals along the *continuum* of risk, i.e. from abstinence to alcohol dependence. In the early 1980s, several questionnaires were available for the detection of alcohol abuse and dependence, including the MAST and the CAGE, but none for detecting those with hazardous or harmful drinking^{56,58}. The phase I of the “WHO collaborative project on the identification and treatment of persons with harmful alcohol consumption” aimed to fill this gap with the development and validation of a

new screening instrument, later on known as the AUDIT⁵⁸. Since its publication in 1993, the AUDIT has been extensively researched to determine its performance to screen for alcohol problems^{57,59,60}. Although some heterogeneity exists concerning its diagnostic performance⁵⁹, the AUDIT has been found to perform equally well or even better than other screening instruments¹⁸, especially in primary health care settings. In a recent meta-analysis, AUDIT screening scores were associated with mortality risk⁶¹. Several clinical guidelines recommend using the AUDIT to detect individuals with alcohol-related problems^{18,62-65};

c. Clinical indicators. Clinical strategies for detecting alcohol use include clinical judgement and laboratory values (for example, liver enzymes such as γ -glutamyl transferase and aminotransferases, mean corpuscular volume, carbohydrate-deficient transferrin). Evidence shows that the use of these clinical indicators, either isolated or in combination, is outperformed by the use of screening instruments such as the AUDIT and cannot, therefore, be recommended for screening^{18,57}.

1.5.2. Brief Interventions

Brief interventions are a range of '*psychosocial interventions designed to help recipients recognize harmful patterns of substance use and to motivate and support them to address that use*'⁶⁶ ranging from 5 to 30 min, traditionally delivered face to face. Brief interventions are known by many different names in the literature, such as brief intervention, brief advice, brief motivational interviewing, brief lifestyle counselling, and health behaviour change counselling. '*The term brief interventions is, therefore, best seen as an umbrella term encompassing a wide range of interventions that fit within the broad definitions given above*'⁵¹. The first brief intervention trial took place in 1957, led by Morris Chafetz and colleagues at the Massachusetts General Hospital in Boston⁶⁷. The trial aimed to investigate the adequacy of existing emergency room care for alcoholics and found a positive effect of brief interventions in motivating patients to attend an out-patient alcohol clinic over a 12-month period. Around 20 years later the first primary care brief intervention trial for any health-related behaviour took place, led by Michael Russell and colleagues. The trial showed a significant effect of general practitioner-delivered brief intervention in motivating smokers to quit⁶⁸. Since then, a range of trials was carried out to investigate the efficacy of alcohol brief interventions

in primary care settings. Several systematic reviews and meta-analysis of these trials found brief interventions to be effective in reducing hazardous and harmful alcohol consumption⁶⁹⁻⁷² but not alcohol dependence⁷³. Brief interventions are effective in both men and women^{71,72,74} of any age, including older people^{75,76} and adolescents^{77,78}, although the evidence is weaker concerning the latter. Brief alcohol interventions are among the most effective and cost-effective services in primary care. Two meta-analyses found the number needed to treat (the number of hazardous and harmful drinkers that need to receive a brief intervention for one to reduce drinking to low-risk levels) to vary between 6 and 12^{69,79}. Several cost-effectiveness analysis showed alcohol brief interventions to be cost-effective⁸⁰⁻⁸²; in some European countries it may even be cost-saving⁸⁰. Finally, brief interventions save lives. One meta-analysis found that, compared to a control group, brief interventions prevented one in three deaths amongst problem drinkers⁸³. The number needed to treat was 282, which means that 282 drinkers need to receive advice to prevent one death within one year. Therefore, several clinical guidelines recommend the use of brief interventions at the primary health care level for reducing hazardous and harmful alcohol consumption^{18,62-65}.

Recently, some researchers have questioned the evidence supporting the effectiveness and even the efficacy of brief interventions to prevent harm from alcohol use^{84,85}. They argue that the outcome in almost all trials is the self-reported alcohol consumption rather than alcohol-related morbidity or mortality problems and that self-reported outcomes are vulnerable to social desirability bias. Furthermore, researchers are yet to discover which brief intervention techniques are most associated with improved outcomes. Notwithstanding these recent discussions on the efficacy/effectiveness of brief interventions, evidence undoubtedly shows that alcohol consumption is a leading risk factor for more than 200 diseases and health conditions^{37,86}, and that few of the at-risk drinkers currently receive any alcohol-related advice when visiting primary care^{28,87-89}. They are, therefore, denied the opportunity to understand the risks and make an informed decision about whether or not to cut down, which is against the modern ideal of a consumer society that postulates that well-informed consumers are more likely to behave in accordance to advice from official or professional sources³⁷. In short, more research is needed on the efficacy and effectiveness of brief interventions in reducing alcohol-related harm. For the time being, brief interventions are the best evidence-based interventions that can be offered to at-risk drinkers and

until something better sprouts from research, delivering brief interventions in primary health care still makes sense.

1.6. Challenges for implementing the use of screening and brief interventions in the Primary Health Care setting

General practice has been charged with the task of implementing screening and brief intervention programmes to reduce the risk of alcohol-related harm⁹⁰. Several of the characteristics of general practice make this the ideal setting for implementing screening and brief interventions. Firstly, general practice has a high level of access to the population^{91,92}. Secondly, patients return regularly for follow-up appointments⁹³. Thirdly, excessive drinkers represent, on average, a fifth of patients on practice lists and present twice as often as others^{90,92}. Finally, patients build long-term relationships with their general practitioner for whom they have a high level of respect⁹². Furthermore, both general practitioners and primary care nurses strongly support early intervention for alcohol problems^{92,94,95}. Notwithstanding, implementation of alcohol screening and brief interventions is low: health professionals often fail to identify and/or advise patients concerning their use of alcohol^{87,95-103}. A recent study estimated that prior to intervention only 5.9% of patients consulting a primary health care provider were screened for their alcohol consumption and that only 3% of patients who might benefit from brief advice actually received it¹⁷. Whilst the majority of both general practitioners and primary care nurses agree that general practice is an appropriate setting for delivering brief interventions for alcohol¹⁰³⁻¹⁰⁷, they also cite a horde of barriers to implementation¹⁰⁸. To date, only one study, published in 2010, provided a review of the barriers and facilitators for implementing alcohol screening and brief interventions¹⁰⁸. The review reported on 47 articles focusing on different healthcare settings. Lack of resources, workload, and absence of training and support from management were the main barriers to implementation. Adequate resources, training and the identification of those at risk without stereotyping were pointed as the main facilitators. The authors came to these conclusions after giving priority to studies judged to best inform the UK practice, and after considering settings other than primary health care, such as emergency care, secondary care and probation centres. This means that the barriers and facilitators identified in this review are specific of the UK practice and may not be representative of the barriers and facilitators in other

countries. Furthermore, by including several settings, the barriers and facilitators are also not specific of the primary health care setting. A more comprehensive review is needed that identifies the factors influencing primary health care providers' routine delivery of alcohol screening and brief interventions. Such a review could be useful in helping researchers throughout the world in selecting the barriers and facilitators to implementation that are meaningful locally. Therefore, one of the aims of this thesis is to systematically review the factors that influence the implementation of alcohol screening and brief interventions in the primary health care setting (Chapter 3).

One extensively addressed barrier for implementing alcohol screening and brief interventions in primary health care is the attitudes of health care providers towards excessive drinkers. A seminal work for understanding how attitudes towards at-risk drinkers influence practice is the Maudsley Alcohol Pilot Project, which started in 1973¹⁰⁹. As mentioned in section 1.4, the time this project occurred coincided with an era when the problems related to alcohol and the responses that could be given to them started being regarded more broadly. It was a tenet of the project the recognition that community agents find 'alcohol a difficult business' and that more insight was needed concerning the reasons why they find it difficult and what could be done about it. The project, therefore, aimed to make practical recommendations to improve the responses to alcohol problems¹⁰⁹. To attain this, researchers in the Maudsley Alcohol Pilot Project used the Alcohol and Alcohol Problems Perception Questionnaire (AAPPQ)¹⁰⁹, a self-completion instrument that measures the therapeutic attitudes of health providers towards problem drinkers¹¹⁰. The AAPPQ is a composite measure divided into five subscales: 1) motivation to work with drinkers; 2) expectation of work satisfaction in working with drinkers; 3) feelings about the adequacy of their knowledge and skills in working with drinkers; 4) feelings of legitimacy in working with drinkers; and 5) task-specific self-esteem. The AAPPQ scale comprises 30 statements with which the respondent is asked to indicate the extent of agreement on a 7-point scale ranging from 'strongly agree' to 'strongly disagree'. An overall attitude score can be calculated by adding the scores of the five subscales. Using the AAPPQ, researchers in the Maudsley Alcohol Pilot Project found that health providers failed to recognize and respond to problem drinkers because: 1) they felt not having the knowledge and skills to identify and advise problem drinkers (role adequacy); 2) they felt unsure whether or to what extent addressing problem drinkers was part of their job (role legitimacy); and 3) they

felt there would be no one that could help them when they were unsure whether or how to respond¹⁰⁹. The project proposed that providing training and support to primary health care providers was key to improve their attitudes towards drinkers, which in turn would lead to more screening and brief intervention activity¹¹¹. This set the tone for the research developed over the next decades in that training and support were regarded as two fundamental pillars for implementing alcohol screening and brief interventions in the primary health care setting. In 1987, Anderson and Clement derived a shortened version of the AAPPQ (the short AAPPQ or SAAPPQ) on the basis that the willingness of general practitioners to participate in research was low and having to respond to a 30 item questionnaire could appear aversive to the participant¹¹². Using factor analysis, the authors derived the SAAPPQ, an instrument that retained the 5 original subscales from the AAPPQ mentioned above but with only two statements in each subscale. The authors suggested that the new 10-item questionnaire *“is a more simple and useful measure of general practitioner’s attitudes to working with patients with alcohol problems”*¹¹². The SAAPPQ soon became one of the most used instruments in research for analysing how health providers’ attitudes towards problem drinkers influenced the implementation of alcohol screening and brief interventions^{28,29,89,111,113-121}. A number of studies using the AAPPQ, the SAAPPQ, or other methods for assessing primary health care providers’ attitudes towards at-risk drinkers, show that providers’ attitudes modulate their responses to excessive drinkers: health providers with more positive attitudes report managing more patients with alcohol problems^{111-114,116,122-124}; health providers with more stigmatizing attitudes towards drinkers are less prone to implement alcohol-related preventive care¹²⁴. Furthermore, data collected from the Phase III of a WHO collaborative study show that health providers’ attitudes also moderate the impact that training and support can have on the implementation of screening and brief interventions in clinical practice¹¹³. In this study, training and support increased the implementation of screening and brief interventions for general practitioners who already had more positive attitudes in working with drinkers but not for those who had more negative attitudes. Moreover, training and support actually deteriorated the attitudes of general practitioners with more negative attitudes¹¹³. This suggests the existence of two groups of general practitioners with distinct attitudes towards working with at-risk drinkers. However, this hypothesis has never been proven. The identification of

distinct groups of general practitioners could be useful to better understand the effects that training and support programmes have on the attitudes of general practitioners towards patients with excessive alcohol consumption. Therefore, another aim of this thesis is to investigate whether or not a typology of general practitioners exists based on their attitudes towards at-risk drinkers (Chapter 4).

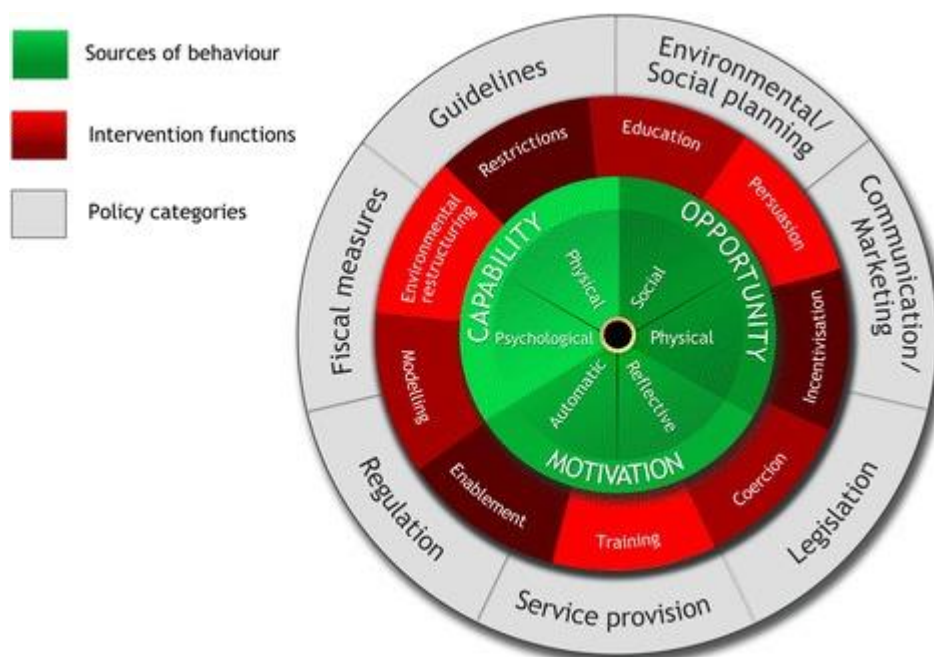
As so elegantly put by O'Donnell and colleagues, "*today's challenge is more about how to encourage the uptake and use of brief alcohol interventions in routine practice, and less about financing additional research on its effectiveness*"⁹⁰. Several trials were conducted to investigate how to best implement screening and brief interventions for excessive use of alcohol in general practice^{121,125-132}. One meta-analysis by Anderson and colleagues, published in 2004, compared the effect of several interventions to engage primary health care providers in screening for and giving advice about hazardous and harmful alcohol consumption¹³³. The study found a non-significant absolute increase of 11% in the screening rates and 17% in the brief intervention rates in the intervention group. Notwithstanding, the study found that alcohol-specific programmes have a significantly higher impact on implementation success when compared with more general prevention programmes in which alcohol was included¹³³. The same study also found evidence in favour of multicomponent programmes (i.e., programmes that included more than one type of education-based intervention or more than one type of office-based intervention or a combination of education- and office-based interventions) compared to single component programmes¹³³. The results from the above-mentioned review suggest the need to design alcohol-specific, multicomponent programmes that simultaneously address several barriers to the implementation of screening and brief interventions for hazardous and harmful alcohol use for increasing the chances of a successful implementation. Another meta-analysis by Keurhorst and colleagues, published in 2015, analysed the impact of strategies employed in randomized controlled trials to increase primary care providers' uptake of alcohol screening and brief interventions¹³⁴. The authors divided the strategies used into professional- (e.g. educational meetings, educational outreach, audit and feedback), patient- (e.g. printed educational materials) and organizational-orientated strategies (e.g. counselling by telephone, changes in medical record systems). The study found that, despite the considerable efforts undertaken in these trials, overall, implementation of alcohol

screening and brief interventions remained low¹³⁴. However, studies that combined provider and patient implementation strategies had a significantly higher impact on the screening and brief intervention activity. The authors of this meta-analysis concluded that their study confirms that multi-component programmes are the most promising implementation strategies¹³⁴. With the notable exception of a recently published trial protocol by Abidi and colleagues¹³⁵, a limitation of the implementation programmes included in both the Anderson et al and Keurhorst et al meta-analysis, and in other trials conducted afterwards^{17,115,136} is that they lack a theoretical rationale for how they would change practitioner behaviour.

Changing ingrained behaviour can be difficult. Evidence shows that the chances for changing a particular behaviour can be increased by applying evidence-based principles of behaviour change theory in the design of interventions¹³⁷⁻¹³⁹. Theory in this context refers to the current knowledge of the mechanisms of action (mediators) and moderators of behaviour change as well as the a priori assumptions about what human behaviour is, and what the influences on it are¹⁴⁰. These theoretical principles make the backbone of many theories of behaviour change and their use is recommended as a crucial step in the design and evaluation of interventions and in evidence synthesis by the UK Medical Research Council's guidance for developing and evaluating complex interventions¹⁴¹ and by the Portuguese National Programme on screening and brief interventions for excessive alcohol consumption in primary health care¹⁴². There are several reasons by which theory is recommended in designing behaviour change initiatives¹⁴⁰. Firstly, theory provides a mean for the proper identification of the antecedents of behaviour and the causal determinants of change. Secondly, it provides a rationale for selecting the most appropriate behaviour change techniques towards the causal determinants of change. Thirdly, theory allows for an investigation of the theoretically identified mechanisms of action (mediators) in order to gain further understanding as to how the investigation brings about its effects. This means that the use of theory allows researchers to determine whether unsuccessful interventions failed because the intervention had no effect upon the mediator or because the successfully influenced mediator had no effect upon the behaviour. Fourthly, theory summarizes the cumulative knowledge of how to change behaviour across different populations and contexts. Finally, theory-based interventions provide an opportunity in which theory can be tested. Notwithstanding, theory is seldom used

in designing and evaluating implementation interventions¹⁴³. Even when interventions are said to be guided by theory, often they are not or are only minimally¹⁴⁴. A systematic review of the use of theory in the design and implementation strategies found that only 22.5% of the studies retrieved used theories of behaviour change¹⁴⁵. Designing interventions based on intuition diminishes not only the chances of success but also the possibility of understanding the mechanisms of behaviour change underlying effective interventions and its reproducibility for future interventions¹⁴³. There are many theories of behaviour change, though with considerable overlap between them, and striking differences in terminology, definitions and key constructs¹⁴⁶⁻¹⁴⁸. To overcome these problems, a plethora of frameworks were created for classifying behaviour change interventions^{146,149-151}, including the Behaviour Change Wheel (BCW). The BCW (Figure 6) emerged recently as a comprehensive and coherent framework for designing interventions. Since its publication in 2011, the BCW has been vastly used to investigate how to change healthcare providers' and patients' behaviours¹⁵²⁻¹⁶⁴. The BCW consists of three layers. The rim of the wheel comprises seven policy categories which represent the decisions authorities can use to support interventions. The intermediate layer identifies nine intervention functions which are broader categories of means by which an intervention can change behaviour.

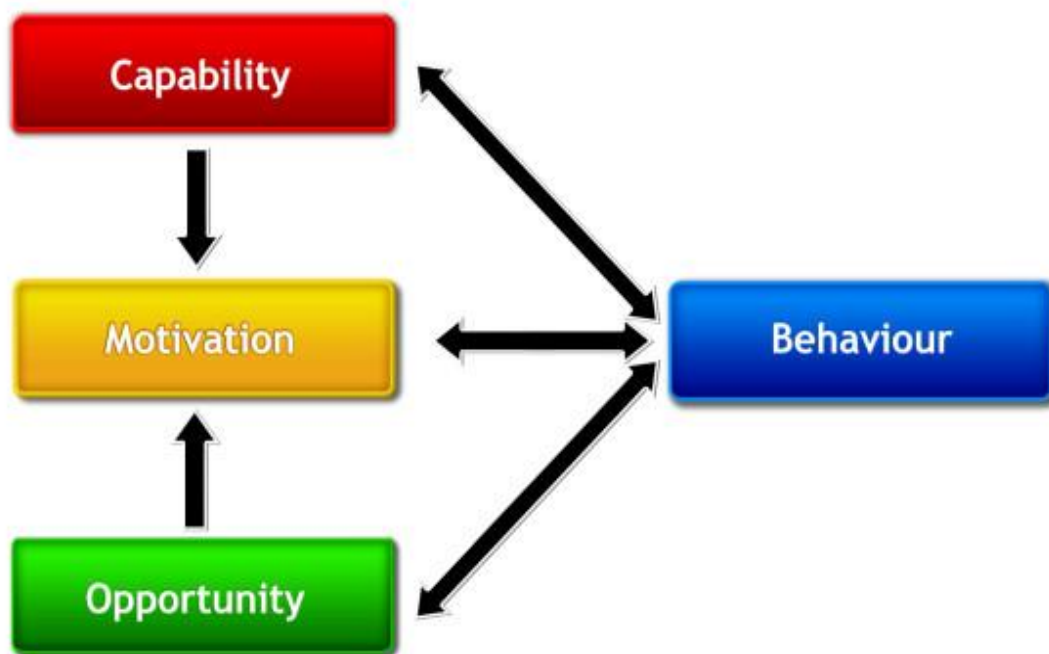
Figure 6. The Behaviour Change Wheel.



Source: Michie et al.¹⁵¹, reprinted with permission

At the core of the wheel (inner layer) is a 'behaviour system' involving three essential conditions: capability, opportunity, and motivation (the COM-B system, Figure 7).

Figure 7. The COM-B system.



Source: Michie et al.¹⁵¹, reprinted with permission

Capability refers to an individual's physical and psychological capacity (e.g. comprehension, literacy, reasoning) to engage in the activity concerned. It includes having the necessary knowledge and skills to enact the target behaviour. Motivation refers to all the brain processes that energize and direct behaviour. It includes habitual processes, emotional responding, as well as analytical decision-making. Opportunity refers to the factors that lie outside the individual that make behaviour change possible or prompt it. Opportunity can be physical opportunities afforded by the environment in which people live or social opportunity which is affected by the cultural milieu in which we think about things, words we use and concepts that make up our language^{151,161}. The single-headed and double-headed arrows in Figure 7 represent potential influence between components in the system. For example, capability and opportunity can influence motivation; enacting a behaviour can alter capability, motivation, and opportunity¹⁵¹. This model of behaviour provides a basis for designing

interventions aimed at behaviour change. The task would, therefore, be to consider what behaviour needs changing, and which COM components would need to be changed to achieve the target behaviour¹⁵¹. The COM-B system can be further expanded by the Theoretical Domains Framework (TDF – Figure 8)^{143,165}. The TDF has

Figure 8. Mapping of the COM-B system to the TDF domains.

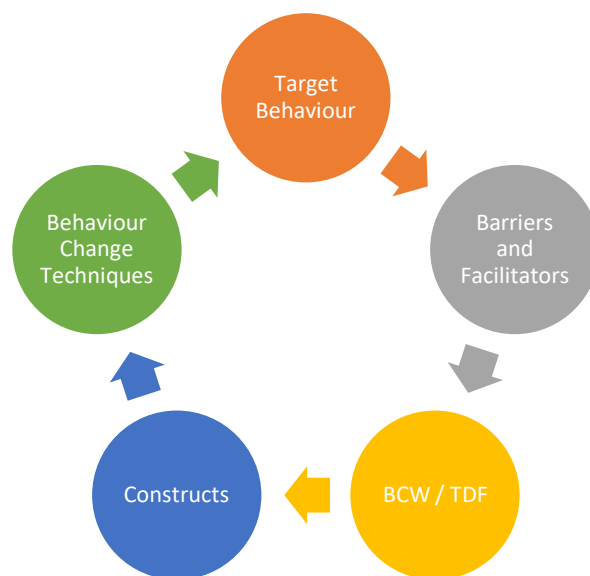
COM-B component		TDF Domain
Capability	Psychological	Knowledge Skills Memory, Attention and Decision Processes Behavioural Regulation
	Physical	Skills
Opportunity	Social	Social Influences
	Physical	Environmental Context and Resources
Motivation	Reflective	Social/Professional Role & Identity Beliefs about Capabilities Optimism Beliefs about Consequences Intentions Goals
	Automatic	Social/Professional Role & Identity Optimism Reinforcement Emotion

Source: Cane et al.¹⁴³, reprinted with permission

also been extensively used by research teams worldwide to explain implementation problems, either alone or in combination with the BCW¹⁶⁶⁻¹⁷⁷. The TDF simplifies and integrates a plethora of behaviour change theories that make theory more accessible to, and usable by, other disciplines^{143,165}. The TDF derives from an analysis of 33 theories of behaviour change and comprises 14 domains consisting of 84 component constructs of behaviour change. The TDF can be used to identify the theoretical constructs linked to the barriers to and facilitators of the behaviour of interest. This, in turn, can be used to select the behaviour change techniques (BCTs) that are more likely to lead to behaviour change. BCTs are the smallest components of an intervention with the potential to change behaviour¹⁷⁸. A behaviour change technique (BCT) taxonomy has been developed to assist in the design of behaviour change interventions and to standardize the reporting of intervention content¹⁷⁹. The taxonomy maps the BCTs to the domains of the TDF, which brings full circle the process of identifying the target

behaviour and selecting the active components of an intervention to change that behaviour (Figure 9). As mentioned above, the vast majority of the trials for

Figure 9. From target behaviour to selecting the BCTs: designing a behavioural intervention using the BCW/TDF framework.



implementing alcohol screening and brief intervention delivery in primary health care practices lacks a theoretical basis in the design of the intervention. This thesis aims to fill this gap in the evidence base. To attain this, the BCW-TDF framework was used in the above mentioned systematic review (Chapter 3) to analyse the barriers and facilitators to implementation of alcohol screening and brief interventions in primary health care. The BCW-TDF framework was further used to inform the conceptualization, development, implementation and evaluation of an intervention to enhance primary care providers' roles in screening for and advising patients with excessive alcohol consumption (Chapter 5). The BCW-TDF was chosen as the underpinning theoretical framework because it is one of the most comprehensive and coherent frameworks available to date. The BCW-TDF was also chosen because its use is recommended by the Portuguese National Programme on screening and brief interventions for excessive alcohol consumption in primary health care¹⁴² to investigate how to best implement alcohol screening and brief interventions in primary health care.

In short, the aims of this thesis will address the above-mentioned gaps in the international database. At a national level, the results of this thesis could be useful to

inform the development of the Portuguese National Programme on screening and brief interventions for excessive alcohol consumption in primary health care.

CHAPTER 2

AIMS OF THE THESIS

The overall aim of this thesis is to investigate how to implement screening and brief interventions for excessive alcohol consumption in primary health care, by addressing three main questions, each with specific objectives:

1. What are the factors influencing general practitioners/family physicians' and primary care nurses' routine delivery of alcohol screening and brief interventions in adults?

Objective 1.1. To identify the barriers to routine delivery of alcohol screening and brief interventions by general practitioners/family physicians and nurses in primary care settings;

Objective 1.2. To identify the facilitators to routine delivery of alcohol screening and brief interventions by general practitioners/family physicians and nurses in primary care settings;

Objective 1.3. To analyse the identified barriers and facilitators with the BCW-TDF framework.

The first question and related objectives are addressed in Chapter 3.

2. Can family physicians be divided into distinct groups based on their attitudes to addressing alcohol issues in their patients?

Objective 2.1. To identify a typology of family physicians based on their attitudes toward patients with excessive alcohol consumption;

Objective 2.2. To develop and validate a model for classifying family physicians into distinct groups;

Objective 2.3. To compare the identified groups regarding demographics, alcohol-related clinical practice, knowledge of sensible drinking limits, and barriers and facilitators to working with patients with excessive alcohol consumption.

The second question and related objectives are addressed in Chapter 4.

3. What is the impact of a theory-driven behaviour change intervention for implementing screening and brief interventions for excessive alcohol consumption in primary health care?

Objective 3.1. To design a theory-based behaviour change intervention for implementing alcohol screening and brief interventions in primary health care;

Objective 3.2. To determine the impact of a theory-based behaviour change intervention in the delivery of alcohol screening;

Objective 3.3. To determine the effect of a theory-based behaviour change intervention in the delivery of alcohol brief interventions;

Objective 3.4. To evaluate the effect of a theory-based behaviour change intervention on the attitudes of family physicians towards patients with excessive alcohol consumption;

Objective 3.5. To investigate the impact of a theory-based behaviour change intervention on the hypothesized mediators/theoretical constructs of the implementation of alcohol screening and brief interventions;

Objective 3.6. To evaluate the impact of a theory-based behaviour change intervention on the family physicians' and nurses' theoretical knowledge to key concepts related to alcohol screening and brief interventions.

The third question and related objectives are addressed in Chapter 5.

The thesis is based on four published papers and two manuscripts, each with its own introduction, methods, results and discussion.

CHAPTER 3

RESULTS

RESEARCH QUESTION 1

RESEARCH QUESTION 1 - What are the factors influencing general practitioners/family physicians' and primary care nurses' routine delivery of alcohol screening and brief interventions in adults?

Objective 1.1. To identify the barriers to routine delivery of alcohol screening and brief interventions by general practitioners/family physicians and nurses in primary care settings;

Objective 1.2. To identify the facilitators to routine delivery of alcohol screening and brief interventions by general practitioners/family physicians and nurses in primary care settings;

Objective 1.3. To analyse the identified barriers and facilitators with the BCW-TDF framework.

Factors influencing the implementation of screening and brief interventions for alcohol use in primary care practices: a systematic review

Frederico Rosário, Maria Inês Santos, Kathryn Angus, Leo Pas, Cristina Ribeiro, Niamh Fitzgerald

Summary

Introduction. Alcohol is a leading risk factor contributing to the global burden of disease. Screening and brief interventions in primary care settings are recommended by national and international agencies as evidence-based reducing alcohol consumption. However, the majority of primary care professionals do not routinely deliver such interventions.

Objective. To identify factors influencing general practitioners/family physicians' and primary care nurses' routine delivery of alcohol screening and brief intervention in adults.

Methods. A systematic literature search was carried out in the following electronic databases: MEDLINE, CINAHL, CENTRAL, and PsycINFO. Two authors independently abstracted data and assessed study quality using the NIH National Heart, Lung, and Blood Institute quality assessment tools for quantitative studies, and the CASP checklist for qualitative studies. A narrative synthesis of the findings is provided, structured around the barriers and facilitators identified. Identified barriers and facilitators were further analysed using the Behavioural Change Wheel/Theoretical Domains Framework.

Results. Eighty-four studies were included. Of these, 49 were quantitative, the majority of which using a cross-sectional design. We extracted 660 data items pertaining to barriers and 253 to facilitators, which were grouped into 47 themes. The themes most commonly reported related to practitioner: beliefs about their ability to deliver SBI and to help patients to cut down (n=62 data items), alcohol-related knowledge (n=58 data items), and time (n=50 data items). All the 47 identified themes mapped to at least one of the three components of the BCW and to at least one of the 14 domains of the TDF. The TDF domains with the highest number of data items coded were: 'Environmental Context and Resources' (n=158); 'Beliefs about Capabilities' (n=134); and 'Skills'

(n=99). The three TDF domains with the lowest number of data items coded were: 'Memory, Attention and Decision Processes' (n=9); 'Behaviour Control' (n=6); and 'Optimism' (n=4).

Conclusions. This study identified a wide range of potential barriers and facilitators to the implementation of alcohol SBI delivery in primary care practices and adds to the scarce body of literature that identifies the barriers and facilitators from a theoretical perspective. Given that alcohol SBI is seldom implemented, this review provides researchers with practical evidence for designing novel theory-oriented interventions to support the implementation of this activity in primary health care.

Introduction

Alcohol misuse is a major risk factor for ill-health and death¹⁶. The World Health Organization estimates alcohol to be accountable for 5.3% of all deaths worldwide and 5.1% of the global burden of disease and injury⁸. The economic impact of alcohol use and related harm alone can reach as much as 3.3% of the gross domestic product⁸⁶, mostly due to productivity losses. Even small reductions in alcohol intake can bring about significant health gains³⁷. For example, a reduction in the daily average consumption of pure alcohol from 40 to 30 grams (from 4 to 3 standard drinks) is associated with a 48% decrease in the risk of oral cancer, and a decrease in the risk of hypertension of 13% in men and 66% in women.

In the past four decades, numerous randomized controlled trials and meta-analyses have found alcohol screening and brief interventions (SBI) in primary care settings to be effective and cost-effective or cost-saving^{69-71,80-83,180}. Alcohol increases the risk of several physical, mental and social conditions that present frequently in primary care^{37,86} and a significant proportion of patients visiting primary care are drinking at least at a hazardous level^{119,181,182}. However, only a few at-risk drinkers are identified as such and counselled to cut down^{28,87-89,183-185}; many leave their primary care appointment unaware of the risks of their alcohol consumption or how it might be contributing to current ill-health. Notwithstanding recent debates questioning SBI effectiveness^{84,186}, denying these patients the chance to make an informed decision about whether or not to cut down is contrary to the prevailing ideal of a consumer society, in which well-informed consumers choose to behave in accordance to advice provided by official or professional sources³⁷.

Although there is a growing literature on barriers to and facilitators of the implementation of alcohol SBI in routine clinical practice, this information is scattered in the literature and does not present a clear picture of the factors affecting primary care providers' systematic engagement with at-risk drinkers. A review by Johnson *et al.* identified the barriers to and facilitators of the delivery of screening and brief intervention for alcohol misuse¹⁰⁸ but prioritized studies judged to best inform UK practice and focused on several different healthcare settings. Lack of training, support from management and resources, as well as workload pressures were identified as the main barriers to implementation; whilst adequate resources, training and the

identification of those at risk without stereotyping were the main facilitators. This review updates the Johnson *et al.* review, employs a more comprehensive search strategy and has an international focus.

Another gap in the evidence base concerning barriers and facilitators for implementing alcohol SBI in routine clinical practice is the lack of theoretical insights in this area¹⁴⁴. Knowledge of how identified barriers and facilitators fit with the theoretical understandings of behaviour change can help in selecting the implementation interventions that have a higher chance of bringing about the desired change in practitioner behaviour. Our review is theoretically informed by the Behaviour Change Wheel (BCW)/Theoretical Domains Framework (TDF) system and aims to identify the theoretical concepts underpinning the barriers and facilitators to implementation. Our intention is to provide researchers with practical evidence for selecting the best-suited strategies to lead to the implementation of alcohol SBI in primary health care.

Objective

This review aims to identify factors influencing general practitioners/family physicians' (GPs) and primary care nurses' routine delivery of alcohol screening and brief interventions in adults. The specific research questions addressed are:

1. What are the barriers to routine delivery of alcohol screening and brief interventions by GPs and nurses in primary care settings?
2. What factors help to facilitate the routine delivery of alcohol screening and brief interventions by GPs and nurses in primary care settings?
3. How do the identified barriers and facilitators map to the BCW/TDF frameworks?

Methods

This review is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement¹⁸⁷. The protocol was pre-registered on PROSPERO (CRD42016052681).

Inclusion and exclusion criteria

Study designs. Studies with abstracts published in a peer-reviewed scientific journal which report primary data were included; studies without abstracts and studies published as conference abstracts were excluded. If more than one publication describing a single study and presenting the same data was found, then only the most recent publication was included. The review included quantitative and qualitative studies. Quantitative studies were included if they are randomized controlled trials, before-after studies with no control group, cohort, case-control, or cross-sectional studies. Qualitative studies were included if they use Delphi methodology, focus groups, in-depth interviews, or semi-structured interviews.

Participants. Studies were included if the participants include GPs or nurses working in primary care practices. "Primary care practices" were defined as follows, adapted from the definition of the American Academy of Family Physicians.¹⁸⁸ Primary care practices typically serve as the patient's first point of entry into the health care system and provide services such as health promotion, disease prevention, health maintenance, counselling, patient education, diagnosis and treatment of acute and chronic illnesses. Primary care practices are generally located in the community of the patients, thereby facilitating access to healthcare. The structure of the primary care practice may include a team of physicians and other health professionals. Studies relating only to medical practitioners other than GPs were excluded. Studies relating only to medical practitioners or nurses not working in primary care practices, or only to other professionals working in primary care were also excluded.

Interventions. The targeted intervention was the implementation of activities aiming to reduce alcohol consumption, conducted in primary care practices, and defined as follows:

- a) early identification/screening of patients who drink at a level deemed to merit intervention as defined by the authors;
- b) brief interventions, defined as one to four sessions of a structured conversation (e.g. 5-30 minutes each) about alcohol with patients from a).

Outcomes. The outcomes of interest in this review are barriers and facilitators potentially influencing the implementation of screening and brief interventions for alcohol use. Studies were included if they report from primary data at least one clearly defined barrier or facilitator potentially influencing the implementation of the interventions as defined above. In this review, barriers are clearly defined factors that decrease the probability of the implementation of the intervention by GPs or nurses working in primary care practices. Facilitators are clearly defined factors that increase the probability of the implementation of the intervention by GPs or nurses working in primary care practices.

Studies were excluded if they report on: implementation barriers and/or facilitators for patients with pathologies that present rarely to primary care providers; factors influencing implementation on populations with specific co-morbidities such as HIV, autoimmune diseases, psychosis, personality disorders, post-traumatic stress or major anxiety disorders, dementia (list not exhaustive) and; factors influencing the implementation of the intervention on people who are less than 18 years of age, or in which this age group is included and no clear distinction can be made between the barriers to implementation in this age group and those aged 18 or above.

Setting. The intervention must have been offered in a primary care practice (as defined above). All other settings were excluded.

Language. Studies were included if they are reported in any of the following languages: English, French, Spanish, and Portuguese. Studies in other languages were excluded.

Information sources and search strategy

The following electronic databases were searched, from the onset of literature database until May 2016, for studies meeting the inclusion criteria stated above: MEDLINE, CINAHL, CENTRAL, and PsycINFO. The search strategy was developed with a health information specialist (KA), based on a list of relevant keywords identified from an exploratory search of the literature and by exploring the Medical Subject Headings (MeSH terms) of the US National Library of Medicine. The final search was performed by KA, after adapting the MEDLINE strategy to the syntax of the other

databases (see Annex 1). The reference lists of relevant systematic reviews and meta-analysis identified through the search were scanned for potentially eligible papers.

Data management and study selection

The results of the literature search were uploaded to Reference Manager Version 10 software. One reviewer (FR) scanned the titles and/or abstracts to eliminate duplicate results. Next, two reviewers (FR and MIS) independently screened titles and abstracts of identified references. Studies were excluded if they: 1) did not have a title and an abstract; 2) were not peer-reviewed and published in an academic journal in the public domain; 3) were not published in one of the following languages: English, French, Spanish, or Portuguese; 4) did not focus on alcohol; 5) did not have a qualitative or quantitative methodology as defined above; 6) did not focus on the implementation of the intervention as defined above in the general primary care adult population or; 7) did not focus on barriers and/or facilitators reported by GPs or nurses working in primary care practice. Disagreements were resolved through consensus. Full-text copies of all studies meeting inclusion criteria and of those with unclear eligibility based on title and abstract were sought and the selection process repeated. Reviewers were not blinded for any aspect of the studies identified and selected.

Data extraction

Two authors (FR and MIS) independently extracted data to a data extraction form specifically designed for this review and later entered into a Microsoft Excel sheet. Disagreements were resolved through consensus.

Studies were grouped according to whether they are quantitative or qualitative. Data extracted included: first author; year of publication; title; country of origin; language of publication; main objective of the study; study design; study sample (sampling strategy, type and number of care providers, response/attrition rate); operational definition of identified barriers and facilitators studied; main results; relation with outcomes or process variables in intervention studies.

Assessment of methodological quality

To inform our synthesis of the evidence a critical appraisal of the validity of the included qualitative and quantitative studies was conducted. The methodological quality of each study was independently assessed by two reviewers: half of the studies were appraised by FR and LP, the other half by FR and MIS. Disagreements between the reviewers were resolved through consensus.

Quantitative studies were appraised with the NIH National Heart, Lung, and Blood Institute quality assessment tools for controlled intervention studies, before-after (pre-post) studies with no control group, observational cohort and cross-sectional studies and case-controlled studies¹⁸⁹. The quality of qualitative studies was assessed with the critical appraisal skills programme (CASP) qualitative research checklist¹⁹⁰. As this review considered quantitative and qualitative studies, we additionally appraised all selected studies as recommended by the Supplementary Guidance for Inclusion of Qualitative Research in Cochrane Systematic Reviews of Interventions¹⁹¹. Inclusion of studies was not influenced by methodological quality.

Data synthesis

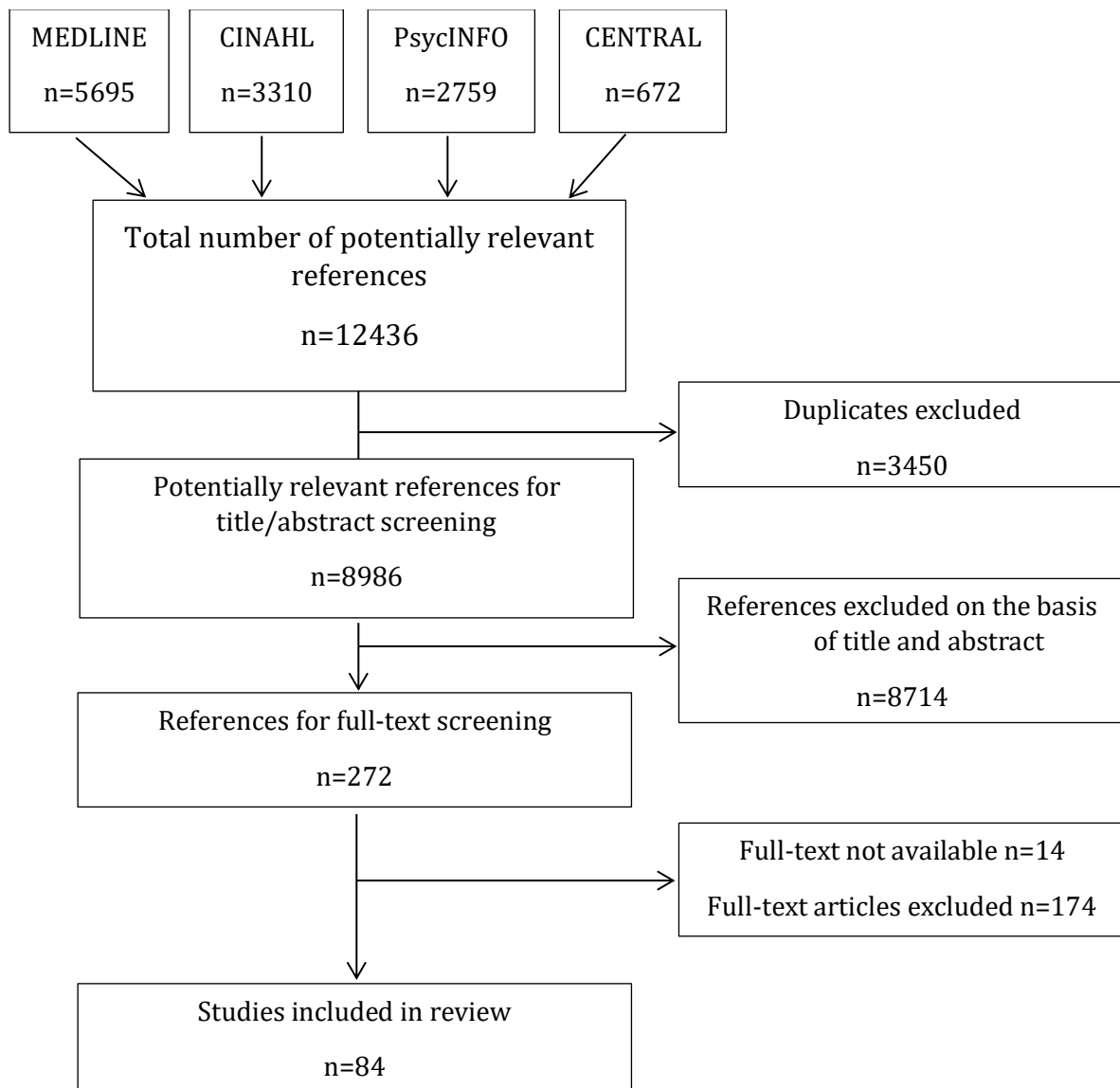
The review starts by reporting the results of the literature searched. PRISMA flowcharts and tables present reasons for inclusion and exclusion as well as the methodology of studies included. The data items extracted (barriers and facilitators) were grouped thematically: two authors (FR and MIS) read and re-read the data items, grouping similar/related items into themes which were developed iteratively. Next, each theme was analysed and mapped to the three components of the BCW (capability, opportunity, motivation) and the 14 domains of the TDF, all of which fall into one of these three components. Disagreements between the reviewers were resolved through consensus. The results of the review are reported in a table and a narrative synthesis of the findings is provided, structured around the themes of barriers and facilitators, the professional group, the alcohol-related intervention (detection/advice/follow up), and the components and domains of the BCW/TDF framework.

Results

Study selection

The search strategy found 12,436 potentially relevant references (see figure 10). After duplicate removal, a total of 8,986 unique references proceeded to abstract screening, from which 272 references were selected for full-text examination. We were unable to obtain full-text copies of 14 references (see Annex 2 for a complete list of references with full-text not available). Of the 258 remaining references, 174 with full-text were excluded (reasons for exclusion are detailed in Annex 3).

Figure 10. Flow diagram of the screening process.



A total of 84 references published between 1982 and 2016 satisfied our inclusion criteria^{27-29,89,91,94,103-107,113,114,116-119,122,123,127,192-255} and are described in detail in Table 1. Of the references included, 76 were single-site studies, mainly from Europe (n=47), North America (n=12) and Oceania (n=12). Of the 8 multi-country studies, half reported data from European countries only. Seventy-nine references were published in English, 3 in Portuguese and 2 in Spanish. Forty-nine studies were quantitative, mostly using a cross-sectional design; 30 were qualitative, mainly using focus groups and/or semi-structured interviews; the remaining 5 used a mixed-methods approach. Sixty studies reported data on GPs, 9 on nurses and 15 on both GPs and nurses.

Methodological quality

We found considerable variation in the quality of the studies retained. Of the 33 qualitative studies, 19 were considered to be good-, 12 fair-, and 2 poor-quality studies. Of the 51 quantitative studies, 18 were considered to be good-, 23 fair-, and 10 poor-quality studies.

Summary of findings

A total of 660 data items (descriptions or reports) pertaining to barriers were extracted. A total of 47 themes were identified from these data items and are described in Tables 2, 3 and 4. The themes most commonly reported related to practitioner: beliefs about their ability to deliver SBI and to help patients to cut down (n=62 data items), alcohol-related knowledge (n=58 data items), and time (n=50 data items). A total of 253 data items pertaining to facilitators were extracted. All facilitators linked to at least one of the themes identified from the analysis of the barriers.

All the 47 identified themes mapped to at least one of the three components of the BCW and to at least one of the 14 domains of the TDF. The TDF domains with the highest number of data items coded were: 'Environmental Context and Resources' (n=158); 'Beliefs about Capabilities' (n=134); and 'Skills' (n=99). The three TDF domains with the lowest number of data items coded were: 'Memory, Attention and Decision Processes' (n=9); 'Behaviour Control' (n=6); and 'Optimism' (n=4).

Table 1. Characteristics of included studies.

First author	Year	Country	Language	Study design	Study sample (n)		Methodological quality	Contribution to the review
					GP	Nurse		
Aalto	2001	Finland	English	Cross-sectional	84	167	Good	Large
Aalto	2003	Finland	English	Cross-sectional	64		Good	Medium
Aalto	2003a	Finland	English	Focus group	18	19	Good	Large
Abidi	2016	Netherlands	English	Delphi	37		Good	Large
Abouyanni	2000	Australia	English	Cross-sectional	416		Poor	Small
Aira	2003	Finland	English	Semi-structured interviews	35		Good	Large
Aira	2004	Finland	English	Semi-structured interviews	35		Good	Large
Ampt	2009	Australia	English	Semi-structured interviews	15	1	Good	Small
Anderson	1985	UK	English	Cross-sectional	312		Good	Large
Anderson	2003	Australia, Belgium, Canada, France, Italy, New Zealand, Norway, Portugal, UK	English	Cross-sectional	1300		Good	Large
Anderson	2004	Australia, Belgium, Spain, UK	English	RCT	277		Good	Large
Anderson	2014	Czech Republic, Italy, Netherlands, Poland, Portugal, Spain, Slovenia, UK	English	Cross-sectional	2345		Fair	Large
Arborelius	1995	Sweden	English	Structured interviews	13		Fair	Medium
Beich	2002	Denmark	English	Focus groups Individual interviews	24		Fair	Large
Bendtsen	2015	Netherlands, Poland, Spain, Sweden, UK	English	Cohort	409	282	Fair	Large
Berner	2007	Germany	English	Cross-sectional	58		Fair	Small
Brennan	2013	Australia	English	Cross-sectional	15		Poor	Medium

Table 1. Characteristics of included studies (cont.)

First author	Year	Country	Language	Study design	Study sample (n)		Methodological quality	Contribution to the review
					GP	Nurse		
Brotons	2005	Croatia, Estonia, Georgia, Greece, Ireland, Malta, Poland, Slovakia, Slovenia, Spain, Sweden	English	Cross-sectional	2082		Poor	Small
Carlford	2012	Sweden	English	Focus groups	9	12	Good	Medium
Casswell	1982	New Zealand	English	Cross-sectional	431		Fair	Medium
Charrel	2010	France	English	Cross-sectional	300		Fair	Medium
Clement	1986	UK	English	Cross-sectional	71		Good	Large
Clifford	2011	Australia	English	Pre-post training surveys Focus groups	3	3	Good	Medium
Deehan	1997	UK	English	Cross-sectional	81		Fair	Medium
Deehan	1998	UK	English	Cross-sectional	2377		Poor	Medium
Deehan	1999	UK	English	Cross-sectional	264	196	Fair	Large
Farmer	2001	UK	English	Semi-structured interviews Cross-sectional	50		Poor	Medium
Ferguson	2003	US	English	Cross-sectional	40		Poor	Small
Fernández	1999	Spain	Spanish	Cross-sectional	227		Fair	Large
Friedmann	2000	US	English	Cross-sectional	243		Fair	Medium
Fucito	2003	Australia	English	Cross-sectional	110		Good	Large
Geirsson	2005	Sweden	English	Cross-sectional	68	193	Good	Large
Gurugama	2003	Sri Lanka	English	Cross-sectional	105		Good	Medium
Haley	2000	Canada	English	Cross-sectional	805		Fair	Small

Table 1. Characteristics of included studies (cont.)

First author	Year	Country	Language	Study design	Study sample (n)		Methodological quality	Contribution to the review
					GP	Nurse		
Harris	2005	Australia	English	Pre-post questionnaire with no control group	21		Poor	Medium
Holmqvist	2008	Sweden	English	Cross-sectional	1790	2549	Good	Large
Hutchings	2006	UK	English	Focus groups	18	15	Good	Large
Johansson	2002	Sweden	English	Cross-sectional	65	141	Good	Large
Johansson	2005	Sweden	English	Focus groups		26	Poor	Medium
Johansson	2005a	Sweden	English	Focus groups	13		Good	Large
Kaariainen	2001	Finland	English	Cross-sectional	GP + Nurse = 69		Fair	Small
Kaner	1999	UK	English	Cross-sectional	279		Good	Large
Kaner	2001	Australia, Belgium, Bulgaria, Canada, France, Hungary, Italy, New Zealand, Norway, Poland, Portugal, Thailand, UK	English	Cross-sectional	2139		Good	Medium
Kaner	2003	UK	English	Cluster RCT		212 general practices	Fair	Large
Kaner	2006	UK	English	Interviews	29		Good	Large
Kersnik	2009	Slovenia	English	Focus groups	32		Good	Large
Keurhorst	2014	Netherlands	English	Cluster RCT	112		Fair	Large
Kolsek	2008	Belgium, Bulgaria, Hungary, Italy, Latvia, Russia, Slovenia	English	Delphi Focus groups	n.r.	n.r.	Fair	Small
Koopman	2008	South Africa	English	Cross-sectional	50		Fair	Medium

Table 1. Characteristics of included studies (cont.)

First author	Year	Country	Language	Study design	Study sample (n)		Methodological quality	Contribution to the review
					GP	Nurse		
Lacey	2009	UK	English	Focus groups Semi-structured interviews Cross-sectional		n.r.	Fair	Medium
Lambe	2008	UK	English	Cross-sectional Focus groups		53	Good	Small
Lid	2012	Norway	English	Focus groups	13		Fair	Medium
Lid	2015	Norway	English	Focus groups	19		Good	Large
Linke	2005	UK	English	Focus groups	10		Fair	Small
Lock	2002	UK	English	Semi-structured interviews		24	Good	Large
Maheux	1999	Canada	English	Cross-sectional	805		Fair	Small
May	2006	UK	English	Semi-structured interviews	43	1	Good	Medium
McAvoy	2001	Australia, Canada, Denmark, France, Hungary, Italy, New Zealand, Norway, Poland, Russia	English	Semi-structured interviews	126		Fair	Large
Miller	2006	US	English	Focus groups	n.r.	n.r.	Good	Large
Miner	1990	Spain	Spanish	Cross-sectional	83		Fair	Small
Mistral	2001	UK	English	Cross-sectional Semi-structured interviews	103		Poor	Small
Moretti-Pires	2011	Brazil	Portuguese	Focus groups Semi-structured interviews		12	Fair	Small
Mules	2012	New Zealand	English	Semi-structured interviews	19		Fair	Medium
Nevin	2002	Canada	English	Cross-sectional	75		Fair	Small
Nygaard	2010	Norway	English	Cross-sectional	901		Good	Large

Table 1. Characteristics of included studies (cont.)

First author	Year	Country	Language	Study design	Study sample (n)		Methodological quality	Contribution to the review
					GP	Nurse		
Nygaard	2011	Norway	English	Focus groups	40		Good	Large
Owens	2000	UK	English	Cross-sectional		101	Fair	Medium
Payne	2005	Australia	English	Cross-sectional	170		Fair	Small
Poplas Susic	2010	Slovenia	English	Focus groups	32		Good	Large
Proude	2006	Australia	English	Pre-post questionnaire with no control group	300		Poor	Medium
Rapley	2006	UK	English	Semi-structured interviews	43		Good	Large
Ribeiro	2011	Portugal	Portuguese	Cross-sectional	188		Fair	Medium
Richmond	1998	Australia	English	Post-intervention questionnaire with no control group	272		Poor	Medium
Roche	1991	Australia	English	Focus groups	44		Fair	Medium
Rush	1994	Canada	English	Cross-sectional	1235		Good	Large
Rush	1995	Canada	English	Focus groups	12		Good	Large
Segnan	1992	Italy	English	Semi-structured interviews				
Sharp	2011	US	English	Cross-sectional	209		Fair	Medium
Slaunwhite	2015	Canada	English	Cross-sectional	101		Good	Large
Souza	2012	Brazil	Portuguese	Cross-sectional	67		Poor	Small
Souza	2012	Brazil	Portuguese	Semi-structured interviews		8	Fair	Small
Van Zyl	2013	South Africa	English	Cross-sectional	77		Fair	Small
Vandermause	2007	US	English	In-depth interviews		23	Fair	Small
Vinson	2004	US	English	Cluster RCT	44		Fair	Medium
Wilson	2011	UK	English	Cross-sectional	282		Good	Large

GP – General practitioner / family physician; n.r. – not reported; RCT – randomized controlled trial

The following sections provide a more detailed description of the factors influencing the implementation of alcohol screening and brief interventions by primary care doctors and nurses. Firstly, the BCW component is described, and then for each TDF domain within that component, the themes relating to barriers and facilitators that fall within that domain are described in brief, but also outlined in detail in supporting Tables 2, 3 and 4 (see Annexes 4 and 5 for a complete description of the barriers and facilitators extracted).

Capability (BCW Component 1) (Table 2)

The 13 themes in the Capability component of the BCW emerged from 68 studies from 26 countries as shown in Table 2. The majority of the studies (n=40) were quantitative in design and reported data mainly from GPs alone (n=49).

Skills – TDF domain (1 of 14) within the Capability component of the BCW

Theme: Training. In general, both GPs and nurses reported a lack of training in dealing with alcohol problems. The majority of the GPs think their medical training was inadequate to address alcohol issues in their patients. Three survey studies from the UK found that only a minority of the GPs and nurses received alcohol-specific training since graduation¹⁰⁴⁻¹⁰⁶. In 9 survey studies, the majority of the GPs and nurses who received training reported that those programmes lasted less than four hours^{28,29,89,114,116,122,127,214,220}. Several studies on both GPs and nurses reported the availability of educational and training programmes as an important facilitator^{29,89,192,204,217,224}.

Theme: Role adequacy. Mixed evidence was found concerning GPs and nurses appraisal of their skills in detecting and advising at-risk drinkers. On the one hand, the majority of the GPs in 9^{28,103,104,107,116,122,206,223,243}, and of the nurses in 3, quantitative studies^{28,104,224} felt they were not skilled enough to deliver alcohol SBI; on the other hand, the majority of the GPs in 14^{28,29,89,103,119,192,201,209,214,223,234,245,247,250}, and of the nurses in 2, quantitative studies^{192,214} reported the opposite.

Table 2. Themes of barriers and facilitators coded to each of the 4 domains of the TDF within the Capability component of the BCW

TDF	Theme	Study type (no)	Countries	References on barriers	References on facilitators
Knowledge	Alcohol-related knowledge	Survey (26) Interview (6) Focus groups (5) Mixed methods (2) Delphi (1) FG + Int (1)	UK(8); Finland(6); Sweden(4); Multicountry(3); Norway(3); Australia(2); New Zealand(2); South Africa(2); Spain(2); US(2); Brazil(1); Canada(1); France(1); Netherlands(1); Portugal(1); Slovenia(1); Sri Lanka(1)	27-29, 88, 98, 102, 111, 114, 116, 191-193, 196, 200, 204, 205, 208-210, 213, 216-218, 222, 223, 226, 228, 232, 234, 235, 237, 239, 241, 243, 246, 249, 252	194, 203, 213, 216, 219, 238
	Disease model training	Interview (2) Survey (2) Focus groups (1)	Finland(3); Sweden(1); UK(1)	27, 101, 193, 196, 217	
	Doctors and nurses own drinking habits	Interview (2) Focus groups (1)	UK(2); Norway(1)	85, 226, 228	
	Alcohol being perceived as having health benefits	Survey (2) Interview (1)	Finland(1); Sweden(1); UK(1)	27-29	
	Patients' receptiveness to alcohol interventions	Interview (3) Focus groups (1) Mixed methods (1) Survey (1)	Australia(1); Finland(1); New Zealand(1); Norway(1); UK(1); US(1)	27, 209, 243	206, 226, 235
	Knowledge of support services	Survey (2)	Sweden(1); UK(1)	213, 239	

Table 2. Themes of barriers and facilitators coded to each of the 4 domains of the TDF within the Capability component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries	References on barriers	References on facilitators
Skills	Training	Survey (28) Interview (4) Mixed methods (3) Focus groups (2) FG + Int (2) Delphi (1) RCT (1)	UK(13); Sweden(5); Multicountry(4); US(3); Canada(2); Finland(2); Spain(2); Australia(1); Brazil(1); Denmark(1); Italy(1); Netherlands(1); New Zealand(1); Portugal(1); Slovenia(1); South Africa(1); Sri Lanka(1)	28, 29, 88, 98-102, 109, 111, 114, 116, 118, 123, 191, 196, 198, 200, 205, 207-209, 211, 213, 219, 222, 228, 229, 232-234, 239, 248, 249	29, 88, 116, 191, 194, 197, 200, 203, 215, 216, 219, 220, 223, 239
	Role adequacy	Survey (16) Interview (4) Mixed methods (3) Focus groups (2) FG + Int (1) PP intervention (1) Post-intervention (1) RCT (1)	UK(9); Australia(3); US(3); Multicountry(2); Sweden(2); Canada(1); Denmark(1); Finland(1); New Zealand(1); Norway(1); Portugal(1); Slovenia(1); South Africa(1); Spain(1); Sri Lanka(1)	28, 29, 88, 98, 99, 102, 111, 114, 116, 118, 191, 198, 200, 205, 208, 209, 213, 222, 223, 226, 233, 235, 241-244, 246, 249, 254	
	Demographical characteristics of the PHC professionals	Survey (2)	Germany(1); Norway(1)	199, 238	

Table 2. Themes of barriers and facilitators coded to each of the 4 domains of the TDF within the Capability component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries	References on barriers	References on facilitators
Memory, Attention and Decision Processes	Demographical characteristics of the patient	Interview (3) Focus groups (1) Survey (1)	Finland(1); Germany(1); Sweden(1); UK(1); US(1)	196, 199, 217, 243, 253	
	Remembering	Interview (1) Focus groups (1)	Finland(1); Sweden(1)	196, 217	
	Feedback on the results of delivering SBI	Interview (2) Survey (2) Focus groups (1) FG + Int (1)	UK(2); Denmark(1); Finland(1); Norway(1); Sweden(1)	27	29, 197, 198, 214, 238
Behaviour regulation	Organisation for preventive counselling	Focus groups (7) Survey (5) Interview (4) Delphi (1) RCT (1)	Sweden(4); UK(4); Slovenia(2); Canada(1); Finland(1); Multicountry(1); Netherlands(1); New Zealand(1); Norway(1); South Africa(1); US(1)	29, 111, 217, 222, 241, 247	123, 194, 196, 202, 213, 214, 216, 220, 230, 231, 235, 237

BCW – Behaviour Change Wheel; FG + Int – Focus groups + Interview; PP – Pre-post; RCT – Randomized controlled trial; TDF – Theoretical Domains Framework

Theme: Demographical characteristics of the primary health care professionals. One survey study from Germany found female GPs to be better at detecting at-risk drinkers than male GPs²⁰⁰. The same study also found that older, more experienced GPs were better at detecting at-risk drinkers than younger GPs. One correlational study from Norway found an inverse association between GPs' experience and the use of screening instruments²³⁹.

Knowledge – TDF domain (2 of 14) within the Capability component of the BCW

Theme: Alcohol-related knowledge. A total of 53 data units from 35 studies reporting on barriers were extracted. Most data came from GPs (n=34). Alcohol-related knowledge included issues of self-reported knowledge of alcohol SBI concepts (e.g. the definition of sensible drinking limits, the content of a brief intervention), and familiarity with guidelines and screening tools. One Spanish study found that 60% of the GPs had not received alcohol-specific education during medical school²³³. One Norwegian study on GPs found that knowledge of brief interventions was associated with a 43% increase in the odds of using interventions²³⁹. Several quantitative studies suggest knowledge of alcohol and alcohol-related problems to be higher than knowledge on how to deliver a brief intervention. Notwithstanding, several qualitative studies point to a great deal of confusion concerning the low-risk drinking limits. One quantitative study on nurses found no correlation between the perception that one had sufficient knowledge of low-risk limits and the correct responses on sensible limits²⁴⁰. A varying degree of both GPs and nurses in 2 survey studies indicated alcohol-specific education as a facilitator^{214,217}.

Theme: Disease model training. Four studies (3 qualitative and 1 quantitative) from the Nordic countries mentioned that GPs asked their patients about alcohol only if there was something that made them to suspect the patient was a heavy drinker^{27,194,197,218}. Notwithstanding, a quantitative study from the UK reported that only 4% of the GPs agreed that their role was to treat alcohol-related medical complications only¹⁰⁶.

Four other less frequently mentioned themes were linked to the Knowledge domain of the TDF which are summarized in Table 2.

Memory, Attention and Decision Processes – TDF domain (3 of 14) within the Capability component of the BCW

Theme: Demographical characteristics of the patient. Six pieces of data from 3 qualitative, 1 quantitative and 1 mixed methods studies alluded that both GPs and nurses screening activities were influenced by patients' characteristics^{197,200,218,244,254}. Older patients and being a female were found to be at lower odds of being detected while visiting the GP more than 5 times within the last year increased the chances of detection.

Theme: Remembering. Asking about alcohol was found easy to forget in 2 qualitative studies on GPs from the Nordic countries^{197,218}.

Theme: Feedback on the results of delivering SBI. One interview study from Finland found that GPs are unaware of whether or not patients they advised reduced their drinking because they do not schedule follow-up appointments²⁷.

Behaviour Regulation – TDF domain (4 of 14) within the Capability component of the BCW

Theme: Organization for preventive counselling. Data from 3 survey studies indicate that 40 to 86% of the GPs believe general practices are not organized to do preventive counselling^{29,116,223}. GPs in 3 qualitative studies mentioned that implementation strategies for routine screening of at-risk drinkers are lacking^{218,242,248}. GPs and nurses often cited improving professional teamwork (e.g. having a practice nurse delivering SBI, having receptionists giving screening tools to patients) as a facilitator^{127,195,197,203,214,215,217,221,231,232,236,238}.

Motivation (BCW Component 2) (Table 3)

The 33 themes in the Motivation component of the BCW emerged from 75 studies from 30 countries as shown in Table 3. The majority of the studies (n=43) were quantitative in design and reported data mainly from GPs alone (n=54).

Beliefs about Capabilities – TDF domain (5 of 14) within the Motivation component of the BCW

Theme: Beliefs about the ability to deliver SBI and in helping patients to cut down. Twenty three studies reported on how GPs felt about their abilities for screening and advising at-risk drinkers, of which 16 found a majority of GPs believed they were confident in their abilities^{28,29,103-107,113,114,116-118,122,192,196,201,209,210,223,243,245,247,250} compared with 1 of 3 studies involving nurses^{28,104,192}. One study from Norway found that GPs who were more confident discussing alcohol issues had a 51% greater likelihood to self-report using interventions²³⁹. Notwithstanding, the majority of the GPs in 7 from a total of 11 studies^{28,29,103-106,202,204,210,223,247}, and of the nurses in 2 studies^{28,225}, did not feel their advice would have much impact. GPs and nurses reported more training for improving counselling skills^{28,29,199,223} and feedback on successful cases²¹⁵ as facilitators.

Theme: Time. Lack of time was cited as a barrier mainly by GPs in 28 studies, evenly balanced between qualitative and quantitative design. Two main sub-themes were identified: having competing demands (e.g. needing to attend patients with multiple health problems); and thinking that alcohol SBI is too time-consuming. These barriers could explain why providers feel impossible to screen all patients or the routine follow-up of at-risk drinkers^{207,238,244}. More time per consultation, more experience in delivering brief interventions and simplifying the screening process (e.g. short and simple screening tools, giving patients self-report questionnaires) are examples of reported facilitators^{123,195,232,236}.

Theme: Difficult task. Thirty pieces of data on barriers were extracted, evenly balanced between quantitative and qualitative studies. In several qualitative studies, difficulty in asking about patients' drinking habits and/or in advising those at risk was reported as important barriers to implementation. In 1 quantitative study from Canada, 41% of the GPs found it difficult to inquire about alcohol²¹²; in 6 survey studies, 32 to 86% of the GPs agreed that alcohol counselling is difficult^{29,89,103,116,223,230}. Pragmatic case finding^{103,195,215,226,227,238}, including alcohol questions on a general health check^{238,244,248} and having an alcohol screening tool incorporated into the health records keeping system^{236,238,244} were reported as facilitators in several qualitative studies.

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Beliefs about Capabilities	Beliefs about the ability to deliver SBI and in helping patients to cut down	Survey (23)	UK(11); Australia(5);	28, 29, 85, 98-102, 108,	29, 197, 198, 214, 238
		Interview (5)	Multicountry(5); Finland(3);	109, 111-113, 118, 191,	
		Focus groups (4)	Sweden(3); US(3); Canada(2);	192, 195-197, 200, 201,	
	Time	Mixed methods (2)	Denmark(1); New Zealand(2);	203, 208, 209, 215, 222,	88, 119, 194, 213, 214, 220, 231, 235
		FG + Int (2)	Netherlands(1); South	224, 235, 239, 242-247,	
		Cohort (1)	Africa(1); Spain(1); Sri	249, 254	
		Post-intervention (1)	Lanka(1)		
		PP intervention (1)			
		RCT (1)			
		Focus groups (10)	Sweden(7); Australia(5); UK(5);	28, 88, 98, 102, 114, 192,	
		Survey (9)	US(4); Finland(2); Norway(2);	196-198, 200, 202, 206,	
		Interview (7)	Canada(1); Denmark(1);	207, 209, 213, 215-217,	
		Mixed methods (3)	Multicountry(1);	226, 230, 233, 235, 237,	
FG + Int (2)	Netherlands(1); New	243-245, 247, 249			
Delphi (1)	Zealand(1); Portugal(1);				
Post intervention (1)	Slovenia(1); Sri Lanka(1)				
Difficult task	Difficult task	Survey (13)	UK(8); Australia(3); Canada(3);	27, 29, 88, 98-102, 114,	98, 194, 196, 206, 214, 225, 226, 235, 237, 243, 247
		Focus groups (6)	Finland(3); Norway(3);	116, 192, 196, 198, 202,	
		Interview (6)	Multicountry(2); Sweden(2);	211, 216, 222, 225, 229,	
		FG + Int (2)	Brazil(1); Denmark(1);	235, 237, 240, 243, 245,	
		Mixed methods (2)	Netherlands(1); New	247, 251	
		Delphi (1)	Zealand(1); Portugal(1); South		
		Post intervention (1)	Africa(1); Sri Lanka(1)		

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Beliefs about Capabilities	Therapeutic commitment	Survey (3) Cohort (1) RCT (1)	Multicountry(4); Netherlands(1)	108, 109, 111-113	
	Self-esteem when working with at-risk drinkers	Survey (4) Focus groups (1)	UK(3); Portugal(1); Sweden(1)	28, 29, 114, 116	214
	Disease model training	Interview (1)	Finland(1)	196	
	Patients' beliefs about alcohol	Interview (1)	UK(1)	243	
	Demographical characteristics of the patient	Interview (1)	New Zealand(1)	235	
Beliefs about Consequences	Effectiveness of SBI	Survey (13) Focus groups (4) Interview (3) FG + Int (2) Delphi (1) Mixed methods (1) Post intervention (1)	UK(6); Finland(3); Sweden(3); Australia(2); Multicountry(2); Norway(2); Canada(1); Denmark(1); Italy(1); Netherlands(1); New Zealand(1); South Africa(1); Spain(1)	27-29, 111, 116, 191, 193, 198, 203, 205, 208, 213, 216, 222, 223, 225, 230, 244, 245, 248	29, 88, 111, 116, 191, 194, 214, 223, 226, 247

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Beliefs about Consequences	Patients' feelings when asked about their drinking	Focus groups (6)	Norway(3); UK(3); Finland(2);	27-29, 88, 111, 116, 196,	206, 231
		Interview (6)	Multicountry(2); US(2);	204, 214, 225, 226, 231,	
	Therapeutic relation with the patient	Survey (5)	Australia(1); Brazil(1);	235, 237, 241, 251, 253	
		Mixed methods (1)	France(1); New Zealand(1);		
		Focus groups (5)	Slovenia(1); Sweden(1)		
Reliability of the answers of the patients when asked about alcohol	Interview (4)	Sweden(3); UK(2); Canada(1);	192, 197, 198, 204, 215,	198, 217, 223, 237	
	FG + Int (2)	Denmark(1); Finland(1);	217, 230, 235, 237, 241,		
Patients' reactions when asked about alcohol	Mixed methods (1)	France(1); New Zealand(1);	247, 253		
	Survey (1)	Norway(1); Slovenia(1); US(1)			
Patients' receptiveness to alcohol interventions	Interview (5)	Finland(2); Denmark(1);	27, 88, 102, 192, 197, 198,	228, 235, 237	
	Focus groups (2)	Multicountry (1); New Zealand(1); Norway(1); Sri Lanka(1); Sweden(1); UK(1)			
Patients' receptiveness to alcohol interventions	FG + Int (1)	Sweden(3); UK(3); Australia(1);	88, 213, 216, 223, 228,	196-198	
	Survey (3)	Denmark(1); Finland(1);	233, 240		
Patients' receptiveness to alcohol interventions	Mixed methods (2)	Multicountry(1)			
	FG + Int (1)	Finland(2); US(2); Australia(1);	27, 191, 207, 209, 216,	206, 226, 235	
Survey (4)	New Zealand(1); Norway(1);	241, 243			
Patients' receptiveness to alcohol interventions	Interview (3)	Slovenia(1); Sweden(1); UK(1)			
	Focus groups (2)				
Patients' receptiveness to alcohol interventions	Mixed methods (1)				

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Beliefs about Consequences	Frustrating task	Interview (2) Survey (2) FG + Int (1) Mixed methods (1)	UK(3); Canada(1); Portugal(1); Sweden(1)	85, 98, 114, 205, 247	197
	Alcohol being perceived as having health benefits	Survey (2) Interview (1)	Finland(1); Sweden(1); UK(1)	27-29	
	Incentives	Survey (4) Focus groups (2) Delphi (1) Interview (1) Mixed methods (1)	UK(3); Australia(1); Finland(1); Multicountry(1); Netherlands(1); Slovenia(1); Sweden(1)	233, 245	28, 29, 88, 116, 191, 194, 220
	Time	Focus groups (4) Interview (4) Delphi (1) Survey (1)	Sweden(2); Australia(1); Finland(1); Multicountry(1); Netherlands(1); New Zealand(1); Slovenia(1); UK(1); US(1)	192, 197	88, 119, 194, 213, 214, 220, 231, 235
	Delivering SBI can make other patients suffer	Mixed methods (1) Survey (1)	Sweden(1); UK(1)	216, 233	
	Bad publicity	Mixed methods (1)	UK(1)	233	

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Beliefs about Consequences	Demographical characteristics of the patient	Interview (1)	UK(1)	228	
	SBI delivery impedes caring for other patients	Survey (1)	Finland(1)	193	
	Uncomfortable task	Delphi (1) Focus groups (1)	Australia(1); Netherlands(1)	245	194
	Patients with alcohol problems do not attend their appointments	Interview (1)	New Zealand(1)	235	
Social/ Professional Role and Identity	Role legitimacy	Survey (15) Focus groups (4) Interview (4) FG + Int (2) Mixed methods (1)	UK(7); Finland(5); Sweden(3); Canada(2); New Zealand(2); Australia(1); Denmark(1); Norway(1); Portugal(1); Slovenia(1); South Africa(1); Spain(1)	29, 98, 114, 116, 118, 191- 193, 198, 200, 203, 205, 208, 215-218, 222, 228, 235, 237, 241, 243, 246, 247	
	Professional responsibility	Survey (12) Focus groups (4) Interview (2) Mixed methods (1)	UK(7); Sweden(3); Finland(2); New Zealand(2); Australia(1); Multicountry(1); South Africa(1); Sri Lanka(1); US(1)	29, 98-102, 111, 116, 192, 193, 203, 209, 215-217, 222, 235, 243, 245	

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Social/ Professional Role and Identity	Disease model training	Survey (7) Focus groups (4) Interview (2) Mixed methods (1)	UK(4); Sweden(3); Finland(2); Australia(1); Multicountry(1); Norway(1); South Africa(1); Sri Lanka(1)	27, 29, 101, 102, 111, 116, 196, 206, 215-217, 222, 227, 237	
	Doctors and nurses own drinking habits	Survey (4) Focus groups (3) Interview (2)	UK(4); Canada(1); Multicountry(1); Norway(1); Slovenia(1); Sweden(1)	29, 85, 111, 116, 217, 226, 228, 236, 241	
	Doctors' and nurses' permissiveness towards alcohol	Interview (3) Survey (3)	UK(2); Finland(1); Multicountry(1); Sweden(1); US(1)	28, 111, 116, 193, 228, 253	
	Role security	Survey (3) Cohort (1) RCT (1)	Multicountry(4); Netherlands(1)	108, 109, 111-113	
	Doctors' and nurses' attitudes towards discussing alcohol with patients	Focus groups (1) FG + Int (1) Survey (1)	Finland(2); Denmark(1)	191, 192, 198	
	Patients' feelings when asked about their drinking	Interview (2) Focus groups (1) Mixed methods (1)	Finland(2); Australia(1); US(1)	27, 196, 231	206, 231

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Social/ Professional Role and Identity	Demographical characteristics of the PHC professionals	Focus groups (1) FG + Int (1)	Australia(1); Canada(1)	245, 247	
	Demographical characteristics of the patient	Interview (1)	UK(1)	228	
	Therapeutic relation with the patient	Focus groups (2) FG + Int (1) Mixed methods (1) Survey (1)	Denmark(1); Finland(1); Norway(1); Sweden(1); UK(1)	193	198, 217, 223, 237
	Feedback on the results of delivering SBI	Interview (2) Survey (2) Focus groups (1) FG + Int (1)	UK(2); Denmark(1); Finland(1); Norway(1); Sweden(1)	27	29, 197, 198, 214, 238
Emotion	Uncomfortable task	Interview (6) Survey (5) Focus groups (3) Delphi (1) FG + Int (1) RCT (1)	UK(5); Finland(2); US(2); Canada(1); France(1); Multicountry(1); Netherlands(1); New Zealand(1); Norway(1); South Africa(1); Sweden(1)	29, 85, 111, 116, 192, 196, 202, 204, 222, 228, 230, 235, 237, 247, 253, 254	194

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Emotion	Satisfaction when working with at-risk drinkers	Survey (13) Mixed methods (1)	UK(8); Sweden(2); Canada(1); Portugal(1); Spain(1); Sri Lanka(1)	28, 29, 98-102, 114, 116, 118, 205, 216, 232, 246	
	Patients' feelings when asked about their drinking	Focus groups (5) Interview (2) Mixed methods (1)	Norway(3); US(2); Australia(1); New Zealand(1); UK(1);	214, 225, 226, 235, 237, 253	206, 231
	Frustrating task	Interview (2) Survey (2) FG + Int (1) Mixed methods (1)	UK(3); Canada(1); Portugal(1); Sweden(1)	85, 98, 114, 205, 247	197
	Therapeutic commitment	Survey (3) Cohort (1) RCT (1)	Multicountry(4); Netherlands(1)	108, 109, 111-113	
	Self-esteem when working with at-risk drinkers	Focus groups (1) Mixed methods (1) Survey (1)	UK(2); Canada(1)	98, 246	214
	Doctors and nurses own drinking habits	Interview (2)	UK(2)	85, 228	

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Emotion	Motivation to work with at-risk drinkers	Survey (4) Interview (2) Delphi (1) Focus groups (1)	UK(3); Multicountry(1); Netherlands(1); Norway(1); Sri Lanka(1); Sweden(1)	243	99, 100, 102, 111, 194, 197, 237
Intentions	Motivation to work with at-risk drinkers	Survey (15) Mixed methods (2) Focus groups (2) Interview (2) Delphi (1)	UK(9); Sweden(3); Australia(2); Spain(2); Canada(1); Multicountry(1); Netherlands(1); Portugal(1); Sri Lanka(1); US(1)	28, 29, 98, 114, 116, 118, 205, 208-210, 232, 233, 243, 245, 246	99, 100, 102, 111, 194, 197, 237
	Therapeutic commitment	Survey (3) Cohort (1) RCT (1)	Multicountry(4); Netherlands(1)	108, 109, 111-113	
Reinforcement	Incentives	Survey (7) Focus groups (4) Delphi (1) Interview (1) Mixed methods (1) Post-intervention (1)	UK(3); Australia(2); Multicountry(2); Slovenia(2); Finland(1); Netherlands(1); Norway(1); Portugal(1); South Africa(1); Sweden(1)	29, 88, 111, 114, 116, 222, 233, 237, 241, 244, 245	28, 29, 88, 116, 191, 194, 220

Table 3. Themes of barriers and facilitators coded to each of the 8 domains of the TDF within the Motivation component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Goals	Importance / Priority given to alcohol issues	Interview (5) Survey (5) Focus groups (3)	UK(4); Sweden(3); Multicountry(2); Norway(2); Finland(1); US(1)	28, 29, 88, 111, 116, 196, 197, 209, 214, 217, 227, 243	237
	Time	Survey (5) Interview (4) Focus groups (3) Delphi (1) Post intervention (1)	UK(4); Australia(2); Multicountry(2); Netherlands(1); New Zealand(1); Slovenia(1); South Africa(1); Sweden(1); US(1)	29, 88, 111, 116, 222, 243, 244	88, 119, 194, 213, 214, 220, 231, 235
Optimism	Beliefs about the ability to deliver SBI and in helping patients to cut down	Survey (3) Interview (2) Focus groups (1) FG + Int (1) Mixed methods (1)	UK(3); Denmark(1), Multicountry(1); New Zealand(1); Norway(1); Sweden(1)	88, 98, 203	29, 197, 198, 214, 238

BCW – Behaviour Change Wheel; FG + Int – Focus groups + Interview; PHC – Primary health care; PP – Pre-post; RCT – Randomized controlled trial; SBI – Screening and brief interventions; TDF – Theoretical Domains Framework

Five other less frequently mentioned themes were linked to the Beliefs about Capabilities domain of the TDF which are summarized in Table 3.

Beliefs about Consequences – TDF domain (6 of 14) within the Motivation component of the BCW

Theme: Effectiveness of SBI. Mixed evidence was found concerning whether or not GPs believed in the effectiveness of brief interventions for reducing alcohol consumption in their patients. In 4 quantitative and 4 qualitative studies GPs were sceptical that patients would follow their advice^{27-29,116,199,223,231,246}; data from 6 quantitative and 1 qualitative studies point otherwise^{89,209,214,217,226,245,249}. Three studies on nurses found that most believe in the efficacy of brief interventions^{214,217,224}. One correlational study found that GPs who find giving advice ineffective raise the subject seldom or not at all²⁰⁴. Despite that, the majority of GPs and nurses in 3 survey studies from the Nordic countries believed to be worthwhile working with at-risk drinkers^{192,194,217}. More information about the effectiveness of brief interventions^{29,89,94,116,192,195,224,227} and feedback on successful cases^{215,248} were identified as implementation facilitators by both GPs and nurses.

Theme: Patients feelings when asked about their drinking. Evidence from several qualitative studies suggests that GPs and nurses might be afraid to offend their patients by asking them about alcohol. This issue was addressed in 5 survey studies among GPs, of which 4 found a majority of GPs did not believe patients would resent being asked^{28,29,89,116,205}. In 1 study from Australia, both GPs and nurses reported that no patient showed discomfort to screening²⁰⁷. Increasing experience with screening and normalizing alcohol questions were reported as facilitators in 1 focus groups study²³².

Theme: Therapeutic relation with the patient. Fear of damaging the relationship with the patient by asking about alcohol was frequently mentioned by both GPs and nurses in several qualitative studies. Notwithstanding, 1 survey on French GPs found that less than a sixth of women suffering from alcohol dependence broke off medical care after being asked about their drinking²⁰⁵. Qualitative evidence suggests that building good working relationships with patients^{199,224} and making use of good communication skills^{218,238} could be useful for overcoming this barrier.

Theme: Reliability of the answers of the patients when asked about alcohol. Several pieces of qualitative data were extracted suggesting that GPs and nurses felt that patients intentionally underestimate their alcohol use. One study from Sri Lanka found that 57% of the GPs believe that patients usually lie when reporting their drinking habits¹⁰⁷.

Theme: Patients' reactions when asked about alcohol. In 3 pieces of qualitative data, GPs (1 multicountry study) and nurses (2 UK based studies) mentioned their concern about patients reacting negatively if asked about their drinking habits^{94,224,229}. One UK based survey on GPs found that 53% agreed patients can have an aggressive behaviour²³⁴; however, only a minority of GPs and nurses on 2 Swedish surveys shared the same opinion^{214,217}.

Theme: Patients' receptiveness to alcohol interventions. Mixed evidence was found concerning GPs and nurses concerns about patients' receptiveness to participate in alcohol SBI. GPs in 2 qualitative studies from Finland and Slovenia mentioned that patients would not be keen to be asked about their drinking^{27,242}; GPs in 1 UK based interview study believed that patients expect them to be asked about alcohol²⁴⁴. In 2 quantitative studies from Finland and the US, both GPs and nurses were divided on this matter^{192,210}.

Theme: Frustrating task. GPs in 2 qualitative studies reported feeling frustrated when dealing with at-risk drinkers^{91,248}. In 2 studies from the UK and Portugal, 32 to 68% of the GPs concurred with this view^{103,119}. One Swedish interview study found that after having experienced delivering brief interventions GPs reported reduced feelings of frustration¹⁹⁸.

Nine other less frequently mentioned themes were linked to the Beliefs about Consequences domain of the TDF which are summarized in Table 3.

Social/Professional Role and Identity – TDF domain (7 of 14) within the Motivation component of the BCW

Theme: Role legitimacy. In general, the majority of both GPs and nurses agreed that identifying and providing alcohol-related advice is a natural part of their job. Nearly all

GPs in 3 studies from the UK and Canada believe they have the right to ask patients about alcohol and that their patients also agree with that^{103,206,247}. Notwithstanding, qualitative data from the Nordic countries, Slovenia and New Zealand suggest that some GPs and nurses may have ethical concerns regarding addressing alcohol issues in their patients^{193,194,199,216,218,236,242}.

Theme: Professional responsibility. Believing that preventing alcohol problems is a GP responsibility was found to vary substantially from country to country. On the one hand, the majority of the GPs in 1 multicountry and 1 South African studies reported that these problems are not their responsibility^{107,116}; on the other hand, the majority of the GPs in 2 studies from the UK and 1 study from the US think the opposite^{29,89,210}. Sixty-one to 87% of the GPs in 4 studies from the UK and 1 from Sri Lanka¹⁰³⁻¹⁰⁷, and 71.3% of the nurses in 1 UK based study¹⁰⁴ agreed that general practice is an appropriate, if not ideal, place to detect and treat alcohol misuse.

Theme: Disease model training. A varying number of GPs agreed to have a disease model training and that they don't think about prevention. Data mainly from qualitative studies suggest that GPs and nurses do not screen systematically for alcohol but only when they suspected heavy consumption, or when the patient's complaint was likely to be alcohol-related^{27,107,197,207,216-218,228}.

Theme: Doctors and nurses own drinking habits. Data from 3 qualitative studies suggest that some GPs and nurses use their own drinking as a reference for deciding whether or not to advise patients^{91,227,229}. A varying degree of European GPs believes that doctors themselves may have alcohol problems^{29,89,116}. Notwithstanding, only 12% of the GPs in 1 study from Canada believe that GPs' drinking behaviour can influence them in diagnosing at-risk drinkers²³⁷.

Eight other less frequently mentioned themes were linked to the Social/Professional Role and Identity domain of the TDF which are summarized in Table 3.

Emotion – TDF domain (8 of 14) within the Motivation component of the BCW

Theme: Uncomfortable task. Several GPs and nurses expressed feeling uneasy when asking patients about their drinking. Ten pieces of data extracted from as many

qualitative studies indicate that these providers consider asking about alcohol a delicate task because alcohol is considered a sensitive issue, making them feel uncomfortable^{91,193,197,203,229,231,236,238,248,254}. Notwithstanding, the majority of the GPs in 4 from a total of 6 quantitative studies reported feeling comfortable asking about alcohol^{29,89,116,205,223,255}. Destigmatizing problematic alcohol use was identified as a facilitator in 1 qualitative study¹⁹⁵.

Theme: Satisfaction when working with at-risk drinkers. Fourteen quantitative studies were found addressing GPs' and nurses' satisfaction in working with at-risk drinkers. With the notable exception of 1 study on GPs from Sri Lanka¹⁰⁷, the majority of the GPs in the remaining studies (8 from the UK), and of the nurses in 3 studies (2 from Sweden and 1 from the UK) reported feeling unsatisfied advising patients to cut down^{28,29,89,103-106,119,122,206,217,233,247}.

Six other less frequently mentioned themes were linked to the Emotion domain of the TDF which are summarized in Table 3.

Intentions – TDF domain (9 of 14) within the Motivation component of the BCW

Theme: Motivation to work with at-risk drinkers. In 2 qualitative studies from Australia and the UK, GPs acknowledged they were not interested in dealing with alcohol problems^{244,246}. The majority of the GPs in 8 from a total of 10 quantitative studies felt unmotivated to work with at-risk drinkers^{29,89,103,119,122,206,211,233,234,247}. In 1 survey study from Sweden, nurses scored neutral on a motivational scale from 1 to 7²⁸. The majority of the GPs from several countries^{104,105,107,116}, and of the nurses in 1 UK based study¹⁰⁴, reported that more training in brief interventions would increase their motivation to work with at-risk drinkers. Only 17 to 33% of the GPs from Sri Lanka and the UK agreed they would be more willing to work with at-risk drinkers if financial incentives were provided^{104,107}.

Theme: Therapeutic Commitment. Five quantitative studies (4 on GPs and 1 in both GPs and nurses) employed a validated scale for measuring GPs' and nurses' predisposition to working therapeutically with at-risk drinkers^{113,114,116-118}. All 5 studies reported that the majority of these professionals were not therapeutically committed.

Goals – TDF domain (10 of 14) within the Motivation component of the BCW

Theme: Importance / Priority given to alcohol issues. Fourteen to 54% of the GPs in 3 quantitative studies considered alcohol an unimportant issue in PHC^{29,89,116} and was deemed easy to forget to ask by GPs from the Nordic countries^{197,218}. Creating a specific billing code for this area was reported by some Norwegian GPs as a facilitator to increase GPs awareness of the importance of alcohol-related problems²³⁸.

Theme: Time. Alcohol is not a goal priority for GPs because they are too busy, which makes them to neglect alcohol issues in favour of other presenting problems^{29,89,94,116,223,244,245}. Implementing a short questionnaire in the registration system¹⁹⁵, increasing knowledge that a brief intervention costs little time and can be effective¹⁹⁵, and arranging for more time per consultation to discuss alcohol use with patients^{94,195,214,221,236} were suggested as facilitators.

Reinforcement – TDF domain (11 of 14) within the Motivation component of the BCW

Theme: Incentives. The majority of the GPs in 3 quantitative studies reported that alcohol SBI activities are not reimbursable under government health schemes^{29,116,223}. In 1 qualitative study from Australia, GPs alluded that advising patients to reduce their drinking was not financially rewarding²⁴⁶ but only 13% of the GPs agreed with this in a mixed-methods study from the UK²³⁴. Training was cited as an important facilitator in 2 survey studies from Sweden and the UK^{28,29}. Three qualitative studies reported that GPs and nurses would feel incentivized if financial reimbursement for providing brief interventions for alcohol was available^{195,221,244}; however, only 24% of the GPs and nurses in 2 survey studies from the Nordic countries agreed with this^{28,192}.

Optimism – TDF domain (12 of 14) within the Motivation component of the BCW

Theme: Beliefs about the ability to deliver SBI and in helping patients to cut down. Two quantitative studies from New Zealand and the UK found that 13 to 28% of the GPs felt pessimistic about what they could do to help at-risk drinkers^{103,204}. More training for

improving counselling skills^{29,199} and feedback on successful cases²¹⁵ were reported as facilitators.

Opportunity (BCW Component 3) (Table 4)

The 17 themes in the Opportunity component of the BCW emerged from 66 studies from 25 countries as shown in Table 4. The majority of the studies (n=33) were quantitative in design and reported data mainly from GPs alone (n=44).

Environmental Context and Resources – TDF domain (13 of 14) within the Opportunity component of the BCW

Theme: Time. GPs and nurses often cited time constraints as a barrier for implementing alcohol SBI. For some doctors and nurses, alcohol SBI is too time-consuming^{216,234,245} and they are already too busy dealing with other problems^{29,89,94,116,223,245}. More time per consultation^{94,195,214,221,236}, more experience in delivering brief interventions²³², simpler screening processes (e.g. short and simple screening tools, giving patients self-report questionnaires)¹⁹⁵, and increasing knowledge that a brief intervention costs little time and can be effective¹⁹⁵ were reported as facilitators.

Theme: Support. Data from both qualitative and quantitative studies show that, in general, providers feel they could be working in a more supportive environment for delivering alcohol SBI. The majority of the GPs in 3 survey studies reported lack of support from government health policies^{29,116,223}. Most GPs in 1 study from South Africa reported difficulties in referring patients to specialized services²⁵³; however, this was not an issue for the majority of the GPs from Canada and Sweden^{214,251}. Only 35% of the GPs in 1 UK based study agreed that there is adequate support for GPs from specialized alcohol services¹⁰⁶. Better co-operation with specialized services^{28,104,105,195,221}, involving other professionals in general practice (e.g. an addiction consultant or a specialized nurse)^{195,215,244}, public health educational campaigns^{29,89,116,238,249}, and more media attention^{195,249} were among the most commonly cited facilitators.

Table 4. Themes of barriers and facilitators coded to each of the 2 domains of the TDF within the Opportunity component of the BCW

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators	
Environmental Context and Resources	Time	Survey (16)	UK(10); Sweden(7); Australia(5);	28, 29, 88, 98-102, 111,	88, 119, 194, 213, 214, 220, 231, 235	
		Focus groups (11)	US(5); Finland(2); Multicountry(2);	114, 116, 192, 196-198,		
		Interview (7)	Norway(2); Slovenia(2); Canada(1);	200, 202, 206, 207, 209,		
		Mixed methods (3)	Denmark(1); Netherlands(1); New	213-217, 222, 226, 230,		
	Support	FG + Int (2)	Zealand(1); Portugal(1); South	231, 233, 235, 237, 241,		
		Delphi (1)	Africa(1); Sri Lanka(1)	243-245, 247, 249, 254		
		Post-intervention (1)				
		RCT (1)				
		Survey (24)	UK(12); Multicountry(4); Canada(3);	29, 88, 101, 109, 111,	28, 29, 88, 98-100, 102, 111, 116, 191, 192, 194, 213, 214, 220, 223, 235, 237, 238, 243, 248	
		Focus groups (5)	Finland(3); New Zealand(2);	203-205, 207, 209, 213,		
		Interview (3)	Norway(2); South Africa(2);	214, 218, 221, 222, 227,		
		FG + Int (2)	Sweden(2); US(2); Brazil(1);	234, 239, 243, 246, 247,		
		Mixed methods (2)	France(1); Italy(1); Netherlands(1);	250, 252		
		Delphi (1)	Slovenia(1); Sri Lanka(1);			
Delphi + Focus groups (1)						
Resources	Resources	Survey (9)	Finland(4); Sweden(3); UK(3);	27-29, 111, 116, 193,		27-29, 88, 111, 116, 192, 194, 203, 213, 227, 237
		Focus groups (5)	Australia(2); Multicountry(2);	196, 206, 207, 212, 217,		
		Interview (3)	Canada(1); Netherlands(1); New	222, 241, 247		
		Delphi (1)	Zealand(1); Norway(1); Slovenia(1);			
		FG + Int (1)	South Africa(1); US(1)			
		Mixed methods (1)				
		PP intervention (1)				
Patients' denial of the problem and resistance to accepting treatment	Patients' denial of the problem and resistance to accepting treatment	Survey (6)	Australia(2); US(2); Brazil(1);	196, 200, 204, 206, 207,		
		Interview (3)	Canada(1); France(1); Finland(1);	209, 216, 225, 235, 250,		
		Focus groups (1)	New Zealand(1); Norway(1);	251		
		Mixed methods (1)	Sweden(1)			

Table 4. Themes of barriers and facilitators coded to each of the 2 domains of the TDF within the Opportunity component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Environmental Context and Resources	Patients' feelings when asked about their drinking	Survey (5)	UK(3); Multicountry(2); US(2);	28, 29, 88, 111, 116, 204,	206, 231
		Focus groups (3)	Australia(1); France(1); New	214, 235, 241, 253	
		Interview (3)	Zealand(1); Slovenia(1); Sweden(1);		
		Mixed methods (1)			
	Organisation for preventive counselling	Focus groups (7)	UK(5); Sweden(4); Slovenia(2);	29, 111, 200, 217, 222,	123, 194, 196, 202, 213, 214, 216, 220, 230, 231, 235, 237
		Survey (6)	Australia(1); Canada(1); Finland(1);	228, 241, 247	
		Interview (4)	Multicountry(1); Netherlands(1); New		
Delphi (1)		Zealand(1); Norway(1); South			
FG + Int (1)		Africa(1); US(1)			
	RCT (1)				
Incentives for patients	Survey (5)	Multicountry(2); UK(2); Canada(1);	29, 88, 111, 222, 227,	248, 250	
	Focus groups (1)	Italy(1); South Africa(1)			
	Interview (1)				
Patients' beliefs about alcohol	Interview (3)	Finland(2); UK(2); New Zealand(1)	192, 193, 228, 243	235	
	Focus groups (1)				
	Survey (1)				
Patients with alcohol problems do not attend their appointments	Interview (2)	UK(2); Denmark(1); New Zealand(1)	198, 233, 235, 243		
	FG + Int (1)				
	Mixed methods (1)				
Patients' receptiveness to alcohol interventions	Interview (2)	Australia(1); Denmark(1); New	198, 243, 254	206, 226, 235	
	Focus groups (1)	Zealand(1); Norway(1); UK(1); US(1)			
	FG + Int (1)				
	Mixed methods (1)				
	RCT (1)				

Table 4. Themes of barriers and facilitators coded to each of the 2 domains of the TDF within the Opportunity component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Environmental Context and Resources	Delivering SBI can make other patients suffer	Mixed methods (1) Survey (1)	Sweden(1); UK(1)	216, 233	
	Familiarity with the patient	Focus groups (1) Interview (1)	UK(2)	243	214
Social Influences	Patients' feelings when asked about their drinking	Focus groups (5) Survey (5) Interview (4) Mixed methods (1)	UK(4); Multicountry(2); US(2); Australia(1); Brazil(1); France(1); New Zealand(1); Norway(1); Slovenia(1); Sweden(1)	28, 29, 88, 111, 116, 204, 214, 227, 231, 235, 237, 241, 251, 253	206, 231
	Patients' reactions when asked about alcohol	Interview (5) Survey (3) Mixed methods (2) Focus groups (1) FG + Int (1)	UK(4); Sweden(3); Australia(1); Denmark(1); Finland(1); Multicountry(1); Norway(1)	88, 198, 213, 216, 223, 225, 228, 233, 240, 243	196-198
	Doctors' and nurses' permissiveness towards alcohol	Interview (3) Survey (3)	UK(2); Finland(1); Multicountry(1); Sweden(1); US(1)	28, 111, 116, 196, 228, 253	
	Patients seeking help	Interview (4) Survey (4)	Finland(2); Multicountry(2); UK(2); Brazil(1); France(1)	27, 196, 204, 251	29, 88, 111, 116, 196
	Support	Survey (11) Focus groups (5) Interview (3) Mixed methods (2) Delphi (1) Delphi + Focus groups (1)	UK(8); Multicountry(3); Finland(2); Norway(2); Slovenia(2); Sweden(2); Italy(1); Netherlands(1); New Zealand(1); Sri Lanka(1)	221, 237, 241	28, 29, 88, 98-100, 102, 111, 116, 191, 192, 194, 213, 214, 220, 223, 235, 237, 238, 243, 248

Table 4. Themes of barriers and facilitators coded to each of the 2 domains of the TDF within the Opportunity component of the BCW (cont.)

TDF	Theme	Study type (no)	Countries (no)	References on barriers	References on facilitators
Social Influences	Patients' receptiveness to alcohol interventions	Interview (2)	Australia(1); Denmark(1); New Zealand(1); Norway(1); UK(1); US(1)	198, 243, 254	206, 226, 235
		Focus groups (1)			
		FG + Int (1)			
		Mixed methods (1)			
		RCT (1)			
	Role legitimacy	Focus groups (1)	Norway(1); US(1)	237, 253	
		Interview (1)			
	Presence of third parties in the consultation	Interview (1)	New Zealand(1)	235	

BCW – Behaviour Change Wheel; FG + Int – Focus groups + Interview; PP – Pre-post; RCT – Randomized controlled trial; SBI – Screening and brief interventions;

TDF – Theoretical Domains Framework

Theme: Resources. GPs from several countries reported that more resources are needed for implementing alcohol SBI. Lack of resources included lack of screening tools^{28,29,89,116,218,223,248}, lack of counselling materials^{27-29,89,116,248} and lack of specific guidelines²⁴²; availability of these resources and displaying information in the waiting room (e.g. posters) were reported as facilitators in several studies^{28,29,89,94,116,193,195,204}.

Theme: Patients' denial of the problem and resistance to accepting treatment. This theme was identified by both GPs and nurses in 11 studies, evenly balanced between qualitative and quantitative studies. Resistance included refusal to accept the diagnosis and refusal to accept help (including specialized treatment).

Theme: Patients' feelings when asked about their drinking. Fear of embarrassing or insulting the patient by asking about alcohol was considered a barrier in 4 qualitative studies on GPs^{94,215,236,242} and in 2 qualitative studies on nurses^{215,254}. However, evidence from 5 quantitative studies suggests that only a minority of the GPs think that patients would resent being asked about their drinking^{28,29,89,116,205}.

Theme: Organization for preventive counselling. Three survey studies from several countries found that between 40 to 86% of the GPs agreed that general practices are not organized for preventive counselling^{29,116,223}. Lack of organization for preventive counselling included issues such as an absence of implementation strategies, lack of support from the health care system and alcohol-related illiteracy of the receptionists. GPs and nurses often cited improving professional teamwork (e.g. having a practice nurse delivering SBI, having receptionists giving patients screening tools) as a facilitator^{127,195,197,203,214,215,217,221,231,232,236,238}.

Six other less frequently mentioned themes were linked to the Environmental Context and Resources domain of the TDF which are summarized in Table 4.

Social Influences – TDF domain (14 of 14) within the Opportunity component of the BCW

Theme: Patients' reactions when asked about their drinking. Both doctors and nurses in 6 qualitative studies expressed their concern about negative reactions from patients when discussing alcohol issues^{94,199,224,226,229,244}. Although this can be a concern for some providers, the majority of both doctors and nurses mentioned that this is the

exception rather than the rule in 3 out of 4 studies^{214,217,234,241}. Experiencing with SBI could act as a facilitator; in 2 qualitative studies, GPs referred that most patients had positive reactions to screening^{197,199}.

Theme: Doctors' and nurses' permissiveness towards alcohol. Some GPs recognized that they have liberal attitudes towards alcohol. In 1 qualitative study from Finland it was pointed that GPs are members of the community and that it is only natural that they have the same attitudes towards alcohol as their patients¹⁹⁷. In 2 qualitative studies from the UK and the US, nurses reported that societal acceptance of heavy drinking can make them hesitate to assess for alcohol in their patients^{229,254}.

Theme: Patients seeking help. Patients not seeking help for their alcohol use was an important barrier for some. Nurses in 1 Brazilian study mentioned that patients might not regard PHC as the right setting to be treated²⁵² while GPs in 1 Finnish study reported that patients hesitate to talk about alcohol because it is considered a sensitive issue¹⁹⁷. Having patients requesting advice was mentioned as a facilitator by 77 to 93.4% of the GPs in 3 survey studies^{29,89,116}.

Five other less frequently mentioned themes were linked to the Social Influences domain of the TDF which are summarized in Table 4.

Discussion

The aims of this review were to identify barriers and facilitators that may influence GPs' and primary care nurses' routine delivery of alcohol SBI in adults and to map the identified barriers and facilitators to the BCW/TDF frameworks. The review identified a range of barriers and facilitators to implementation that linked to all the domains of the BCW/TDF.

We mapped the barriers and facilitators identified in this review to the theoretical domains of the BCW/TDF. The barriers represent potential targets for changing GPs and nurses practice behaviour; the facilitators suggest potential interventions to bring about the desired behaviour change. The analysis linked all the TDF domains within each condition (capability, opportunity and motivation) of the BCW's model of behaviour to at least one of the barriers identified. This suggests that increasing all aspects of capability, opportunity and motivation may be needed for successfully

implementing alcohol SBI in primary health care. Furthermore, several barriers linked to more than one TDF domain suggesting that complex and comprehensive strategies for addressing particular barriers may be needed to support implementation. For example 'lack of time' linked to the TDF domains 'environmental context and resources' and 'beliefs about capabilities'. Restructuring the environment (e.g. involving receptionists in the screening process, arranging for more time per consultation) and modelling (e.g. demonstrating that it is possible to advise at-risk drinkers within the time of the consultation) are examples of strategies that could be used to address this barrier. These findings demonstrate the considerable challenges researchers face in implementing alcohol SBI in primary care settings and help to explain why the implementation of alcohol SBI in primary care has been proven difficult to achieve.

The analysis identified the following TDF domains in each condition of the BCW's model of behaviour as having the highest number of data units coded: 'Environmental Context and Resources' (Opportunity); 'Beliefs about Capabilities' (Motivation); and 'Skills' (Capability). Comparatively, few data units were linked to the following domains: 'Behaviour Control' and 'Memory, Attention and Decision Processes' (Capability); and 'Optimism' (Motivation). Caution should be exerted when deciding which domains to intervene based on the frequency a particular barrier is reported in the literature. For example, several cross-sectional studies surveyed GPs and nurses based on existing questionnaires which inflates the number of times a particular barrier and/or facilitator is cited. On the other hand, it is possible that important barriers to implementation linked to these TDF domains are yet to be identified, which could give the idea that addressing these domains are less likely to influence implementation. More research is needed that focus on less well-studied barriers to help to decide on their importance. Huijg and colleagues developed a TDF-based questionnaire²⁵⁶ that could be tailored to study these less explored barriers.

In a previous review, Johnson and colleagues identified barriers and facilitators to implementing alcohol screening and brief interventions for alcohol misuse¹⁰⁸. This review included studies from settings other than primary care and gave priority to studies judged to best inform the UK practice. Although the authors have not established any language restrictions, all the articles included in the review were

published in English language. The present review updates the Johnson *et al.* review concerning the barriers and facilitators to implementation in primary care practices. Firstly, the present review provides evidence on barriers and facilitators from several countries that were not limited to inform a particular practice. One recently published survey study conducted in the largest five European Union countries found that the most frequently cited barriers to implementing alcohol screening among patients with hypertension varied substantially from country to country²⁵⁷. This shows that the barriers to and facilitators of implementation can vary substantially, even between countries that are in geographic proximity, and that successful implementation of alcohol SBI depends on tailoring the intervention to local needs²⁵⁸. Hence, this review could be helpful for aiding implementation researchers in the selection of the barriers and facilitators that are more meaningful locally. Secondly, this review was informed by a theoretical framework of behaviour change. Most programmes in practice and research have lacked a theoretical rationale for how they would change practitioner behaviour^{144,145,259}. Understanding how identified barriers and facilitators fit with the theoretical understandings of behaviour change are key to inform the design of interventions that may have a higher chance of successfully changing practitioner behaviour. As an example, we have used the results of this review to inform the design of a trial whose protocol has been published²⁶⁰ (Chapter 5), which was considered key alcohol research by the Oxford University Press Journals²⁶¹. Therefore, this review may also support researchers in the design of novel theory-based interventions.

Implications for the implementation of alcohol SBI

Notwithstanding the above-mentioned need to tailor the intervention to local needs, mapping the barriers to the domains of the BCW/TDF framework allowed for the identification of several content themes that may prove useful for implementation researchers in designing future interventions. Therefore, four key recommendations are suggested based on the results of this review: 1) to develop training programmes for PHC staff; 2) to improve practice organization for preventive counselling; 3) to provide the PHC practices with materials for delivering SBI; and 4) to involve other key stakeholders in the implementation process.

1) Develop training programmes for PHC staff

Both GPs and nurses identified lack of knowledge and skills as hindering factors for the systematic delivery of alcohol SBI. Unfamiliarity with risky drinking guidelines, difficulties in defining the low risk drinking limits, difficulties in differentiating between harmful drinking and alcohol dependence, not knowing how to identify asymptomatic risky drinkers, unawareness of standardized screening tools and not knowing how to deliver a brief intervention are examples of issues that may need to be included in training programmes. Training could also be designed to address providers' motivational issues such as lack of confidence in their ability to deliver alcohol SBI, concerns about the efficacy of brief interventions, low self-efficacy, stigma around alcohol problems, believing that patients would resent being asked about alcohol, believing that delivering SBI is difficult, and lack of time.

2) Improve practice organization for preventive counselling

Several GPs reported that primary care practices lack systematic strategies for identifying and advising at-risk drinkers. Strategies for improving practice organization could include involving receptionists in the screening process, having nurses screening for and/or advising at-risk drinkers, and having simple to use screening tools implemented in frequently used questionnaires or registration systems.

3) Provide PHC practices with materials for delivering SBI

GPs commonly reported lack of materials for delivering alcohol SBI as an important barrier. Providing PHC practices with guidelines, screening and advice tools, and other materials for patients (e.g. posters to display in the waiting room, self-help booklets) are examples of enabling factors to integrate alcohol SBI delivery into practice.

4) Involve key stakeholders in the implementation process

Many GPs and nurses reported they were not working in a supportive environment. Involving PHC management, policymakers, specialized health services, media and available community resources could be key for a successful implementation of alcohol SBI in practice.

Recommendations for future research

The majority of the studies reported GPs views towards the implementation of alcohol SBI. The views of the nurses are less well studied, although they are regarded as an underutilized resource for implementing alcohol SBI. Future research could endeavour to better characterize the barriers and facilitators nurses face when implementing alcohol SBI in primary care practices.

Identifying differences in barriers and facilitators between low and high-income countries was not an objective of this review. The majority of the studies retrieved pertain to high-income countries which means that the results of this review may not be representative of the low-income countries. More research is needed to determine what differences exist between high and low-income countries.

Strengths and limitations

The inclusion of both quantitative and qualitative studies from the onset of literature is a strength of this review as it provides a comprehensive understanding of the factors that influence the implementation of alcohol SBI in primary care practices. This does not mean that all barriers and facilitators will be relevant to all settings; implementation researchers must decide on what makes sense locally. Another strength of this review is that no limitation was applied to the countries in which the study was conducted. This allows researchers to directly use data from their own countries and/or to use data from countries that they judge to be meaningful locally. A final strength of this review is that it was informed by a theoretical framework to guide the identification of the barriers and facilitators. We were able to link all extracted data to the domains of the TDF, which shows that this framework could be useful to support

researchers in designing interventions for implementing alcohol SBI in primary care practices.

A limitation of this review is that it identified barriers and facilitators from the perspective of the GPs and nurses only. GPs and nurses often cited the need to involve other PHC staff (e.g. receptionists) in the implementation efforts. Hence, knowing the views of other PHC professionals, management and patients could have been important for a thorough understanding of the factors influencing implementation. This review was limited to studies published in English, French, Portuguese and Spanish. Although we believe that the majority of the scientific literature is published in these languages, it is possible that the results of this review may have not captured factors influencing implementation from studies published in other languages. Finally, we limited our search to four databases. Searching for other databases and grey literature could have identified any other important barriers and facilitators that may have not emerged in the included studies.

Conclusions

This study identified a wide range of potential barriers and facilitators to the implementation of alcohol SBI delivery in primary care practices and adds to the scarce body of literature that identifies the barriers and facilitators from a theoretical perspective. Given that alcohol SBI is seldom implemented, this review provides researchers with practical evidence for designing novel theory-oriented interventions to support the implementation of this activity in primary health care.

CHAPTER 4

RESULTS

RESEARCH QUESTION 2

RESEARCH QUESTION 2 – Can family physicians be divided into distinct groups based on their attitudes to addressing alcohol issues in their patients?

Objective 2.1. To identify a typology of family physicians based on their attitudes toward patients with excessive alcohol consumption;

Objective 2.2. To develop and validate a model for classifying family physicians into distinct groups;

Objective 2.3. To compare the identified groups regarding demographics, alcohol-related clinical practice, knowledge of sensible drinking limits, and barriers and facilitators to working with patients with excessive alcohol consumption.

Can doctors be divided into groups based on their attitudes to addressing alcohol issues in their patients? Analyses from a survey of Portuguese general practitioners

Frederico Rosário, Marcin Wojnar, Cristina Ribeiro

Summary

Introduction. The effectiveness of interventions to increase general practitioners' management of alcohol problems is affected by their attitudes towards at-risk drinkers. Tailoring training programmes to general practitioners' attitudes may be useful in increasing alcohol screening and brief interventions.

Objectives. To determine if general practitioners could be divided into distinct groups on the basis of their attitudes towards at-risk drinkers; to develop and validate a model for classifying general practitioners into distinct groups; and to compare the two groups regarding demographics, alcohol-related clinical practice, knowledge of sensible drinking limits, and barriers and facilitators to working with at-risk drinkers.

Methods. A random sample of 234 Portuguese general practitioners answered the questionnaire. The questionnaire asked questions on demographics, alcohol-related clinical practice, knowledge of sensible drinking limits, barriers and facilitators to working with at-risk drinkers, and physicians' attitudes to working with at-risk drinkers. Attitudes were measured with the Short Alcohol and Alcohol Problems Perception Questionnaire. Cluster analysis was performed to identify distinct general practitioners groups on the basis of their attitudes towards at-risk drinkers. Logistic regression analysis was used to develop a model for predicting group membership.

Results. Cluster analysis identified two distinct groups of general practitioners, one with more positive attitudes (adequacy=10.8±1.6, legitimacy=11.8±1.7, motivation=9.8±1.7, satisfaction=8.1±1.9, self-esteem=9.7±2.1), the other with more negative attitudes (adequacy=8.9±1.8, legitimacy=11.0±1.8, motivation=7.8±1.6, satisfaction=5.7±2.0, self-esteem=6.8±1.7). The predictors in the final model were self-esteem, motivation, and adequacy. The model predicted general practitioners groups on the training set with 90.4% accuracy (area under ROC curve 0.96) and maintained its predictive performance when applied to the test set (accuracy 93.6%, area under

ROC curve 0.97). General practitioners with more positive attitudes were younger ($p=0.005$), less experienced ($p=0.04$) and had a higher male proportion ($p=0.01$) when compared to the group with more negative attitudes. The group with more positive attitudes also had more hours of postgraduate training ($p<0.001$), felt more prepared to counsel risky drinkers ($p<0.001$) and considered themselves to have better counselling efficacy ($p<0.001$). More GPs in the group with more negative attitudes considered that doctors cannot identify asymptomatic at-risk drinkers ($p=0.01$) and believed counselling is difficult ($p=0.005$).

Conclusions. General practitioners can be divided into distinct groups on the basis of their attitudes towards at-risk drinkers. The group with more positive attitudes had more education on alcohol and reported fewer barriers to work with at-risk drinkers. These findings may prove useful in designing alcohol-specific training programmes for general practitioners.

Introduction

Alcohol ranks among the most important risk factors for the global health burden¹⁶. Screening and brief intervention (SBI) for excessive alcohol consumption is a highly effective and cost-effective intervention when conducted in primary healthcare settings^{69,70,81-83,262}. General practitioners/family physicians (GPs) are ideally positioned to reduce the alcohol-related health burden by advising at-risk drinkers⁹⁰. Although GPs strongly support GP-delivered early intervention for alcohol problems⁹⁴, the majority of them do not routinely deliver such interventions^{28,88,184,185}.

Lack of training is one of the most commonly cited barriers to the widespread delivery of SBI in primary care^{29,89,90,116,119,263}. Considerable efforts have been made to develop training programmes that improve the implementation of SBI by GPs, with modest results at best¹³³. We have yet to determine which components are effective in designing training programmes²⁶⁴.

Addressing GPs' attitudes towards working with at-risk drinkers is one promising training component^{113,265}. Anderson and colleagues found that training and support programmes work differently depending on whether GPs have positive or negative attitudes¹¹³. In this study, training and support increased SBI rates for GPs who felt secure and committed to working with problem drinkers but had no effect for those who were already insecure and uncommitted. The authors concluded that "*in the absence of role security and therapeutic commitment, the impact of professionally and organizationally based programmes is considerably diminished*"¹¹³. This suggests the existence of two distinct groups of GPs based on their attitudes towards problem drinkers. However, the authors came to these findings after having subjectively dichotomized GPs based on the median scores for the role security and therapeutic commitment scales in the Short Alcohol and Alcohol Problems Perception Questionnaire (SAAPPQ). This approach has three important limitations. First, it assumes that only two groups exist. Second, it assumes that the median is the most appropriate cut-off to identify the groups. Finally, it does not provide a tool to classify GPs into distinct groups. This method cannot, therefore, be used to tailor training programmes to GPs' attitudes or to measure the efficacy of the training programme for specific groups. To fill this gap in the evidence base, we conducted a survey of Portuguese GPs. We aimed to determine if GPs could be divided into distinct groups on

the basis of their attitudes towards at-risk drinkers and to develop and validate a model for classifying GPs into distinct groups. Another aim of this study was to characterize the groups by comparing their characteristics and views on barriers and facilitators for alcohol SBI.

Methods

Study population and sample

A random sample was drawn from the Portuguese national GPs database after being stratified by geographic location, age and sex. Participants were invited by email to complete the Optimizing Delivery of Health Care Interventions (ODHIN) online survey. Briefly, ODHIN was a four-year project involving research institutions from nine European countries. Research focused on the implementation of identification and brief intervention programmes for hazardous and harmful alcohol consumption in primary health care (detailed information available at <http://www.odhinproject.eu/>). Given that response rates to Web-based surveys are often low²⁶⁶, we assumed a response rate of 30%. A total of 850 GPs were invited to achieve a sample size of 250. Two email reminders were sent to increase participation.

Survey instrument and data collection

The survey was conducted from April to June 2012. Participants filled in the questionnaire via a secured website. GPs received an email invitation to participate in the study. The email contained information about the study and a link to the questionnaire's website. The questionnaire was adapted from questionnaires applied in the World Health Organization Phase III strand I study¹¹⁴ and in a primary care survey conducted in England⁸⁹. The questionnaire asked GPs to report on: demographics; education and training on alcohol; what they considered to be the upper limit for alcohol consumption before advising a healthy man or a nonpregnant healthy woman to reduce or stop drinking; alcohol-related clinical practice; barriers and facilitators for implementation of alcohol SBI; and attitudes towards at-risk drinkers, measured with the SAAPPQ. The SAAPPQ (Table 5) is a validated instrument with 10

items scored on a seven-point Likert scale ranging from “strongly disagree” to “strongly agree”^{112,119}. The responses were summed within the five domains of adequacy, legitimacy, motivation, task-specific self-esteem, and satisfaction. For each domain, a score is obtained by adding the individual item scores. Adequacy and legitimacy can be summed to measure the latent factor “role security” (i.e. how secure GPs feel in managing of alcohol problems). Self-esteem, motivation, and satisfaction can be added to measure the latent factor “therapeutic commitment”¹¹³ (i.e. how therapeutically committed GPs feel in managing alcohol problems). Both self-esteem items and the second motivation item were reverse scored since they are phrased in the semantically opposite direction.

Table 5. The Short Alcohol and Alcohol Problems Perception Questionnaire.

Latent factor	Domain	Item
Role security	Adequacy: the extent to which GPs believe they have sufficient knowledge and skills to manage drinkers	I feel I know enough about the causes of drinking problems to carry out my role when working with drinkers.
		I feel I can appropriately advise my patients about drinking and its effects.
	Legitimacy: the extent to which GPs consider some aspects of their job as being their responsibility	I feel I have the right to ask patients questions about their drinking when necessary.
		I feel that my patients believe I have the right to ask them questions about drinking when necessary.
Therapeutic commitment	Motivation: the extent to which GPs want to work with drinkers	I want to work with drinkers.
		Pessimism is the most realistic attitude to take toward drinkers.
	Self-esteem: the extent to which GPs perceive their self-worth when dealing with drinkers	I feel I do not have much to be proud of when working with drinkers.
		All in all, I am inclined to feel I am a failure with drinkers.
Satisfaction: the extent to which GPs feel rewarded when working with drinkers	In general, it is rewarding to work with drinkers.	
	In general, I like drinkers.	

GPs – General practitioners/Family physicians

Data collection and ethical review

Participants answered the survey through a secured website. They received an e-mail invitation explaining the study's objectives, survey filing details, and a direct website link. The data collection method was completely anonymous and did not retain any information that could be used to differentiate respondents from nonrespondents. The study protocol received ethical approval from the Ethics Committee of the Faculty of Medicine of Lisbon (Ref. 233/14).

Data management

Previous education and training on alcohol was dichotomized from a self-reported ordinal scale into "less than four hours" or "four or more hours" of alcohol-specific education and training. Beliefs about GPs' effectiveness after being adequately trained in reducing patients' alcohol consumption was dichotomized into "effective" or "ineffective." According to the Portuguese guideline⁶², the upper limit of alcohol consumption was dichotomized as two standard drinks/day or any other answer for a healthy man and one standard drink/day or any other answer for a nonpregnant healthy woman. Alcohol-related clinical practice questions were recoded from a self-reported ordinal scale as follows: 'asking patients about alcohol even if they do not' was dichotomized into "All the time/Most of the time" or "Some of the time/Rarely or never"; 'obtaining information on patients drinking alcohol moderately' was dichotomized into "Always/As indicated" or "Occasionally/Rarely or Never"; 'preparedness to counsel patients reducing alcohol consumption' was dichotomized into "Very prepared/Prepared" or "Unprepared/Very unprepared"; 'effectiveness in reducing patients' alcohol consumption' was dichotomized into "Very effective/effective" or "Ineffective/Very ineffective"; 'number of times a blood test was requested in the last year because of concern about alcohol consumption' was dichotomized into "More than twelve times" or "Twelve times or less"; 'number of self-reported patients managed specifically for their hazardous drinking or alcohol-related problems in the last year' was dichotomized into "Less than seven" or "Seven or more." Finally, 'barriers and facilitators' were recoded as "Don't know/Not at all" or "Little/Quite a bit/Very much" to differentiate between physicians who expressed agreement with the statement and those in disagreement or who had no opinion.

Statistical analysis

Continuous data are presented as mean (SD) and categorical data as n (%). The sample was compared with the population of GPs practising in Portugal regarding age and sex with one sample t-test and one sample binomial test, respectively.

Attitude scores were submitted to hierarchical cluster analysis using Ward's method and squared Euclidean distance to determine whether meaningful groups of GPs could be identified. The Calinski-Harabasz criterion was used to confirm the results from the cluster analysis. The internal validity of the obtained groups was assessed with three validity measures: connectivity, Dunn index, and silhouette width. The stability of the groups was assessed with four measures: average proportion of non-overlap, average distance, average distance between means, and figure of merit²⁶⁷. Finally, a k-means cluster analysis was conducted to further improve the preliminary hierarchical classification using the hierarchical cluster centroids as initial centres. Next, the sample was randomly split into two sets to develop and validate the classification model. The training set (2/3 of GPs) was used for developing the model. The validation set (1/3 of GPs) was used as a holdout dataset to validate the model. Age and sex distributions between the training and validation sets were compared with independent samples t-test and chi-square test. Logistic regression was performed on the training set to examine the association of GPs' attitudes with the groups and to develop the classification model. The predictive performance of the model was examined by receiver operating characteristic (ROC) curve analysis and 5-fold cross-validation. The validation set was used to assess the performance of the model on unseen data. Finally, calibration was evaluated by comparing the observed versus expected probabilities using calibration plots.

The groups of GPs identified using the above-mentioned methodology were compared with independent samples t-test for continuous variables and chi-square or Fisher's exact test for categorical variables, as appropriate.

All statistical tests were two-sided. A p-value <0.05 was considered for significance. All statistical analyses were conducted using R[®] 3.0.2 (The R Foundation for Statistical Computing).

Results

Sample description

Two hundred and thirty-four GPs answered the questionnaire (response rate of 27.5%). The sample was, on average, middle-aged, and predominantly female (Table 6). Male physicians were older than females. The sample was representative of the age and sex distribution of GPs practising in Portugal (Table 6). Doctors had on average 23.0 ± 9.4 years of experience working as family physicians, and the majority were working in an urban (N=104, 44.5%) or mixed urban/rural (N=96, 41.0%) practice. Overall, physicians scored higher on role security domains than on therapeutic commitment domains (Table 7).

Table 6. Characteristics of the study participants and the population from which they were sampled.

	Sample	Population	Test statistic	p
Age – yr <i>Mean (SD)</i>	52.3 (8.7)	52.7 (8.4)	t(233) = -0.67	.50
Male	54.1 (8.1)	54.4 (7.5)	t(83) = -0.29	.77
Female	51.3 (8.9)	51.5 (8.8)	t(149) = -0.28	.78
Female sex – n (%)	150 (64.1)	3336 (60.2)	---	.23*

*binomial test

Identification of groups

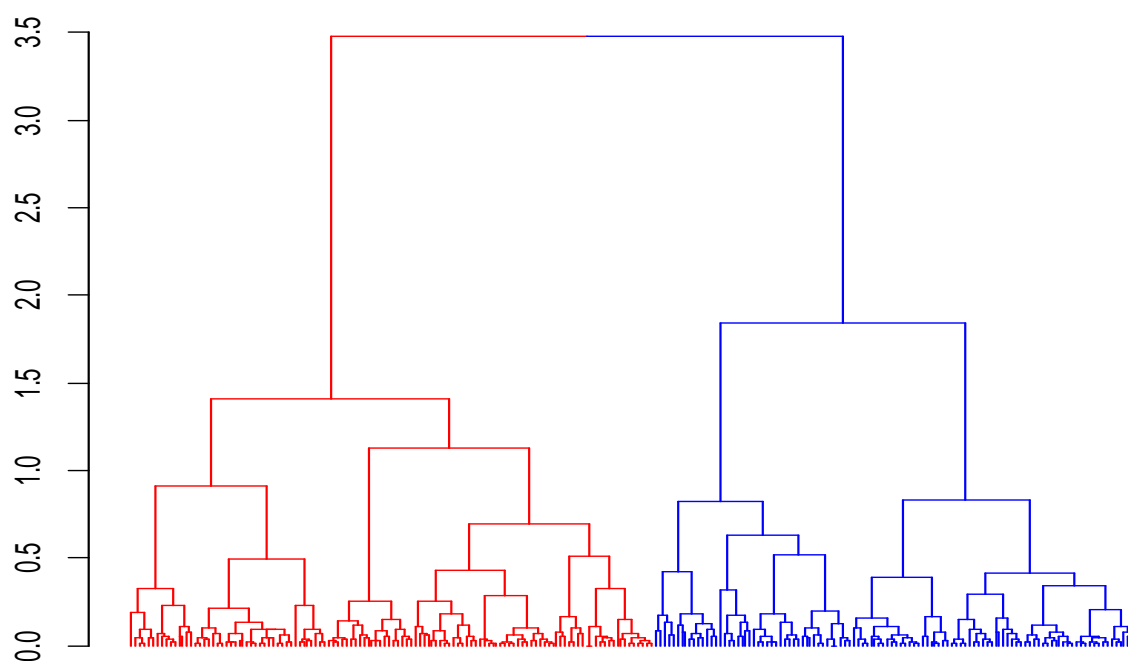
The hierarchical cluster analysis and the Calinski-Harabasz criterion showed that GPs could be divided into two distinct groups (Figure 11).

Table 7. GPs' scores on each domain of the SAAPPQ for the overall sample, and separately for each group.

	Overall sample (n = 234)	Group with more negative attitudes (n = 140)	Group with more positive attitudes (n = 94)
Adequacy	9.7 (2.0)	8.9 (1.8)	10.8 (1.6)
Legitimacy	11.3 (1.8)	11.0 (1.8)	11.8 (1.7)
Motivation	8.6 (1.9)	7.8 (1.6)	9.8 (1.7)
Self-esteem	7.9 (2.4)	5.7 (2.0)	8.1 (1.9)
Satisfaction	6.7 (2.2)	6.8 (1.7)	9.7 (2.1)

Values are presented as mean (SD). GPs – General practitioners / Family physicians; SAAPPQ – Short Alcohol and Alcohol Problems Perception Questionnaire

Figure 11. Identification of groups of GPs.



Shown is the sample dendrogram from the hierarchical cluster analysis with Ward's method showing separation into two major groups. GPs – General practitioners / Family physicians.

Cluster validation indices confirmed the internal validity and stability of the two groups. The two-cluster solution was further improved using k-means cluster analysis (Table 7). The largest group (n=140, 59.8%) was composed of GPs with more negative attitudes towards working with at-risk drinkers. Both groups scored, on average, above the midpoint of the adequacy and legitimacy domains. This suggests that GPs in both groups believed to have enough knowledge and skills to manage at-risk drinkers and that they considered addressing alcohol issues to be their responsibility. The group with more negative attitudes scored below the midpoint on all three therapeutic commitment domains, while the group with more positive attitudes scored above the midpoint on all these domains. These results show that the groups differed mainly in terms of their commitment to work with at-risk drinkers.

No differences were found between the training and the validation sets (Table 8). Logistic regression analysis showed that self-esteem (OR 2.87; 95%CI 1.88 to 4.38), motivation (OR 2.73; 95%CI 1.68 to 4.43) and adequacy (OR 2.58; 95%CI 1.67 to 3.97) were significantly associated with the groups. Legitimacy was not included in the final model because it was not a significant predictor. Satisfaction was excluded due to collinearity with self-esteem (variance inflation factor = 29.3).

Table 8. Comparison of training and test set characteristics.

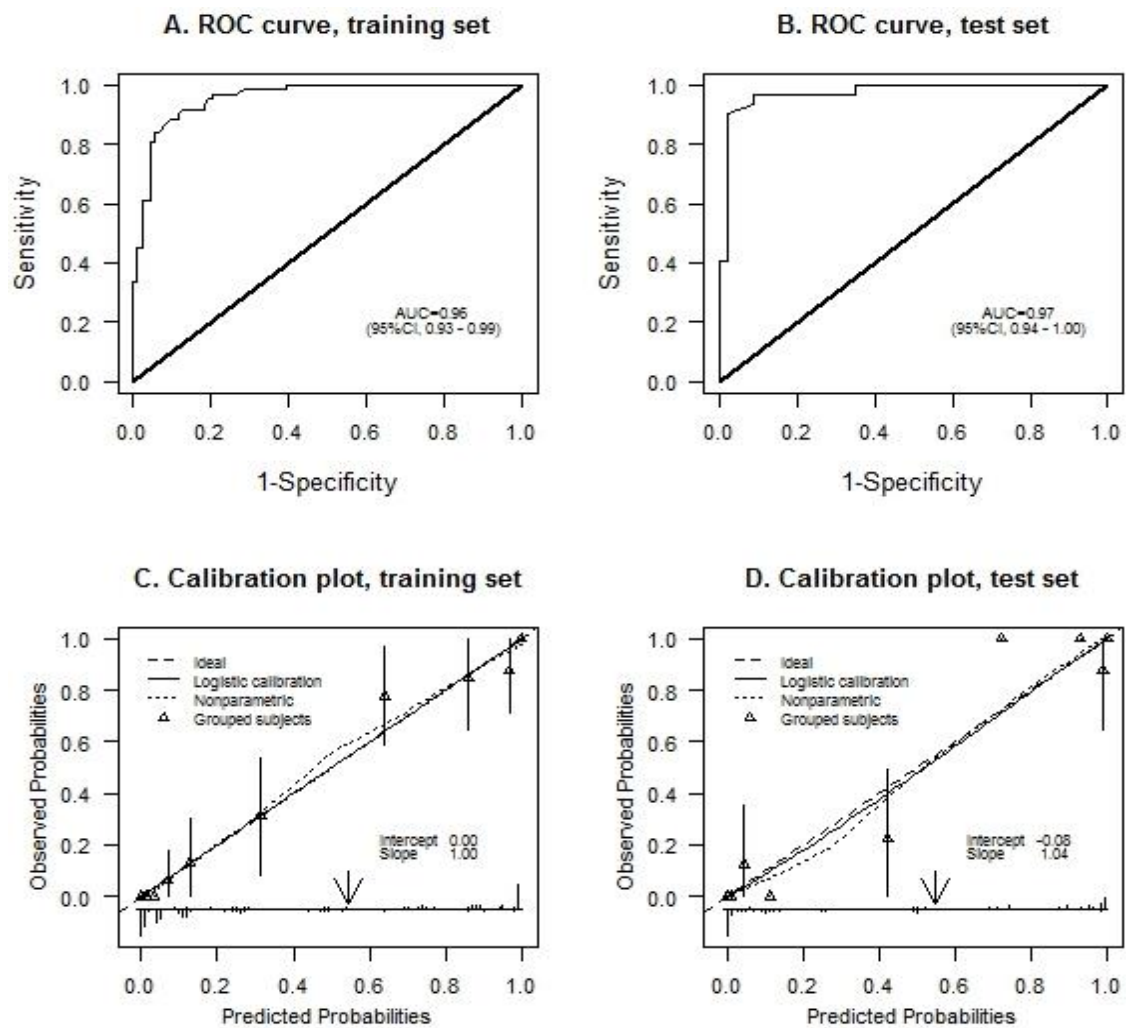
	Training set (n=156)	Validation set (n=78)	Test statistic	p
Age – yr, <i>Mean (SD)</i>	52.7 (8.6)	51.6 (9.0)	t(232) = 0.95	.34
Female sex – n (%)	97 (62)	53 (68)	$\chi^2(1) = 0.75$.39
SAAPPQ, <i>Mean (SD)</i>				
Adequacy	9.7 (1.8)	9.6 (2.3)	t(232) = 0.66	.51
Legitimacy	11.2 (1.8)	11.4 (1.9)	t(232) = -0.66	.51
Motivation	8.6 (1.9)	8.6 (1.9)	t(232) = -0.05	.96
Satisfaction	6.8 (2.2)	6.5 (2.4)	t(232) = 0.72	.47
Self-esteem	8.0 (2.2)	7.9 (2.7)	t(129.4) = 0.33	.74

SAAPPQ – Short Alcohol and Alcohol Problems Perception Questionnaire

Development and validation of the model

ROC curve analysis (Figure 12A) showed that the model had high discriminative ability to distinguish between GPs with more positive attitudes and those with more negative attitudes towards working with at-risk drinkers (Table 9). A cut-off point of 0.546 was optimal for predicting group membership. The performance of the model was confirmed in the validation set with excellent calibration (Figure 12C and 12D).

Figure 12. Receiver Operating Characteristic Curves and Calibration Plots for the Training and Test Sets.



Shown are ROC curves for the training set (Panel A) and the test set (Panel B). Panels C and D show the calibration plot for the training and test sets, respectively; vertical lines at the bottom of the plot indicate individual observations in the data set, the arrows indicate the cut-off point. The ideal and logistic calibration curves are virtually overlapped on both plots with minor changes in intercept (-0.08) and slope (1.04) for the test set (Panel D), showing excellent model calibration.

Table 9. Performance characteristics of the classification model.

	Training set		Validation set
	Development	Cross-validation	
AUC	.96 [.93 – .99]	.95 [.89 – 1.0]	.97 [.94 – 1.0]
Accuracy %	90.4 [84.4 – 94.3]	88.1 [78.1 – 98.2]	93.6 [85.0 – 97.6]
Sensitivity %	91.2 [80.0 – 96.7]	90.7 [75.3 – 100.0]	96.6 [80.4 – 99.8]
Specificity %	89.9 [81.8 – 94.8]	84.1 [61.3 – 100.0]	91.8 [79.5 – 97.4]
Agreement (kappa)		.75 [.54 – .96]	.87 [.75 – .98]

AUC – Area Under the Curve

Comparison of the groups

GPs with more positive attitudes towards at-risk drinkers were younger and less experienced and had a higher proportion of male doctors than the group with more negative attitudes (Table 10). The groups had similar practice distributions.

Table 10. Comparison of the groups regarding demographics.

	Group with more negative attitudes	Group with more positive attitudes	p
Age – yr <i>Mean (SD)</i>	53.7 (7.7)	50.3 (9.8)	.005 ^a
Years of practice <i>Mean (SD)</i>	24.0 (8.6)	21.4 (10.3)	.04 ^a
Female Sex n (%)	99 (70.7)	51 (54.3)	.01 ^b
Practice characteristic n (%)			
Urban	62 (44.3)	42 (44.7)	
Rural	23 (16.4)	11 (11.7)	.57 ^b
Mixed urban/rural	55 (39.3)	41 (42.7)	

^aIndependent samples t-test; ^bChi-square test; GP – General practitioner / Family physician

Education and Training on Alcohol. A majority of physicians (N=141, 60.3%) reported having less than 4 hours of training on alcohol and alcohol-related problems. Almost all doctors (N=220, 94.0%) believed that with adequate information and training family physicians would achieve higher effectiveness in helping patients to cut down

on their drinking. GPs with more positive attitudes towards at-risk drinkers reported having received more training in this specific area (Table 11). More doctors in this group also believed GPs could be more effective with proper training.

Table 11. Number of hours of training on alcohol received and views on effectiveness in reducing patients' alcohol consumption if properly trained.

	Group with more negative attitudes	Group with more positive attitudes	p ^a
<4 hours of post-graduate training, continuing medical education or clinical supervision on alcohol ever received n (%)	98 (70.0)	43 (45.7)	<.001
Agree GPs would be effective in helping patients reducing alcohol given adequate information and training n (%)	128 (91.4)	92 (97.9)	.04

^aChi-square test; GPs – General practitioners / Family physicians

Drinking Limits. Ninety-eight participants (41.9%) reported they would consider two standard drinks as the upper limit for alcohol consumption before they would advise a healthy adult man to cut down. A similar proportion (N=102, 43.6%) answered one unit per day when asked the same question for a nonpregnant healthy woman. We found no differences between the groups with respect to knowledge on sensible drinking limits (Table 12).

Table 12. GPs' knowledge of sensible drinking limits.

	Group with more negative attitudes	Group with more positive attitudes	p ^a
2 standard drinks/day is the upper daily limit for a healthy man n (%)	57 (40.7)	41 (43.6)	.66
1 standard drink/day is the upper daily limit for a non-pregnant healthy woman n (%)	62 (44.3)	40 (42.6)	.79

^aChi-square test; GPs – General practitioners / Family physicians

Alcohol-Related Clinical Practice. Most GPs (N=178, 76.1%) indicated they ask patients frequently about alcohol even if patients do not ask about it. A majority also reported: obtaining information on alcohol always or at least as indicated (N=210, 89.7%); feeling prepared to counsel patients to cut down (N=190, 81.2%); and feeling effective in helping patients to change their alcohol habits (N=141, 60.3%). Nearly six out of ten GPs (N=138, 59.0%) said they have taken or requested a blood test more than 12 times in the last year because of concern about alcohol consumption, and 69.7% (N=163) reported having managed in the last year at least 7 patients specifically for their hazardous drinking or alcohol-related problems. Both groups gave similar answers concerning alcohol-related clinical practice except when it comes to feeling prepared to counsel, and effective in helping, patients to cut down: more GPs with more positive attitudes felt prepared and effective in doing so (Table 13).

Barriers to Alcohol Screening and Brief Advice. In general, nearly half or more of the participants agreed with all suggested barriers. In respect to health provider-related barriers, GPs agreed that doctors: believe counselling is too difficult (N=212, 90.6%); are not trained in counselling for reducing alcohol consumption (N=196, 83.8%); do not know how to identify problem drinkers who have no obvious symptoms of excess consumption (N=173, 73.9%); feel awkward asking patients questions about alcohol (N=172, 73.5%); may have alcohol problems (N=161, 68.8%); have a disease model training (N=156, 66.6%); have a liberal attitude towards alcohol (N=149, 63.7%); and think preventive health should be patients' responsibility and not theirs (N=112, 47.9%). Regarding patient-related barriers, GPs agreed doctors believe patients would disregard their advice (N=190, 81.2%) and that they would resent being asked about alcohol (N=134, 57.3%). Concerning organizational barriers, GPs agreed doctors: lack suitable counselling materials available (N=196, 83.8%); are too busy dealing with other patients' problems (N=194, 82.9%); are not sufficiently encouraged by their contract to work with alcohol problems (N=193, 82.5%); and lack a suitable screening device available (N=184, 78.6%). GPs on both groups overlapped their views on most suggested barriers (Table 14). Their opinions differed only on two health provider-related barriers since more GPs in the group with more negative attitudes agreed doctors do not know how to identify problem drinkers who have no obvious symptoms

of excess consumption ($p=0.01$) and believed counselling is too difficult ($p=0.005$). We also found a trend towards more GPs in the group with more negative attitudes agreeing doctors feel awkward asking patients questions about alcohol ($p=0.07$).

Table 13. Alcohol-related clinical practice behaviours.

	Group with more negative attitudes n (%)	Group with more positive attitudes n (%)	p^a
Ask all the time/most of the time about alcohol even if patients don't	102 (72.9)	76 (80.9)	.16
Obtain always/as indicated information on patients' drinking alcohol moderately	124 (88.6)	86 (91.5)	.47
Feel prepared/very prepared to counsel patients reducing alcohol consumption	104 (74.3)	86 (91.5)	<.001
Feel effective/very effective in helping patients reducing alcohol consumption	68 (48.6)	73 (77.7)	<.001
Requested a blood test >12 times in the last year because of alcohol concern	77 (55.0)	61 (64.9)	.13
Managed ≥ 7 patients for alcohol in the last year	92 (65.7)	71 (75.5)	.11

^aChi-square test

Facilitators of Alcohol Screening and Brief Interventions. The vast majority of the GPs agreed with all suggested incentives to implement alcohol SBI. In respect to health provider-related facilitators, GPs agreed they would be encouraged to do more early intervention for hazardous alcohol consumption if early intervention for alcohol was proven to be successful (N=226, 96.6%). Concerning patient-related facilitators, GPs agreed they would be encouraged to do more early interventions if patients requested health advice about alcohol consumption (N=229, 97.9%) and if public health education campaigns in general made society more concerned about alcohol (N=228, 97.4%). As to organizational facilitators, participants agreed they would be encouraged

to do more early interventions if: general support services (self-help/counselling) were readily available to refer patients to (N=229, 97.9%); quick and easy counselling materials were available (N=228, 97.4%); training programmes for early intervention were available (N=226, 96.6%); quick and easy screening questionnaires were available (N=222, 94.1%); and salary and working conditions were improved (N=192, 82.1%). GPs in both groups showed similar views on all suggested barriers (Table 15).

Discussion

This study shows that Portuguese GPs can be divided into two groups based on their attitudes towards at-risk drinkers. We have also developed and validated a model for predicting groups of GPs towards working with these patients. GPs with more positive attitudes reported fewer constraints to implement alcohol SBI.

Previous research in this field focused on identifying groups of GPs based on their attitudes towards alcohol and other drugs. Roche & Richard identified three groups of GPs that differed on their willingness to intervene with patients with alcohol and drug problems¹⁸⁵. Amaral-Sabadini and colleagues identified two groups of primary care providers that differed on their readiness to work with patients with unhealthy alcohol and other drug use¹²⁴. One disadvantage of mixing views on alcohol and other drugs is that attitudes towards illegal drugs are usually more negative than towards alcohol^{124,268,269}. This is an important aspect to take into account when designing training programmes because alcohol-specific training increases alcohol SBI rates to a greater extent than more general substance abuse educational programmes¹³³. To our knowledge, this is the first study to identify distinct groups of GPs on the basis of their attitudes towards at-risk drinkers and to provide an objective way of classifying GPs to a specific group. This knowledge could be useful to improve the impact of alcohol-specific training programmes by better addressing the emotional needs of the GPs. For instance, the group with more negative attitudes could benefit from training programmes that use techniques aiming to increase their self-esteem (for example, focusing on past successes when working with at-risk drinkers)^{143,179}.

Table 14. Agreement with selected barriers to the implementation of alcohol screening and brief interventions.

	Group with more negative attitudes agree n (%)	Group with more positive attitudes agree n (%)	p ^a
Doctors are just too busy dealing with the problems people present with	120 (85.7)	74 (78.7)	.16
Doctors have a disease model training and don't think about prevention	99 (70.7)	57 (60.6)	.11
Doctors think preventive health should be patients' responsibility not theirs	71 (50.7)	41 (43.6)	.29
Doctors are not sufficiently encouraged to work with alcohol problems	111 (79.3)	82 (87.2)	.12
Doctors feel awkward about asking questions about alcohol consumption	109 (77.9)	63 (67.0)	.07
Doctors do not know how to identify problem drinkers who have no obvious symptoms	112 (80.0)	61 (64.9)	.01
Doctors do not have a suitable screening device to identify problem drinkers	115 (82.1)	69 (73.4)	.11
Doctors do not have suitable counselling materials available	117 (83.6)	79 (84.0)	.92
Doctors are not trained in counselling for reducing alcohol consumption	124 (88.6)	78 (83.0)	.22
Doctors believe that alcohol counselling is too difficult	133 (95.0)	79 (84.0)	.005
Doctors do not believe that patients would take their advice	117 (83.6)	73 (77.7)	.26
Doctors themselves have a liberal attitude to alcohol	91 (65.0)	58 (61.7)	.61
Doctors themselves may have alcohol problems	96 (68.6)	65 (69.1)	.93
Doctors believe that patients would resent being asked about their alcohol consumption	82 (58.6)	52 (55.3)	.62

^aChi-square test

We developed and validated a simple method that can be used for predicting group membership. The predictors in the final model were self-esteem, motivation, and adequacy, with similar odds ratios. Legitimacy was excluded from the model because

Table 15. Agreement with selected facilitators for the implementation of alcohol screening and brief interventions.

	Group with more negative attitudes agree n (%)	Group with more positive attitudes agree n (%)	p
Public health education campaigns	136 (97.1)	92 (97.9)	1.0 ^a
Patients requesting advice about alcohol	139 (99.3)	90 (95.7)	.16 ^a
Having quick and easy screening questionnaires	134 (95.7)	88 (93.6)	.55 ^a
Having quick and easy counselling materials	136 (97.1)	92 (97.9)	1.0 ^a
Proof of alcohol's early intervention effectiveness	136 (97.1)	90 (95.7)	.72 ^a
Training programmes for early intervention for alcohol	136 (97.1)	90 (95.7)	.72 ^a
General support services (self-help/counselling)	137 (97.9)	92 (97.9)	1.0 ^a
Better salary and working conditions	115 (82.1)	77 (81.9)	.96 ^b

^aFisher's exact test; ^bChi-square test

it did not reach statistical significance. Satisfaction, on the other hand, was excluded due to collinearity. Collinearity happens when two or more independent variables are highly correlated which, in this case, can be explained by the way the SAAPPQ was designed. This instrument was developed using factor analysis with oblique rotation¹¹², a method that allows for correlation between variables. Our classification model was validated on an independent dataset, making it useful for designing training programmes tailored to the emotional needs of the GPs. It could also prove useful for measuring the efficacy of training programmes in changing GPs' attitudes towards working with at-risk drinkers.

It is known that the majority of GPs do not routinely deliver SBI for alcohol problems^{28,88,184,185}. A recent study showed that only 6.5% of excessive drinkers recalled receiving advice on their alcohol consumption in the last year⁸⁷. There are

several possible reasons for the low SBI rates but one may be GPs' attitudes towards at-risk drinkers: the more negative their attitudes, the more likely they are not to screen and advise excessive drinkers^{113,206}. In our study, the majority of GPs was classified in the group with more negative attitudes. The differences between the groups were more evident in the self-esteem, motivation and satisfaction domains. This means that most GPs do not feel motivated nor rewarded when working with at-risk drinkers, and have low self-worth when performing this specific task. These findings may help to explain why so many GPs remain unwilling to deliver SBI.

This study showed that GPs with more positive attitudes towards at-risk drinkers report fewer constraints to implement alcohol SBI, specifically when it comes to physician-related barriers. Both groups reported similar views on organizational and patient-related barriers and differed only in two physician-related barriers concerning beliefs about knowledge and skills to approach patients' alcohol-drinking habits. We also found a trend towards more doctors in the group with more negative attitudes feeling uncomfortable asking patients about alcohol. Taken together, these findings suggest that doctors with more negative attitudes have higher knowledge and skills-training needs and also lower confidence levels in their abilities to implement alcohol SBI. This claim finds support in the differences found in education and training on alcohol: the group with more positive attitudes had more hours of postgraduate training, which may imply that previous training may have boosted physicians' knowledge, skills, and confidence. However, this was a cross-sectional study, which means that causality cannot be inferred. It is possible that physicians already with more positive attitudes prior to training sought to obtain education on alcohol simply because they had an interest in alcohol issues. On the other hand, having more education and training on alcohol does not seem to improve knowledge of daily drinking limits, which points to the need for improving the way information is delivered during training.

Despite the differences found on the above-mentioned barriers, the groups shared similar views on all suggested facilitators. It seems that GPs in both groups could equally benefit from changes at the organizational level. Possible changes are the availability of screening and counselling materials (e.g., having a screening tool on the electronic health record software, leaflets for patients), easy access to support services

(e.g., specialist advice on difficult cases, a working referral network), and better payment and working conditions overall. Social pressure may also play an important part in increasing alcohol discussions as most physicians would like to see patients asking for advice on this specific issue. Public health education campaigns could be a possible measure to increase patients' awareness concerning alcohol-related problems.

GPs' agreement with the barriers and facilitators found in this study mirrors that reported in the literature. Many studies point to organizational factors as a major impediment to implement SBI. The most common organizational barriers cited in these studies are lack of time^{29,94,103,197,199,217,234}, lack of screening tools^{29,197}, lack of counselling materials^{29,197} and lack of support^{94,103,105}. Evidence also shows similar patient- and physician-related factors as important barriers. Patient-related barriers most often reported relate to fear of upsetting patients^{90,94,108} and belief that patients will disregard advice to cut down^{29,90,199}. As to physician-related barriers, doctors often report lack of training^{90,94,108,197,199}, lack of knowledge and skills^{94,108,197} and low confidence and motivation to identify risky drinkers and deliver advice^{108,197}. These similarities strengthen the reliability of the results found in our study.

Another interesting aspect of this study relates to clinical practice issues. When advising patients to cut down, GPs with more positive attitudes reported feeling more prepared and effective in reducing alcohol consumption than GPs with more negative attitudes. Despite this, we were surprised to find similar self-reported practice behaviours on the number of patients advised, blood tests required, and information obtained on alcohol from patients. Previous research reported the opposite, i.e. GPs with more positive attitudes were associated with a higher self-reported SBI activity^{111,113,116,123,124}. Therefore, having more positive attitudes towards, and feeling more effective when working with, drinkers do not necessarily translate into more self-reported SBI activity. The reasons for the discrepancy between our findings and those found in the literature were not sought as we did not anticipate to find this difference. Nevertheless, our findings suggest that despite the importance of having the emotional needs of the GPs' into account when designing programmes to increase their SBI activity, improving attitudes alone may not be enough to significantly increase SBI rates.

Implications for Implementation Research

Based on the findings of this study it seems reasonable to postulate that differences between the groups of GPs with distinct attitudes towards at-risk drinkers relate essentially to their views on alcohol issues and to the way they feel about addressing those issues with patients. As such, we hypothesize that fine-tuning implementation programmes only to the differences found in this study may set the ground to an improvement in the way physicians think and feel about alcohol-related problems but may not be enough to achieve higher SBI rates. We believe a more comprehensive strategy is needed to address the way GPs deal with these issues in their daily practice. For example, we must carefully consider the role of other primary health care professionals. Having nurses screening for alcohol and delivering brief interventions may have a positive impact on SBI rates. Receptionists handing self-administered screening tools to patients may also boost screening rates. Implementation programmes must be carefully planned if one wants to change ingrained routine clinical practice, which usually neglects the delivery of alcohol SBI.

Strengths and limitations

The strengths of this study include the use of an instrument that specifically measures GPs' attitudes towards patients with alcohol problems, which allows for comparison in future studies, and the development and validation of a simple-to-use tool that can be used to tailor training programmes to GPs' attitudes and to measure the efficacy of the training programme.

There are limitations to our study. Firstly, it is unclear how these findings will generalize to the GP population. We achieved a low response rate despite our attempts to increase participation with e-mail reminders. It is possible that responders were more interested in alcohol issues than non-responders. The sample was representative of the population in terms of age and sex, and it has been suggested that online surveys with low response rates allow generalization²⁶⁶. Notwithstanding, the extent to which the sample is representative of the attitudes of the whole population of GPs is not fully known. Secondly, we selected the two group solution based on cluster analysis. One limitation of cluster analysis is determining the optimal number of groups in a data set. Groups can be found in any data, even those generated by random algorithms. One way

to overcome this limitation (which we applied in this study) is to use several criteria to determine the optimal number of groups to increase the validity of the solution. Thirdly, we used data from a study conducted in only one country. The generalizability of our prediction model may be limited to Portuguese GPs. It is possible that cultural differences and distinct medical educational curricula may affect the model's performance. Fourthly, this was a cross-sectional study, which does not allow for establishing causality paths. The example given earlier is illustrative: it is not possible to ascertain the direction of the association between training and GPs' attitudes. It is possible that training may have improved GPs' attitudes but is also conceivable that GPs with more positive attitudes to begin with sought to get training on alcohol-related problems. Notwithstanding, results are consistent with similar studies previously reported, which gives support to the conclusions drawn here. Finally, data are self-reported and no external data validation was conducted. Some variables such as the number of patients advised on alcohol, the number of blood tests required or frequency of asking about alcohol consumption are personal estimations and possibly subjected to bias.

Conclusions

This study showed that GPs can be divided into groups based on their attitudes towards patients with alcohol problems, and validated a simple-to-use tool for classifying GPs into distinct groups. The tool could be useful to design alcohol-specific training programmes that address the emotional needs of the GPs, as well as to measure the efficacy of training at the attitude level.

GPs with more positive attitudes towards problem drinkers report fewer physician-related barriers to implement alcohol SBI. Both groups face similar difficulties concerning organizational and patient-related barriers. The results of this study were used in the design of a new implementation programme for implementing alcohol SBI in primary health care (Chapter 5).

CHAPTER 5

RESULTS

RESEARCH QUESTION 3

RESEARCH QUESTION 3 – What is the impact of a theory-driven behaviour change intervention for implementing screening and brief interventions for excessive alcohol consumption in primary health care?

Objective 3.1. To design a theory-based behaviour change intervention for implementing alcohol screening and brief interventions in primary health care;

Objective 3.2. To determine the impact of a theory-based behaviour change intervention in the delivery of alcohol screening;

Objective 3.3. To determine the effect of a theory-based behaviour change intervention in the delivery of alcohol brief interventions;

Objective 3.4. To evaluate the effect of a theory-based behaviour change intervention on the attitudes of family physicians towards patients with excessive alcohol consumption;

Objective 3.5. To investigate the impact of a theory-based behaviour change intervention on the hypothesized mediators/theoretical constructs of the implementation of alcohol screening and brief interventions;

Objective 3.6. To evaluate the impact of a theory-based behaviour change intervention on the family physicians' and nurses' theoretical knowledge to key concepts related to alcohol screening and brief interventions.

Implementing alcohol screening and brief interventions in primary health care: a pilot cluster randomized controlled trial

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Summary

Introduction. Alcohol is one of the most important risk factors contributing to the global burden of disease. Screening and brief interventions in primary care settings are effective in reducing alcohol consumption. However, implementation of such interventions in routine practice has been proven difficult. Most programmes in practice and research have lacked a theoretical rationale for how they would change practitioner behaviour.

Objective. To determine whether a theory-based behaviour change intervention delivered to primary care practices significantly increases the delivery of alcohol screening.

Methods. A two-arm, cluster-randomized controlled, parallel, open trial was conducted. Twelve primary care practices were randomized to one of two groups: training and support; and waiting-list control. GPs, nurses and receptionists were eligible to participate. The intervention was a training and support programme. The intervention was tailored to the barriers and facilitators for implementing alcohol screening and brief interventions following the principles of the Behaviour Change Wheel / Theoretical Domains Framework approach. The primary outcome was the proportion of patients screened with the Alcohol Use Disorders Identification Test. The secondary outcomes were: the proportion of screen-positive patients who received a brief intervention; changes in the attitudes of health providers towards at-risk drinkers; the impact of the programme on the barriers to implementation; and the impact of the programme on the alcohol-related knowledge of the health providers.

Results. The theory-based behaviour change intervention increased screening and brief intervention activity at 12-month follow-up in the intervention group, compared to controls, resulting in an average improvement in screening rates of 21.5% ($p=0.016$) and in brief interventions rates of 22.0% (not significant). GPs and nurses in the intervention arm, compared to controls, reported more positive attitudes towards

working with at-drinkers, a decrease in the impact of the majority of the barriers to implementation, and a higher level of alcohol-related knowledge at the 12-month implementation period.

Conclusions. A theory-based implementation programme, which includes training and support activities, significantly increased alcohol screening rates in primary care. The results from this study could be useful to inform future theory-based programmes aiming to implement alcohol screening and brief interventions in primary health care.

Introduction

Background and rationale

Worldwide, alcohol is one of the most important risk factors for mortality¹⁶. Amongst 15-64-year-olds in the European Union, 14% of deaths in men and 8% in women are estimated to be alcohol-related.

Screening and brief interventions (SBI) in primary health care (PHC) settings are a range of “psychosocial interventions designed to help recipients recognise harmful patterns of substance use, and to motivate and support them to address that use”⁶⁶ ranging from five to 30 minutes, traditionally delivered face to face, and have long been advocated for preventing harm from alcohol use. Several randomized controlled trials and meta-analysis have found alcohol SBI to be effective and cost-effective or cost-saving^{71,80,83}. Notwithstanding recent debates concerning this effectiveness evidence⁸⁴, it is clear that alcohol increases the risk of and/or exacerbates many conditions that present in primary care³⁷, and that addressing alcohol in PHC settings still makes sense²⁷⁰. PHC professionals are well-positioned to advise at-risk drinkers⁹⁰ and they support the principle of delivery of alcohol SBI⁹⁴. However, the majority of them do not routinely deliver such interventions^{28,88} and few at-risk drinkers visiting PHC currently receive alcohol-related advice or intervention⁸⁷⁻⁸⁹. They are, therefore, denied the opportunity to understand the risks and make an informed decision about whether or not to cut down.

Whilst alcohol SBI may work in controlled trials, researchers continue to grapple with the challenge of how to achieve effective implementation in routine practice. Several factors have been identified as hindering or facilitating implementation. Lack of time, lack of training, and lack of screening and counselling tools are among the most commonly cited barriers whereas involving all relevant staff, financial incentives, and the intensity of the intervention effort (i.e. the amount of training and/or support provided) are commonly reported facilitators^{89,90,108,265}.

Training and related initiatives have met with only modest success in securing widespread implementation of alcohol SBI¹³³ with the possible exception of a large, highly funded, high profile programme in Scotland²⁷¹. Most programmes in practice and research have lacked a theoretical rationale for how they would change

practitioner behaviour^{144,145,259}. For instance, in the recently published ODHIN multi-centre trial²⁷², three implementation interventions (training and support, financial reimbursement, and Internet-based counselling) were provided separately and in combination to investigate their impact on the SBI activity. Only training and support was proven to have a lasting, albeit small, effect on the SBI activity at 9 months of follow-up. However, the intervention components were not theory-driven which might have had a negative effect on the efficacy of the training and support package. Several other implementation programmes suffered from the same conceptual flaws^{121,130,184}. The intervention in our trial differs from previous, more empirically-derived, strategies in that the intervention components (behaviour change techniques) were selected after a thorough analysis and mapping of the barriers and facilitators to implementation to their respective theoretical constructs. As such, the depth of the approach to intervention design is greater in this study than has previously been the case.

By identifying theoretical concepts underpinning the barriers and facilitators to implementation, researchers can select intervention techniques that are predicted to lead to behaviour change^{144,151,179,273}. One theory-driven intervention study is being tested by Abidi *et al.*¹³⁵ aiming to increase general practitioners' alcohol SBI delivery. In this study, general practitioners are invited to visit a website where they can access an e-learning module and receive tailored feedback and support. Our intervention also differed substantially from the one reported by Abidi *et al.*¹³⁵ (see Annex 6 for a detailed description of the intervention). We delivered a theory-based, face-to-face training and ongoing support intervention to all primary care staff. Involving all staff in the implementation efforts has been identified as an important facilitator for implementing alcohol SBI in PHC^{203,214,236,238}. Another example of an implementation facilitator we used was to promote the exchange of positive experiences with peers^{120,195}. Finally, by delivering face-to-face training, we were able to use role-play for tackling several implementation barriers, such as lack of training and confidence in skills to deliver SBI.

The Context of the Trial

The trial was conducted in the Dão Lafões Grouping of PHC in Portugal. Alcohol is the most commonly consumed addictive substance in Portugal, with 20% to 30% of over 18-year-olds drinking at a hazardous level or higher¹¹⁹. Patients at the Dão Lafões Grouping of PHC Centres have a mortality rate due to liver cirrhosis that is 48% higher than the national average²⁷⁴. Under normal circumstances, professionals at these PHC centres would not receive any intervention focused on their practice relating to alcohol, over and above a normative expectation that they keep track of all national guidelines published by the National Health Directorate, which include guidelines on alcohol interventions⁶².

Objective

The objective of this pilot trial was to determine whether a theory-based behaviour change intervention delivered to PHC practices significantly increases delivery of alcohol screening in those practices compared to delivery in practices assigned to a waiting list (treatment as usual) condition.

Methods

The trial protocol was pre-registered at clinicaltrials.gov (NCT02968186).

Trial design

We conducted a cluster-randomized, waiting-list controlled, open trial, with two parallel groups, with a 1:1 allocation ratio. The unit of randomization was the PHC practice. The study pilot tested the efficacy of a new programme tailored to the barriers and facilitators for implementing alcohol SBI.

Study setting

The trial setting was community-based PHC in Portugal. The Dão Lafões Grouping of PHC Centres comprises 26 PHC units, funded by the National Health Service. Each PHC unit is comprised of general practitioners/family physicians (GPs), nurses, and receptionists. Each GP works preferably with the same nurse and receptionist, providing care to a list of patients (1600 to 1900 patients on average). Since 2005, PHC units in Portugal can be categorized into one of two models: the 'Personalized Health Care Units' (traditional PHC practices), in which professionals receive a fixed salary; and the 'Family Health Units', in which professionals work together to provide a more personal and flexible approach to the care of patients. Professionals at level-A Family Health Units still receive a fixed salary but if they achieve the quality indicators targets, they are upgraded to level-B units. Monthly income for professionals working in a level-B Family Health Unit depends on the base salary, patient list size, and pay for performance.

Eligibility criteria

All PHC units were eligible to participate. PHC units were excluded if they had less than five patient lists, or if they had a specific alcohol programme implemented in their practice but were offered the programme after the end of the trial. All PHC professionals willing to participate were enrolled.

Interventions

The intervention was a package of training and support for PHC professionals. Prior to intervention design, we identified the barriers and facilitators to the implementation of alcohol SBI in PHC using three consecutive approaches. Firstly, we analysed a subset of qualitative data on barriers and facilitators identified in the BISTAIRS (Brief interventions in the treatment of alcohol use disorders in relevant settings) project. This was a European Union co-funded project in which two PHC units from the Dão Lafões Grouping of PHC Centres participated. Barriers and facilitators identified in this project¹²⁰ were mapped and included in the programme. Secondly, we analysed a subset of survey data on barriers and facilitators identified by the ODHIN (Optimizing

delivery of health care interventions) project. This was also a European Union co-funded project in which a representative sample of 234 Portuguese GPs participated. Barriers and facilitators identified²⁷⁵ by these GPs were also taken account of in the programme. With this approach, we aimed to identify the most important barriers and facilitators to alcohol SBI implementation that are both locally and nationally significant. Finally, the programme was informed by the results of a systematic review of the literature^{276,277} (Chapter 3). The barriers and facilitators identified using the three approaches above were collated and analysed with the Behaviour Change Wheel (BCW)/Theoretical Domains Framework (TDF). The BCW emerged recently as a comprehensive framework for designing interventions¹⁵¹. The framework consists of three layers. At the core of the wheel (inner layer) there is a model of behaviour change designated as COM-B ('Capability', 'Opportunity', 'Motivation' and 'Behaviour'). The intermediate layer identifies nine intervention functions which are broader categories of means by which an intervention can change behaviour. The rim of the wheel comprises seven policy categories which represent the decisions authorities can use to support interventions. The COM-B model can be further expanded by the TDF¹⁴³. The TDF was derived from an analysis of 33 theories of behaviour change and comprises 14 domains consisting of 84 component constructs of behaviour change. A Behaviour Change Technique (BCT) taxonomy has been developed to standardize the reporting of intervention content¹⁷⁹. BCTs are the smallest components of an intervention with the potential to change behaviour¹⁷⁸. The BCT taxonomy was used as the final step for designing the intervention. Finally, the selected behaviour change techniques were operationalized and integrated into a comprehensive implementation programme.

The implementation period lasted for one year. Health professionals in the intervention arm received four training sessions (total of 30 hours) in the first 12 weeks of the implementation period. Training was mainly delivered by FR, a local GP champion and certified trainer by the Portuguese Institute for Employment and Vocational Training, with experience in delivering training on alcohol SBI (see Annexes 7 to 10 for a detailed description of the training programme):

- Session 1 - participants became familiar with the evidence concerning alcohol-related harm, and with the evidence for delivering alcohol SBI. Next, the notions of standard drink, risk continuum, daily drinking limits, and binge drinking

were presented. Participants were told how to screen using the Alcohol Use Disorders Identification Test (AUDIT), and how to provide simple advice to patients with a positive screening. Barriers and facilitators for delivering alcohol SBI were presented and discussed. Participants were encouraged to adopt a working team model at their practices;

- Session 2 - participants were asked to share experiences concerning implementation efforts in their practices. Next, participants were introduced to the core concepts of brief intervention with a particular focus in the use of the OARS (Open-ended questions, Affirmations, Reflections, Summaries) skills. The transtheoretical model of behaviour change was presented as a tool for determining patients' readiness to change;
- Session 3 - participants were guided on how to tailor their actions to the stage of change the patient is at. This was achieved through both group and individual exercises. Two specialists on alcohol dependence from a local recovery service talked about alcohol dependence and discussed clinical scenarios with the participants;
- Session 4 - participants were asked to practice brief interventions.

Additional support was continuously available to practices by means of a dedicated team that helped participants who had difficulties in implementing the project (see Annex 6 for a detailed description of the supporting actions). Several support materials were specifically designed for this study. The AUDIT screening tool was designed in order to allow practices to use the AUDIT as a self-report questionnaire (delivered by receptionists). The purpose of this was three-fold: to decrease the time needed for screening; to facilitate initiating a conversation about alcohol with the patient; and to increase the number of patients querying for alcohol-related issues. Posters were made available to the PHC units which aimed to help professionals to elicit alcohol issues during the consultations, and to help professionals to remember to conduct alcohol SBI. Patient leaflets were also specifically produced for this project, aiming to aid professionals in advising at-risk drinkers to cut down and for asking about alcohol at follow-up appointments.

Participants in the control arm were assigned to a waiting list. They were provided with the Portuguese guideline for conducting alcohol SBI and the materials for the collection of research data, without demonstration.

Assessments

Doctors and nurses were asked to fill in a questionnaire before randomization takes place. They were also asked to fill in the same questionnaire at the end of the trial. The questionnaire aimed to measure three distinct areas: attitudes to working with at-risk drinkers; barriers to implementing alcohol SBI; and knowledge about basic notions related to alcohol SBI.

Attitudes to working with at-risk drinkers: was measured with the Short Alcohol and Alcohol Problems Perception Questionnaire (SAAPPQ), a validated scale based on factor analysis^{112,119}. The SAAPPQ measures the level of agreement with ten statements on a seven-point Likert scale, from 1-strongly disagree to 7-strongly agree. Each pair of items measures a distinct dimension – Adequacy, Legitimacy, Motivation, Satisfaction and Self-Esteem;

Barriers for implementing alcohol SBI: was assessed with an adapted version of an existing questionnaire²⁵⁶. Participants were asked to express their level of agreement with 33 statements on a seven-point Likert scale, from 1-strongly disagree to 7-strongly agree. Each statement can be mapped to a specific domain of the TDF. This allowed us to measure the impact of the implementation programme in each TDF domain;

Knowledge: was evaluated by each participant's responses to four multiple choice questions. These questions measured the theoretical knowledge to key concepts related to alcohol SBI, more specifically the definition of standard drink, the definition of low-risk drinking levels, and the AUDIT cut-off scores.

The questionnaire completed at the end of the trial was the same, except for an additional section comprising seven questions. This section was filled in only by participants in the intervention arm. Participants were asked to rate the impact of the materials that were specifically produced for the study. Each statement was measured on a seven-point Likert scale, from 1-strongly disagree to 7-strongly agree.

Primary outcome measure

Screening rate: professionals were asked to screen patients who were 18 years old or older with at least one appointment during the 12-month implementation period excluding any duplicates. Patients were screened based on the Portuguese guideline⁶². At-risk drinkers were defined as patients scoring ≥ 8 on the AUDIT. Screening rates were measured using paper tally sheets. Tally sheets included the AUDIT, a table to indicate the action(s) taken for at-risk patients, participant's name, and a field to input patients' medical record number. The screening rate was computed by dividing the number of completed screens by the total number of eligible patients, multiplied by 100.

Secondary outcome measures

Brief intervention rate: participants were asked to deliver a brief intervention to at-risk drinkers. The brief intervention rate was computed by dividing the number of brief interventions delivered by the total number of at-risk patients multiplied by 100.

Percentage of family physicians in the group with more positive attitudes: participants were asked to fill in the SAAPPQ at baseline (T0), and at the end of the trial (T1). The answers were used to determine in which group a GP was classified by applying the equation

$$P = 1 / (1 + \exp(-(-26.9732 + 0.9467 * \text{Adequacy} + 1.0552 * \text{Self-Esteem} + 1.0053 * \text{Motivation})))$$

that was previously validated²⁷⁸ (Chapter 4). This classification model was used to quantify, in each measurement period T, the percentage of GPs with more positive attitudes in the intervention and control groups.

Changes in barriers to implementing alcohol screening and brief intervention: was ascertained with the answers to the barriers section of the questionnaire, and is expressed by the average score in each domain of the TDF.

Level of knowledge: expressed by the percentage of correct answers on the third section of the questionnaire.

Usefulness of the materials: expressed by the average score on each of the relevant questions answered by the intervention group at the end of the trial.

Participant timeline, recruitment, allocation and blinding

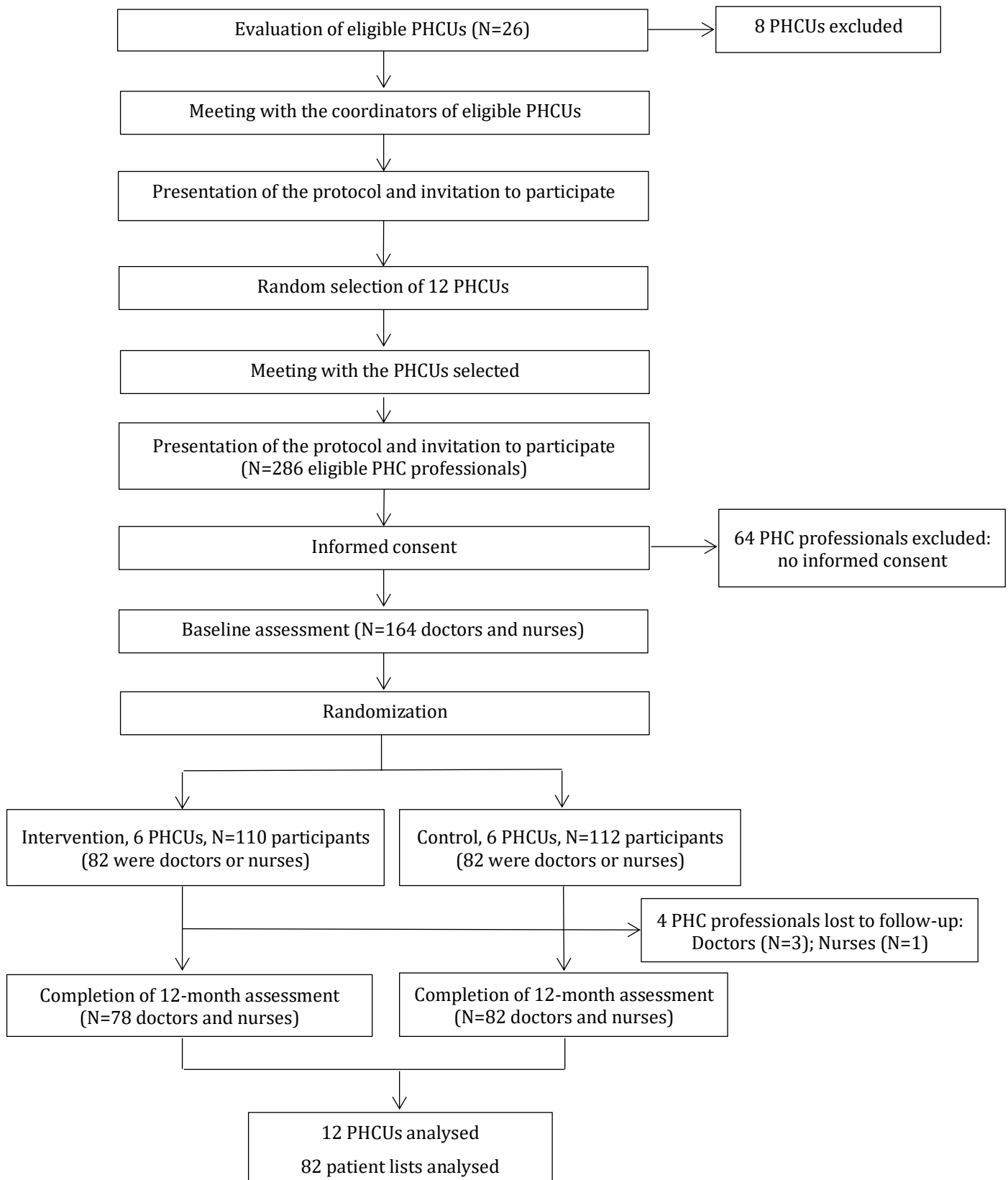
The study flowchart is outlined in Figure 13. Firstly, a joint meeting was scheduled with the coordinators of all 26 PHC units. The research team presented the protocol to the coordinators and invited them to participate. During this meeting, 12 PHC units from those agreeing to participate were randomly selected by ballot without replacement, stratified by type of organization. Secondly, individual meetings with each one of the 12 PHC units selected were scheduled to present the project and invite all PHC professionals to participate. To take part in the trial, professionals were required to sign a consent form. During this meeting, and prior to randomization into one of the trial arms, doctors and nurses were asked to complete a questionnaire to measure knowledge, attitudes and barriers to implementing alcohol SBI. This approach was taken to ensure that participants' answers were not influenced by previously knowing whether they would receive the intervention or integrate a waiting list. Finally, participants were randomized at the PHC unit level by ballot without replacement, stratified by type of organization, into the intervention arm or the waiting list control arm.

Due to the nature of the study design, neither the research team nor the participants were blinded to the allocation of the PHC units.

Sample size

The sample size was calculated on the basis of the primary hypothesis. Assuming a screening rate of 50% in the intervention arm, and 10% in the control group, power of 80%, alpha of 5%, intraclass correlation coefficient of 0.05, and a minimum of five patient lists per cluster, each arm needed to include five PHC units. The intervention rate estimation was based on the results of a meta-analysis¹³³. The control rate was based on the estimated annual screening rate at the Dão Lafões Grouping of PHC. To avoid loss of power due to loss to follow-up, six units were included in each arm of the trial.

Figure 13. Flowchart of the trial.



PHC – Primary Health Care; PHCUs – Primary health care units

Data collection, management and monitoring

Data were independently inputted into an Excel database by two members of the research team. Databases were compared and checked for inconsistencies and errors. All data were stored in a lockable cabinet accessible only to the research team.

Ethics

The study protocol received approval from the Ethics Committee of the Faculty of Medicine of Lisbon (Ref. 359/19) and by the Ethics Committee of the Centre Regional Health Authority (Ref. 77/2016).

Statistical methods

Data are described as frequency distributions, central tendency measures and dispersion measures as appropriate. Computations were conducted as intention-to-treat analysis. Comparison of qualitative measurements was performed with Pearson chi-square or McNemar test, as appropriate; comparison of quantitative variables was conducted with Student's t-test for independent and related samples, as appropriate. Due to the cluster design of the trial, multilevel regression modelling was conducted to assess the association of independent variables with the screening and brief intervention rates. A p-value <0.05 was considered statistically significant.

Results

Study population

In total, 26 PHCUs were eligible to participate (see Figure 13 for trial flowchart). Eight PHCUs were excluded because they had less than 5 patients lists (n=5) or because they had a specific alcohol programme implemented in their practice (n=3). Of the 18 PHCUs meeting the trial's inclusion criteria, 12 were randomly selected. All selected PHCUs agreed to participate. A total of 286 PHC professionals were asked to participate from which 222 (77.6%) signed an informed consent. Participation was higher among nurses (85.9%) and receptionists (84.1%) than among GPs (71.9%) and family medicine residents (58.3%). Just over a third of the participants were nurses (35.6%),

28.8% GPs, 26.1% receptionists and 9.5% residents. Participants age averaged 44.9 years (SD=11.3) and 81.1% were women. The median number of patients lists per PHCU was 7 (range 5 to 8), each list having an average of 1441 adult patients. The baseline characteristics of the participants in each arm of the trial are described in Table 16. No significant differences were found between intervention and controls concerning age, sex or participation in the trial per occupation.

Table 16. Descriptive statistics of the participants in each arm of the trial.

Variable	Intervention	Control
<i>Participation – n (%)</i>		
GPs	32 (72.7)	32 (71.1)
Family Medicine Residents	12 (63.2)	9 (52.9)
Family Nurses	38 (86.4)	41 (85.4)
Receptionists	28 (82.4)	30 (88.2)
<i>Age – yr Mean±SD</i>	42.8 (11.6)	43.6 (11.5)
<i>Sex Female – n (%)</i>	89 (80.9)	91 (81.3)

GPs – General practitioners/family physicians

Screening and brief intervention rates

A total of 74,087 adult patients, evenly balanced between both arms of the trial, had at least one appointment with his/her personal GP or family nurse during the trial period, of which 8,120 (10.96%, 95%CI 10.74% to 11.19%) were screened. Screening rates were considerably higher in the intervention practices (21.66%, 95%CI 21.24% to 22.08%) than in the control practices (0.16%, 95%CI 0.12% to 0.20%). The implementation programme had a significant positive effect on the screening activity (p=0.016). Only 1 PHCU in the intervention group followed the protocol concerning using receptionists throughout the study period to systematically deliver the AUDIT to patients prior to the consultation. The method of distribution in the remaining PHCUs varied greatly: some used receptionists for short periods, others relied exclusively on doctors and/or nurses to screen for alcohol during the consultations. The screening rate of the PHCU that used receptionists as protocolled (60.2%, 95%CI 58.9% to 61.6%)

was 3.8 times higher than the average screening rate of the remaining PHCUs in the intervention arm that did not (15.7%, 95%CI 15.3% to 16.1%).

In total, 891 (10.97%, 95%CI 10.30% to 11.67%) adult patients scored 5+ on the AUDIT-C while 339 (4.17%, 95%CI 3.75% to 4.63%) scored 8+ on the full AUDIT. Of these 339 patients, 28 scored 20+ (probable dependence) and were excluded for calculating brief intervention rates. Therefore, 311 patients were eligible to be offered a brief intervention. The mean proportion of brief intervention delivered to screen positive patients was 84.89% (95%CI 80.42% to 88.68%). The rate of brief intervention delivery to screen positive patients was higher in the intervention group (85.67%, 95%CI 81.18% to 89.43%) than in the control group (63.63%, 95%CI 30.79% to 89.07%). However, the implementation programme did not have a significant impact on the likelihood of delivering a brief intervention to someone who has screened positive (p=0.46).

Attitudes towards working with at-risk drinkers

A. Role security and therapeutic commitment

No significant differences were found at baseline between intervention and controls concerning role security and therapeutic commitment to working with at-risk drinkers as measured using the SAAPPQ (Table 17).

Providers scored on average above the mid-point on role security (mid-point=16 points) and at the mid-point on therapeutic commitment (mid-point=24 points). Providers' attitudes at the 12-month implementation period are shown in Table 18. Providers in the intervention arm scored higher than controls on role security and on therapeutic commitment at the 12-month implementation period.

B. Dimensions of the SAAPPQ

Results from the five dimensions of the SAAPPQ at baseline in each arm of the trial are shown in Table 17. No significant differences were found at baseline between

Table 17. Mean scores on the SAAPPQ at baseline in each arm of the trial.

Variable	Intervention (N=82)	Control (N=82)
<i>SAAPPQ – Mean±SD</i>		
Role security	19.3±3.7	18.3±3.1
Therapeutic Commitment	24.1±5.3	23.8±3.8
Role adequacy	8.7±2.3	8.2±1.8
Role legitimacy	10.6±2.1	10.1±2.0
Task-specific self-esteem	8.2±2.2	8.0±1.9
Motivation	9.2±1.9	9.0±2.0
Satisfaction	6.7±2.3	6.8±1.7

SAAPPQ – Short Alcohol and Alcohol Problems Perception Questionnaire

Table 18. Mean scores on the SAAPPQ after the 12-month implementation period in each arm of the trial.

Variable	Intervention (N=78)	Control (N=82)	p
<i>SAAPPQ – Mean±SD</i>			
Role security	21.6±3.1	19.5±3.4	<0.001
Therapeutic Commitment	25.3±4.4	23.6±3.8	0.01
Role adequacy	10.6±1.8	9.1±2.1	<0.001
Role legitimacy	11.0±2.0	10.4±2.1	0.07
Task-specific self-esteem	9.0±1.8	8.1±2.0	0.004
Motivation	9.2±1.9	8.8±1.9	0.23
Satisfaction	7.2±1.9	6.7±1.9	0.11

SAAPPQ – Short Alcohol and Alcohol Problems Perception Questionnaire

intervention and controls concerning their attitudes towards working with at-risk drinkers. With the exception of satisfaction, participants scored on average above the mid-point of the scale in all dimensions (mid-point=8 points). At the 12-month implementation period, providers in the intervention arm scored higher than controls on role adequacy and task-specific self-esteem.

C. Classification of the GPs into groups

Using the classification model previously validated²⁷⁸, nearly a third of the GPs (N=21, 32.8%) were classified as having more positive attitudes at the baseline. There were no differences concerning GPs classification relating to negative or positive attitudes between the arms of the trial at the baseline (p=0.18). A trend towards significance was found at the 12-month implementation period for the intervention arm to have more GPs classified as having more positive attitudes (66.7% vs 43.8%, p=0.07). A significant effect of the implementation programme was found in the intervention arm on the percentage of GPs in the group with more positive attitudes (T₀=40.6% vs T₁=66.7%, p=0.021). No significant differences were found in the control group (T₀=25.0% vs T₁=43.8%, p=0.15).

Barriers to implementing alcohol SBI

With the exception of the participants in the intervention arm being more positive about integrating alcohol SBI in routine practice (p=0.019), no other differences were found at baseline between intervention and controls. Differences at the 12-month follow-up are shown in Table 19. Significant improvements were found in all the measured theoretical constructs related to the following TDF domains: Knowledge; Skills; Social/Professional Role and Identity; Beliefs about Capabilities; Intention; Memory, Attention and Decision Processes; Environmental Context and Resources; Social Influences; Emotion; and Behavioural Regulation. This means that, for the constructs being measured, the intervention had a significant effect on all the TDF domains within the Capability and Opportunity components of the BCW, and in 4 of the 8 domains of the Motivation component. In the Beliefs about Consequences domain, participants in the intervention arm scored higher than controls concerning their

expectancy that implementing alcohol SBI would bring public health benefits but no differences were found between the groups concerning the potential impact of these practices on the relationship with the patient. In the Reinforcement domain, providers in the intervention group scored higher than controls about feeling that they were making a difference when advising at-risk drinkers to cut down but not in getting recognition from professionals who are important to them. Finally, in the Goals domains, the intervention group scored higher than controls on having a clear plan of how often they would screen and advice for alcohol misuse; however, both groups agreed to the same extent that addressing alcohol has a low priority as they feel more pressured to address other health problems.

Knowledge

At the baseline, participants in the intervention arm gave correct answers, on average, to 21.6% (95%CI 17.2% to 26.1%) of the multiple choice questions, and controls gave correct answers to 18.3% (95%CI 13.8% to 22.8%) of the questions. This difference was not statistically significant. At the 12-month follow-up, a significantly higher average percentage of correct answers was found in the intervention arm participants compared with those in the control arm (48.6%, 95%CI 43.0% to 54.2% vs 23.2%, 95%CI 18.0% to 28.3%; $p < 0.001$).

Usefulness of the materials

Participants in the intervention arm were asked to evaluate the usefulness of the materials produced to facilitate the implementation of alcohol SBI at the 12-month follow-up. Summary results of this evaluation are shown in Table 20. We considered a material useful/not useful when the 95% confidence interval for a specific item did not include the neutral score of the scale (neutral score=4.0). All aspects of the programme were rated as useful except for the posters which were offered to, but not used by, all practices.

Table 19. Mean±SD scores for items measuring constructs within each TDF domain and BCW component post-implementation.

BCW Component	TDF Domain	Construct	Item	Intervention N=78	Control N=82	p
Capability	D1 Knowledge	Knowledge	I know the content and objectives of the guideline on alcohol screening and brief intervention	5.3±0.9	4.2±1.4	<0.001
		Procedural knowledge	I know how to screen for alcohol misuse and how to deliver a brief intervention	5.4±0.9	4.3±1.2	<0.001
	D2 Skills	Skills	I have been trained on how to screen for alcohol misuse and how to deliver a brief intervention	5.1±1.6	3.3±1.7	<0.001
			I have the skills to screen for alcohol misuse and to deliver a brief intervention	5.1±1.0	3.7±1.3	<0.001
Motivation	D3 Social/professional role and identity	Professional role	Screening and advising for alcohol misuse is part of my work as a doctor/nurse	5.9±0.9	5.1±0.9	<0.001
			It is my responsibility as a doctor/nurse to screen and advise for alcohol misuse	5.8±0.9	5.2±1.0	<0.001
	D4 Beliefs about capabilities	Self-efficacy	I am confident that I can screen and advise for alcohol misuse even when the patient is not motivated	4.9±1.3	4.5±1.0	0.028
			I am confident that I can screen and advise for alcohol misuse even when there is little time	4.7±1.1	4.1±1.2	<0.001
		Perceived behavioural control	For me, screening and advising for alcohol misuse is difficult	3.6±1.2	4.4±1.1	<0.001
	D5 Optimism	Optimism	With regard to screening and advising for alcohol misuse I am always optimistic about the future	4.4±0.9	4.1±1.0	0.08
			With regard to screening and advising for alcohol misuse overall, I expect more good things to happen than bad	4.5±0.9	4.4±0.9	0.24
	D6 Beliefs about consequences	Outcome expectancies	If I screen and advise for alcohol misuse it will benefit public health	6.1±1.0	5.7±0.9	0.005
			If I screen and advise for alcohol misuse it will have disadvantages for my relationship with the patient	2.9±1.4	2.8±1.1	0.56

Table 19. Mean±SD scores for items measuring constructs within each TDF domain and BCW component post-implementation (cont.)

BCW Component	TDF Domain	Construct	Item	Intervention N=78	Control N=82	p
Motivation	D7 Reinforcement	Reinforcement	Whenever I screen and advise for alcohol misuse, I feel like I am making a difference	5.4±1.0	4.9±1.1	0.006
			Whenever I screen and advise for alcohol misuse, I get recognition from professionals who are important to me	4.4±1.0	4.2±1.0	0.34
	D8 Intention	Intention	I intend to screen and advise for alcohol misuse in the next appointment	5.2±0.9	4.7±1.0	0.002
			I will definitely screen and advise for alcohol misuse in the next appointment	4.9±1.1	4.4±1.0	0.002
	D9 Goals	Action planning	I have a clear plan of how often I will screen and advise for alcohol misuse	4.2±1.0	3.9±1.0	0.047
		Priority	Generally, I am more pressured to cover something else than to screen and advise for alcohol misuse	5.1±1.3	5.0±1.3	0.53
Capability	D10 Memory, attention and decision processes	Memory	Screening and advising for alcohol misuse is difficult to remember	3.4±1.1	3.8±1.2	0.018
			I often need to check the guideline on alcohol screening and brief intervention before screening and advising for alcohol misuse	3.6±1.1	4.2±1.2	<0.001
Opportunity	D11 Environmental context and resources	Resources/material resources	Screening and advising for alcohol misuse has a good fit with routine practice	4.5±1.1	3.9±0.9	0.002
			In the organization I work screening and advising for alcohol misuse is routine	4.3±1.2	3.8±1.1	0.018
			In the organization I work there is enough time to screen and advise for alcohol misuse	3.5±1.3	3.0±1.2	0.015
			In the organization I work I have the tools to screen and advise for alcohol misuse	5.1±1.0	3.7±1.1	<0.001
			In the organization I work I have a working network for referring patients with alcohol dependence	4.8±1.1	4.0±1.2	<0.001

Table 19. Mean±SD scores for items measuring constructs within each TDF domain and BCW component post-implementation (cont.)

BCW Component	TDF Domain	Construct	Item	Intervention N=78	Control N=82	p
Opportunity	D12 Social influences	Social support	I can rely on a dedicated team of professionals when things get tough when screening and advising for alcohol misuse	4.7±1.3	4.0±1.2	0.001
			I can rely on my colleagues when things get tough when screening and advising for alcohol misuse	4.8±1.1	4.4±1.1	0.028
Motivation	D13 Emotion	Affect	I feel nervous when screening and advising for alcohol misuse	2.7±1.1	3.4±1.2	<0.001
Capability	D14 Behavioral regulation	Automaticity	Screening and advising for alcohol misuse is something I do automatically	4.2±1.2	3.8±1.1	0.026
		Self-monitoring	I tend to notice my successes while working towards screening and advising for alcohol misuse	5.0±1.0	4.5±1.0	<0.001
		Action planning	I have a clear plan when I will screen and advise for alcohol misuse	4.2±1.0	3.6±0.9	<0.001
			I have a clear plan of how I will screen and advise for alcohol misuse	4.5±1.0	3.5±1.1	<0.001

Table 20. Providers' appraisal on the usefulness of the materials specifically produced for the implementation programme.

Item	Mean (95%CI)
Having a receptionist delivering the AUDIT to the patient prior to the consultation shortened the time required to screen for alcohol	5.1 (4.7 to 5.5)
Having a receptionist delivering the AUDIT to the patient prior to the consultation makes it easier to talk about alcohol	5.4 (5.1 to 5.7)
Having a receptionist delivering the AUDIT to the patient prior to the consultation increased the number of patients who asked me about alcohol	4.7 (4.4 to 5.1)
The posters displayed in the waiting room increased the number of patients who asked me about alcohol	4.1 (3.8 to 4.4)
The poster displayed in my consulting room helped me to remember to deliver alcohol SBI	4.0 (3.8 to 4.3)
The leaflets were useful for advising patients to cut down	5.2 (4.9 to 5.5)
The leaflets were useful for asking about alcohol at follow-up appointments	5.1 (4.8 to 5.3)

AUDIT – Alcohol Use Disorders Identification Test; SBI – Screening and Brief Intervention

Discussion

Screening and brief intervention rates

We found that a theory-driven implementation programme led to a higher percentage of consulting adult patients being screened for alcohol consumption. Provision of written guidelines to the control group resulted in very few patients being screened. This is in line with the evidence showing that passive dissemination of guidelines alone is unlikely to result in behaviour change²⁷⁹. Although no data is available in Portugal for measuring compliance with the recommendations of the guideline on alcohol screening and brief interventions, there is a general sense that it is seldom applied, if at all. Notwithstanding, we were surprised to find such a low screening rate in the control group, as we expected a higher placebo effect from participating in an open trial. One possible explanation is that participants in the control arm decided to wait until they receive the implementation programme to start screening and advising for alcohol. Another possible explanation is that this is a true picture of how rarely the Portuguese guideline is being implemented in PHC practices. More research is needed to clarify this issue.

The screening method employed by each practice appears to have impacted on the screening rates. Practices were encouraged to use receptionists to hand out screening questionnaires prior to the consultations but only one practice implemented the protocol fully. Low use of receptionists in the screening process was also reported in other studies^{127,280}. However, receptionists seem to be key to positively influence the number of patients screened. The screening rate in the PHCU that used receptionists as protocolled was nearly four times higher than the average screening rate of the remaining PHCUs in the intervention arm. A similar result was found by Kaner and colleagues¹²⁷, in which practices that used receptionists significantly increased the median number of patients screened for alcohol by a factor of 4.2. In our study, doctors and nurses in the intervention arm were positive that the inclusion of receptionists in the process decreased the time required for screening, made it easier to talk to patients about their drinking and increased the number of patients asking about alcohol. Therefore, using receptionists in the screening process seem to have acted as an enabler that helped PHC providers to overcome, or at least to abate the impact of, several commonly reported barriers for implementing alcohol screening. Future implementation studies should investigate how to increase the participation of receptionists in the screening process.

Portugal is among the countries with the highest alcohol per capita consumption in the world⁸. By its turn, the Dão Lafões region is considered to have one of the highest alcohol consumption rates per capita in Portugal, which is reflected in a 48% higher mortality rate due to liver disease compared to the Portuguese national average²⁷⁴. Therefore, we were surprised to find such a low prevalence of at-risk drinkers in this study, either using the full AUDIT (4.17%) or the AUDIT-C (10.97%). Most studies that used the full AUDIT found higher prevalences of at-risk drinking (13.8% to 33%)^{121,128,220,281-284}; in 2 studies^{255,285}, however, the prevalence of at-risk drinking (4.9% to 8%) was similar to the one found in the present study. Similarly, studies using the AUDIT-C found higher prevalences of at-risk drinking (20.4% to 33.0%)^{17,119,285,286}; in one study, Hoertel and colleagues¹⁸² found a similar prevalence (11.9%) to the one found in the present study. One possible explanation for these differences could be the cut-off used for detecting at-risk drinkers. The use of the AUDIT as a screening instrument is recommended by the WHO and it is also the instrument recommended in the Portuguese guideline. Since its release in the 90's⁵⁸, several studies from

different countries investigated the validity of the AUDIT. A meta-analysis⁵⁹ of these studies analysed the diagnostic accuracy of the AUDIT in primary care using the 8-point cut-off and found a large heterogeneity in the diagnostic performance of the AUDIT, with sensitivity ranging from 31% to 89% and specificity ranging from 83% to 96%. In many studies, the optimal cut-off was lower than 8. Several studies also determined that a shorter version of the test (the AUDIT-C) was suitable for screening^{284,285,287}. In Portugal, the AUDIT was validated in 2002 in a randomly selected sample of 200 patients²⁸⁸. The validation study used the original 8-point cut-off to diagnose at-risk drinkers but did not test whether or not this was the most appropriate cut-off. To our knowledge, no study was conducted in Portugal to determine the validity of the AUDIT-C for screening. It is possible that the AUDIT and the AUDIT-C cut-offs for the Portuguese population are different of, and probably lower than, those recommended by the Portuguese guideline. This means that, assuming the hypothesis that the optimal cut-off for detecting at-risk Portuguese drinkers is lower than those currently used, the screening instrument may have performed worse than expected, and that many at-risk drinkers remain undetected despite having been screened. There are other possible explanations for the differences in the screening rates. For example, it is possible that patients do not understand they should be reporting their alcohol consumption in terms of standard drinks or that they do not understand what is being asked in one or more of the ten questions of the AUDIT. To our knowledge there is only one study conducted in Portugal that validated the AUDIT. However, the study was conducted on a sample from the Lisbon area. This could mean that the Portuguese version of the AUDIT may not be representative of the population and may need further research on its psychometric properties.

Although the brief intervention rate was higher in the intervention group, we were unable to find a significant impact of the programme in changing the percentage of at-risk drinkers given advice. At least two reasons might have contributed to this. Firstly, the trial was powered to detect differences in screening rates but not in brief intervention rates. Secondly, the screening activity in the control group was much lower than expected, which led to very few at-risk drinkers being detected. Therefore, power was low for detecting the difference in the brief intervention rates.

Attitudes towards at-risk drinkers

Evidence shows that providers' attitudes towards at-risk drinkers impact on the number of patients screened and advised for alcohol^{110,111,113,116,206}. Factors such as training, support, and experience with delivering alcohol SBI are associated with positive changes in attitudes. Therefore, one of the objectives of this study was to improve providers' attitudes towards drinkers. The implementation programme in this study was a package of training and support for PHC professionals, which included behaviour change techniques for improving providers' attitudes towards at-risk drinkers²⁶⁰. The implementation programme had a significant positive effect on providers' role security and therapeutic commitment.

Changes in role security were mainly due to increases in role adequacy, which means that providers in the intervention arm, compared to controls, felt more knowledgeable and skilled in addressing alcohol issues in their patients at the 12-month implementation period. A trend towards significance was found for providers in the intervention arm feeling higher role legitimacy to working with at-risk drinkers, which may have also contributed for the higher scores found in role security in the intervention arm. Scores on role legitimacy for both groups were very high at baseline, which is in line with other studies that have used the SAAPPQ to measure providers' attitudes towards at-risk drinkers^{29,89,119,278}. Therefore, a ceiling effect may have occurred which could explain our inability to demonstrate an impact of the implementation programme in changing providers' role legitimacy.

On the other hand, changes in therapeutic commitment were mainly attributed to a significant increase in the task-specific self-esteem of providers in the intervention arm. This means that the implementation programme increased providers' confidence in their own worth when working with at-risk drinkers. Providers in the intervention arm also scored higher than controls on the motivation and satisfaction dimensions of the SAAPPQ but these differences did not reach statistical significance. This could mean that the trial was not powered to detect such differences. Another possible explanation is that the implementation programme needs improvement for increasing providers' motivation and satisfaction in working with these patients. An example of improving the implementation programme for increasing providers' motivation and satisfaction

could be the provision of regular feedback of patients reducing their alcohol consumption after being advised by their personal doctor or nurse.

Anderson and colleagues found that a European training initiative had different effects on the attitudes of general practitioners towards at-risk drinkers depending on whether they have positive or negative attitudes prior to training¹¹³. The authors concluded that training and support did not improve GPs' attitudes with low role security and therapeutic commitment at baseline and it actually made attitudes worse over time for this group of GPs. It is not possible to say whether this finding was specific to the training provided (which was not theory-driven) or if it could apply to training more generally. The results from this study suggest the existence of an underlying two-group structure based on GPs' attitudes towards at-risk drinkers. We previously found evidence to support the existence of this structure in a representative sample of Portuguese GPs²⁷⁸ and validated a model that was used in this trial for differentiating GPs with more positive attitudes from those with more negative ones. Whilst this study did not find a significant difference in the percentage of intervention GPs classified into the group with more positive attitudes when compared to controls, a significant positive pre-post effect was found on attitudes of the GPs in the intervention group. This suggests that the implementation programme may be useful for improving GPs attitudes and that the trial was not powered to detect the difference between intervention and controls.

Barriers to implementing alcohol SBI

As described in the methods section, we identified several barriers to changing PHC providers' behaviour (i.e. to increase alcohol SBI delivery). The barriers mapped to all the 3 components of the BCW and to all the 14 domains of the TDF. Several barriers linked to more than one TDF domain. Therefore, the intervention used in this study was a package of training and support activities that included several behaviour change interventions tailored to the barriers within each TDF domain. The results of this study show a significant effect of the intervention on all the measured constructs of the TDF domains within the Capability and Opportunity components of the BCW. This means that the intervention was successful in increasing providers' capacity to deliver alcohol SBI (e.g., having the knowledge and skills to screen and advise for alcohol,

remembering to deliver alcohol SBI) and in positively modifying factors in the work environment that make the behaviour possible or prompt it (e.g., availability of screening and advice tools, time constraints). The intervention also had a significant effect on all the measured constructs in half of the TDF domains within the Motivation component. Of the remaining four domains within the Motivation component of the BCW, significant positive changes were measured in one of two items measuring the domains Beliefs about Consequences, Reinforcement, and Goals; no effect was found for the items measuring the Optimism domain. This could mean that the intervention programme needs improvement in these specific areas. For example, the intervention failed to increase the priority providers attribute to alcohol issues. Adding an alcohol-related performance indicator to the PHC contract, a stronger engagement from management and policymakers, and more public and media awareness are examples of actions that could result in increasing the priority attributed to addressing alcohol in PHC.

According to the COM-B model, the four components in the system (i.e. Capability, Opportunity, Motivation and the Behaviour of interest) can interact amongst themselves¹⁵¹: Capability can influence Motivation as can Opportunity; Motivation can influence the Behaviour of interest; and enacting a Behaviour can influence Capability, Opportunity, and Motivation. Determining the individual contribution of each behaviour change intervention used in the implementation programme to changing each COM-B component was out of the scope of this trial. However, we believe that this could be an exciting research area for the future as it could help in deciding what behaviour intervention techniques work and what don't.

Knowledge

The training programme significantly increased doctors' and nurses' knowledge of key concepts related to alcohol SBI. Notwithstanding, we were surprised to find that the average of the questions correctly answered in the intervention group after the 12-month implementation period was below 50%. We expected that training and implementing SBI would have had a stronger impact on providers' knowledge. This could mean that the training programme needs improvement concerning key aspects related to alcohol SBI. We did not measure knowledge immediately after training; it is

possible that providers' knowledge was higher right after they completed the training but waned with time. On the other hand, this could also be influenced by the low implementation level of many providers. Not using alcohol SBI on a regular basis could have made providers forget what they have learned. Booster training sessions may be needed to further increase doctors' and nurses' knowledge of alcohol SBI.

Usefulness of the materials

Lack of tools for implementing alcohol SBI in PHC is frequently mentioned in the literature as a barrier to implementation. To overcome this barrier, several tools were specifically designed for this study (see study protocol for a description of the tools²⁶⁰). Providers rated as useful the delivery of the screening tool by the receptionists and also the leaflets for advising patients. However, providers were neutral about having posters displayed in the waiting room and in their offices. During the trial, we realized that many providers chose not to have the posters displayed which could explain why they were uncertain about the usefulness of these materials in helping them to remember delivering SBI and in increasing patients asking about alcohol. The reasons why providers chose not to display the posters were not sought as we did not anticipate this scenario. Further research is needed to clarify this point for deciding whether or not to use posters in the implementation efforts.

Strengths and limitations

Intervention programmes underpinned by theory are more likely to be effective than those that are not in changing a particular behaviour¹⁴³. Therefore, the use of theory in the design of the implementation programme is a strength of this study. We performed a detailed analysis of the barriers and facilitators for changing PHC providers' behaviour, i.e. for implementing alcohol SBI in PHC. Barriers and facilitators were then linked to the BCW/TDF framework, which allowed us to select behaviour change techniques that are predicted to lead to behaviour change and to measure the impact of these techniques on several constructs in each TDF domain. This process was useful for understanding the behaviour change process and to identify areas where the implementation programme could be improved. This methodology also enhances reproducibility and could be useful to inform the design of future interventions.

Another strength of this study is that PHCUs were randomly selected from the pool of eligible units and all agreed to participate. In several trials, PHCUs are volunteers that are included in the trial until the required sample size is reached^{17,121}, which cast doubts on their representativeness.

This study is not without limitations. Firstly, although the results of this trial could be extrapolated regionally, the same may not be true for PHCUs in other health regions in Portugal or in other countries. National and international differences at the PHC and population levels could exist that would require tailoring of the implementation programme to local needs. Therefore, it is unlikely that the implementation programme tested in this trial is exactly tailored to the needs felt by PHC professionals in other places. Notwithstanding, future implementation programmes can build on the interventions used in this trial to design their own programme as the literature suggests that several barriers and facilitators to SBI delivery are common across different jurisdictions. For example, lack of time^{28,103,119,208,214} and lack of training^{28,29,89,103-107,116,119,223,230,233,249} are commonly reported barriers in several countries. Secondly, pen-and-paper screening tools are usually not applied in practice because they are not part of standard clinical protocols and/or not part of the providers' culture²⁸⁹. Therefore, the use of a pen-and-paper screening tool may have deterred from or facilitated the implementation of SBI for some providers. The results from this trial show that PHC providers hold positive views on the screening method, particularly when receptionists are involved, as this method addresses several other barriers to implementation such as lack of time or initiating the conversation about alcohol with the patient. This could mean that the negative impact of adding a new screening method to the practice may have been counterbalanced by the positive impact of the method in overcoming other barriers. Thirdly, we included all the options for giving advice in the same tally sheet used to measure AUDIT. The tally sheet was used for monitoring SBI activity but it also served a second purpose, i.e., it acted as a behaviour change intervention that could be linked to all three components of the COM-B model. As the tally sheet was distributed equally to intervention and controls, it might have had an impact on the SBI rates on controls as well, which may have contributed for our inability to detect significant differences in BI delivery rates to screen positive patients between groups. We also did not evaluate whether the advice was actually delivered, nor did we assess for its fidelity concerning content, quality,

and length of the advice. We have also not measured the impact of the intervention on patient outcomes. Finally, the implementation programme was limited in that not all relevant barriers were addressed because of budget constraints. For example, financial incentives are known to influence the behaviour of health care professionals^{17,290} including in relation to SBI²⁹¹ and its inclusion in the implementation programme could have had a significant positive impact on the screening activity.

Conclusions

A theory-based implementation programme, which included training and support activities, significantly increased alcohol screening rates in primary care. The results from this study could be useful to inform future theory-based programmes aiming to implement alcohol screening and brief interventions in primary health care.

CHAPTER 6

GENERAL DISCUSSION

The consumption of alcoholic beverages is undoubtedly one of the major threats to public health. A significant number of people worldwide die prematurely each year due to alcohol, mainly from uncommunicable diseases. Several policy measures are advocated for influencing the way people use alcohol and in reducing alcohol-related harm. This thesis focused on one of these policy measures, i.e. alcohol screening and brief interventions in primary health care and on the difficulties in implementing it. To study how to best overcome implementation difficulties, three main questions were formulated: 1) what are the factors influencing general practitioners/family physicians' and primary care nurses' routine delivery of alcohol screening and brief interventions in adults; 2) can family physicians be divided into distinct groups based on their attitudes to addressing alcohol issues in their patients; and 3) what is the impact of a theory-driven behaviour change intervention for implementing screening and brief interventions for excessive alcohol consumption in primary health care. This concluding chapter highlights and discusses the main findings of each of the three above mentioned questions in turn, and formulates proposals for practice, policy and future research that could contribute to a more effective implementation of alcohol screening and brief interventions in primary health care.

Factors influencing the delivery of alcohol screening and brief interventions

The work presented in Chapter 3 was the first to review the factors that specifically influence the routine delivery of alcohol screening and brief interventions by primary health care doctors and nurses. This study was also the first to provide a theoretical understanding of these factors, which increases our knowledge of the mechanisms by which a particular factor influences the implementation of this behaviour in practice. The study found a range of barriers and facilitators to implementation, many of which mapping to more than one mediating pathway of behaviour change. This means that some barriers may only be overcome if a combination of intervention strategies are used, which could explain why previous reports found that complex, multicomponent interventions are needed to address the difficulties in implementing alcohol screening and brief interventions^{133,134}. The work presented in Chapter 3 identified factors influencing the implementation of alcohol screening and brief interventions in primary health care from a wide range of countries, which provides researchers with a means

to identify the barriers to, and facilitators for, implementation that are relevant locally. The factors influencing implementation identified in this review were analysed with an integrative framework that synthesizes key theoretical constructs from several relevant theories of behaviour change. This work, therefore, provides researchers with a mean to select the best theory-based intervention strategies to address the barriers and facilitators judged meaningful, thus increasing the likelihood of success in changing primary health care providers' behaviour.

Recommendations for practice and policy

The findings from this review allowed for the formulation of four key recommendations. Firstly, there is a need to develop alcohol-specific training programmes for primary health care staff that increases both their capability and motivation to deliver alcohol screening and brief interventions. Secondly, implementation could be increased by restructuring the way preventive counselling is being delivered in primary health care, thus increasing the capability of, and the opportunity for, primary care providers to engage with at-risk drinkers. Thirdly, there is a need to provide primary care practices with the materials necessary to increase the opportunity to deliver alcohol screening and brief interventions. Materials could also be designed to address capability and motivational issues. Finally, there is a need to involve other key stakeholders (for example, local management, policymakers, specialized health services, the media) in the implementation process to boost the opportunity and motivation to implement screening and brief interventions for excessive alcohol use in practice.

Recommendations for research

Notwithstanding the knowledge gained with the work presented in Chapter 3, the present evidence has some limitations that should be addressed in future studies. Firstly, the study found a scarcity of barriers in some of the theoretical domains. This could mean that these domains are less important for changing primary care providers' behaviour than others domains identified in this review with a higher number of barriers, but it could also mean that some barriers linked to these domains might have

been missed in the research literature. Therefore, more research is needed on the topic. Secondly, the majority of the studies retrieved in this review focused on the views of GPs; the views of the nurses are considerably less well studied, although nurses are regarded as an underutilized resource for implementing alcohol SBI. Therefore, the present evidence would benefit from more extensive research. Finally, the review found that low-income countries are underrepresented as most data came from studies from high-income countries; more research from low-income countries would be useful to bridge this gap in the evidence base.

Groups of family physicians with distinct attitudes to addressing alcohol issues in their patients

A WHO study found that training and support programmes work differently depending on whether GPs have positive or negative attitudes¹¹³, which suggests that distinct groups of GPs could exist based on their attitudes towards patients with excessive alcohol consumption. Chapter 4 reported on an analysis of the attitudes of Portuguese family physicians towards these patients and found evidence of a two-group structure, the largest group having more negative attitudes. Evidence shows that GPs with more negative attitudes report managing a lower number of at-risk drinkers than GPs with more positive attitudes^{111,113,116,123,124}. This suggests that having more GPs in the group with more negative attitudes could act as a barrier to implementation of alcohol screening and brief interventions. Therefore, interventions could theoretically increase their chances of success if they include in their design actions aiming to move GPs from the group with more negative to the group with more positive attitudes. Chapter 4 described the validation of a model that could be useful to researchers for measuring the effect of interventions in changing the composition of the attitude-based groups.

Recommendations for research

Few differences were found between the groups of GPs with distinct attitudes towards at-risk drinkers. However, the groups were analysed on a limited set of selected barriers and facilitators to implementation; differences could exist concerning barriers

and facilitators not included in this study which could prove useful to better characterize the groups and to ascertain the extent to which this knowledge is useful to inform the design of interventions.

The groups found in this study are based on a sample of Portuguese GPs. Whether or not these groups exist in other countries remains unknown. Conversations are underway to test the existence of these groups in two datasets: the WHO collaborative project that gave rise to the research question addressed in Chapter 4; and the remaining data on GPs from countries other than Portugal included in the ODHIN project.

Impact of a theory-driven behaviour change intervention for implementing screening and brief interventions for excessive alcohol consumption in primary health care

Chapter 5 reports the results of a randomized controlled trial that tested the impact of a theory-driven intervention for implementing screening and brief interventions for excessive alcohol. To date, there are no published papers reporting on the results of trials that used theory in the design of programmes for increasing alcohol screening and brief interventions. One ongoing trial in the Netherlands is testing whether a theory-based intervention increases the screening and brief intervention rates of GPs¹³⁵. The intervention in this study requires GPs to visit a website where they can access an e-learning module and receive tailored feedback and support. As reported in Chapter 5, our intervention differed substantially from the one reported in this trial in the way it was designed, the mode of delivery and the range of primary health care works involved. Therefore, this is the first trial to test the efficacy of an implementation programme designed on such premises. The trial reported in Chapter 5 found a significant impact of the theory-driven intervention on the primary outcome, i.e. the screening rate, which nearly doubled the expected difference in screening rates between intervention and controls reported in the literature¹³³. Screening rates were highly and positively affected by the active participation of receptionists in the screening process. The intervention in the present trial also increased the brief intervention rate although it failed to reach statistical significance. Brief intervention rate was a secondary outcome, therefore, the trial was not powered to find differences

in the rates of brief intervention. Significant improvements associated with the theory-driven intervention were also found in the majority of other secondary outcomes (attitudes, barriers to implementation and knowledge) that are predicted to act as mediators of the implementation of alcohol screening and brief intervention. The results presented in Chapter 5 could be used as a basis to improve the implementation programme tested in this trial and to inform other theory-based programmes aiming to implement alcohol screening and brief interventions in primary health care. For instance, the analysis of the mediators for behaviour change in this trial showed no differences in some important motivational barriers, such as the priority given to addressing alcohol issues when compared to other tasks, or the degree of optimism concerning the results of implementing alcohol screening and brief interventions. Therefore, the programme tested here could have been more effective if more/different actions aimed at increasing the priority given to alcohol issues by primary care doctors and nurses, and at increasing their optimism towards the results of implementation, have been included in its design.

Recommendations for practice and policy

Improvement of alcohol screening and brief intervention rates could benefit from including in the process not only GPs – as most trials do – but also primary care nurses and receptionists. This task sharing approach should come with detailed protocols that clearly state who does what along the ‘alcohol screening and brief intervention process’. More actions are needed from policymakers to emphasize the importance of addressing alcohol-related problems in primary health care. Examples of such actions could be the inclusion of an alcohol-related clinical indicator to the primary health care contract and the inclusion of the AUDIT questionnaire in the health electronic record system of primary health care providers. This would signal the importance given to alcohol issues at the system level which could, in turn, lead to an increase in the priority given to alcohol at the primary health care workers level.

Recommendations for research

The programme in this trial was designed based on theoretical assumptions to overcome barriers to implementation and was tested as a whole. Therefore, the present evidence suffers from not knowing the individual contribution of each action included in the programme to changing the behaviour of interest. This knowledge could provide researchers with insight on the contribution of each action to changing the behaviour and to pinpointing which actions merit further improvement. Further, like in other trials, the fidelity of brief interventions delivered by primary health care doctors and nurses was not measured in this trial. This is an unmet need in the scientific literature that should be addressed in the future. Finally, it is not known whether theory-driven implementation programmes result in higher reductions in patients' alcohol consumption when compared to traditional approaches. Therefore, studies addressing the efficacy of theory-driven interventions at this level need to be undertaken.

Bringing it all together

Changing ingrained behaviour is difficult. Evidence shows that changing primary health care providers' delivery of screening and brief interventions is no exception. This thesis provided a clearer picture of the complexity of implementing alcohol screening and brief interventions in primary health care and on the responses that can be given to the factors influencing implementation. These factors can be traced to all levels of the health care system, spanning from system-level policymakers (e.g. ministry of health, general-health directorate) to frontline primary healthcare providers (e.g. GPs and nurses). Top-down, as well as bottom-up approaches, are probably needed to successfully implement alcohol screening and brief intervention activity in primary health care. This thesis tested a bottom-up approach that could be useful to inform future top-down as well as bottom-up approaches. The results from this thesis could be useful to inform the Portuguese National Programme on screening and brief interventions for excessive alcohol consumption in primary health care. This thesis is already making a difference in the region this family physician works in. The programme tested here will be made available in the next few years to all the 26 primary health care units of the Agrupamento de Centros de Saúde Dão Lafões.

Planning is underway to also include public health units and community care units in the project. Overseas, the results of this thesis are being used to test an implementation programme in Belgium. I wish its use will not stop here.

I started planning my PhD with a clear idea in mind: I wanted it to change something... If nothing else, this thesis has surely changed this family physician. Therefore, I believe it is fair to say: mission accomplished!

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List of publications included in the thesis

1. Frederico Rosário, Marcin Wojnar, Cristina Ribeiro. Differences between Groups of Family Physicians with Different Attitudes towards At-Risk Drinkers: A Post Hoc Study of the ODHIN Survey in Portugal. *Int J Family Med.* 2016;2016:3635907.
2. Frederico Rosário, Marcin Wojnar, Cristina Ribeiro. Can Doctors Be Divided Into Groups Based on Their Attitudes to Addressing Alcohol Issues in Their Patients? Analyses From a Survey of Portuguese General Practitioners. *Subst Use Misuse.* 2017;52(2):233-9.
3. Frederico Rosário, Maria Inês Santos, Kathryn Angus, Leo Pas, Cristina Ribeiro, Niamh Fitzgerald. Factors Influencing the Implementation of Screening and Brief Interventions for Alcohol Use in Primary Care Practices: A Systematic Review Protocol. *Acta Med Port* 2018 Jan;31(1):45-50. *Erratum ibid* 2018 Feb 28;31(2):139.
4. Frederico Rosário, Milica Vasiljevic, Leo Pas, Niamh Fitzgerald, Cristina Ribeiro. Implementing alcohol screening and brief interventions in primary health care: study protocol for a pilot cluster randomized controlled trial. *Family Practice* 2019;36(2):199-205.

ANNEXES

ANNEX 1

Electronic search strategy for the retrieval of studies from multiple databases

Databases	Search strategy
Medline search strategy search = ___	1 advice.tw. 2 Attitude of Health Personnel/ 3 (behavio?r* adj1 chang*).tw. 4 (brief adj advice).tw. 5 (brief adj intervention*).tw. 6 Cognitive Therapy/ 7 (cognitive adj therap*).tw. 8 Counseling/ 9 counsel*.tw. 10 detection.tw. 11 exp Directive Counseling/ 12 (early adj1 identif*).tw. 13 (early adj1 intervention*).tw. 14 Health Communication/ 15 Health Promotion/ 16 identification.tw. 17 implementation.tw. 18 Interviews as Topic/ 19 Mass Screening/ 20 Medical History Taking/ 21 (minimal adj intervention*).tw. 22 (motivat* adj intervention*).tw. 23 (motivat* adj interview*).tw. 24 Patient Education as Topic/ 25 Physician-Patient Relations/ 26 Nurse-Patient Relations/ 27 Physician's Practice Patterns/ 28 Physician's Role/ 29 Practice Patterns, Nurses'/ 30 Practice Patterns, Physicians'/ 31 exp Psychotherapy/ 32 Nurse's Role/ 33 screening.tw. 34 Secondary Prevention/ 35 (secondary adj prevention).tw. 36 Substance Abuse Detection/ 37 "Surveys and Questionnaires"/ 38 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 39 abuse.tw.

40 addiction.tw.
41 (alcohol* adj1 dependen*).tw.
42 exp Alcohol drinking/
43 (alcohol* adj1 drinking).tw.
44 (alcohol* adj2 problem*).tw.
45 Alcohol-Induced Disorders/
46 Alcohol-Related Disorders/
47 Alcoholic Intoxication/
48 alcoholism.tw.
49 Alcoholism/
50 (at-risk adj1 drink*).tw.
51 Binge Drinking/
52 (bing* adj drink*).tw.
53 dependence.tw.
54 drinker*.tw.
55 Drinking Behavior/
56 (drink* adj behavio?r*).tw.
57 Drinking/
58 (excessiv* adj1 drink*).tw.
59 (harmful* adj1 drink*).tw.
60 (hazardous adj1 drink*).tw.
61 misus*.tw.
62 (problem* adj1 drink*).tw.
63 (risk* adj1 drink*).tw.

39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or
64 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or
61 or 62 or 63

65 Education, medical/
66 Education, medical, continuing/
67 Education, nursing/
68 Education, nursing, continuing/
69 (family adj doctor*).tw.
70 (family adj medicine).tw.
71 Family Nurse Practitioners/
72 Family Practice/
73 (family adj practice*).tw.
74 General Practice/
75 (general adj practice*).tw.
76 General Practitioners/
77 (general adj practitioner*).tw.
78 Health Personnel/ed [Education]
79 Nurses/
80 Nurse Practitioners/
81 (practice adj nurse*).tw.
82 Physicians, Primary Care/

83 Physicians, Family/
84 Physicians/
85 Primary Health Care/
86 (primary adj care).tw.
87 (primary adj health*).tw.
65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or
88 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or
87

89 38 and 64 and 88

CINAHL search strategy search = ___

- 1 TI (advice) OR AB (advice)
- 2 (MH "Attitude of Health Personnel") OR (MH "Physician Attitudes") OR (MH "Nurse Attitudes")
- 3 TI (behavio#r* N1 chang*) OR AB (behavio#r* N1 chang*)
- 4 TI (brief N1 advice) OR AB (brief N1 advice)
- 5 TI (brief N1 intervention*) OR AB (brief N1 intervention*)
- 6 (MH "Cognitive Therapy")
- 7 TI (cognitive N1 therap*) OR AB (cognitive N1 therap*)
- 8 (MH "Counseling")
- 9 TI (counsel*) OR AB (counsel*)
- 10 TI (detection) OR AB (detection)
- 11 TI (early N1 identif*) OR AB (early N1 identif*)
- 12 TI (early N1 intervention*) OR AB (early N1 intervention*)
- 13 (MH "Health Promotion")
- 14 TI (identification) OR AB (identification)
- 15 TI (implementation) OR AB (implementation)
- 16 (MH "Interviews+")
- 17 (MH "Health Screening+")
- 18 (MH "Patient Assessment") OR (MH "Nursing Assessment")
- 19 (MH "Patient History Taking")
- 20 TI (minimal N1 intervention*) OR AB (minimal N1 intervention*)
- 21 TI (motivat* N1 intervention*) OR AB (motivat* N1 intervention*)
- 22 TI (motivat* N1 interview*) OR AB (motivat* N1 interview*)
- 23 (MH "Motivational Interviewing")
- 24 (MH "Patient Education")
- 25 (MH "Professional-Patient Relations") OR (MH "Physician-Patient Relations")
- 26 MH "Nurse-Patient Relations"
- 27 (MH "Physician's Role")
- 28 (MH "Practice Patterns")
- 29 (MH "Psychotherapy+")
- 30 (MH "Nursing Role")
- 31 TI (screening) OR AB (screening)
- 32 (MH "Recurrence/PC")
- 33 TI (secondary N1 prevention) OR AB (secondary N1 prevention)
- 34 (MH "Substance Abuse Detection+")

35 (MH "Surveys") OR (MH "Questionnaires+")

36 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35

37 TI (abuse) OR AB (abuse)

38 TI (addiction) OR AB (addiction)

39 TI (alcohol* N1 dependen*) OR AB (alcohol* N1 dependen*)

40 (MH "Alcohol Abuse")

41 (MH "Alcohol Drinking+")

42 TI (alcohol* N1 drinking) OR AB (alcohol* N1 drinking)

43 TI (alcohol* N2 problem*) OR AB (alcohol* N2 problem*)

44 (MH "Alcohol-Induced Disorders, Nervous System")

45 (MH "Alcohol-Related Disorders+")

46 (MH "Alcoholic Intoxication+")

47 (MH "Alcoholics")

48 TI (alcoholism) OR AB (alcoholism)

49 (MH "Alcoholism")

50 TI (at-risk N1 drink*) OR AB (at-risk N1 drink*)

51 (MH "Binge Drinking")

52 TI (bing* N1 drink*) OR AB (bing* N1 drink*)

53 TI (dependence) OR AB (dependence)

54 TI (drinker*) OR AB (drinker*)

55 MH (Drinking Behavior)

56 TI (drink* N1 behavio#r*) OR AB (drink* N1 behavio#r*)

57 TI (excessiv* N1 drink*) OR AB (excessiv* N1 drink*)

58 TI (harmful* N1 drink*) OR AB (harmful* N1 drink*)

59 TI (hazardous N1 drink*) OR AB (hazardous N1 drink*)

60 TI (misus*) OR AB (misus*)

61 TI (problem* N1 drink*) OR AB (problem* N1 drink*)

62 TI (risk* N1 drink*) OR AB (risk* N1 drink*)

63 S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62

64 (MH "Education, Medical+")

65 (MH "Education, Medical, Continuing")

66 (MH "Education, Nursing+")

67 (MH "Education, Nursing, Continuing")

68 TI (family N1 doctor*) OR AB (family N1 doctor*)

69 TI (family N1 medicine) OR AB (family N1 medicine)

70 (MH "Family Nurse Practitioners")

71 (MH "Family Practice")

72 TI (family N1 practice*) OR AB (family N1 practice*)

73 TI (general N1 practice*) OR AB (general N1 practice*)

74 TI (general N1 practitioner*) OR AB (general N1 practitioner*)

75 (MH "Health Personnel/ED")

76 (MH "Nurses")

77 (MH "Nurse Practitioners+")

78 TI (practice N1 nurse*) OR AB (practice N1 nurse*)

79 (MH "Physicians, Family")

80 (MH "Physicians")

81 (MH "Primary Health Care")

82 TI (primary N1 care) OR AB (primary N1 care)

83 TI (primary N1 health*) OR AB (primary N1 health*)

84 S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72
OR S73 OR S74 OR S75 OR S76 OR S77 OR S78 OR S79 OR S80 OR
S81 OR S82 OR S83

85 S36 AND S63 AND S84

1 TI (advice) OR AB (advice)

2 (DE "Health Personnel Attitudes")

3 TI (behavio#r* N1 chang*) OR AB (behavio#r* N1 chang*)

4 TI (brief N1 advice) OR AB (brief N1 advice)

5 TI (brief N1 intervention*) OR AB (brief N1 intervention*)

6 (DE "Cognitive Therapy")

7 TI (cognitive N1 therap*) OR AB (cognitive N1 therap*)

8 (DE "Counseling")

9 TI (counsel*) OR AB (counsel*)

10 TI (detection) OR AB (detection)

11 TI (early N1 identif*) OR AB (early N1 identif*)

12 TI (early N1 intervention*) OR AB (early N1 intervention*)

13 (DE "Health Promotion")

14 TI (identification) OR AB (identification)

15 TI (implementation) OR AB (implementation)

16 (DE "Interviews") OR (DE "Interview Schedules")

17 DE "Health Screening" OR DE "Physical Examination"

18 (DE "Patient History")

19 TI (minimal N1 intervention*) OR AB (minimal N1 intervention*)

20 TI (motivat* N1 intervention*) OR AB (motivat* N1
intervention*)

21 TI (motivat* N1 interview*) OR AB (motivat* N1 interview*)

22 (DE "Motivational Interviewing")

23 (DE "Client Education")

24 (DE "Therapeutic Processes")

25 (DE "Professional Role")

26 (DE "Health Care Delivery")

27 (DE "Psychotherapy" OR DE "Adlerian Psychotherapy" OR DE
"Adolescent Psychotherapy" OR DE "Affirmative Therapy" OR DE
"Analytical Psychotherapy" OR DE "Autogenic Training" OR DE
"Behavior Therapy" OR DE "Brief Psychotherapy" OR DE "Brief
Relational Therapy" OR DE "Child Psychotherapy" OR DE "Client
Centered Therapy" OR DE "Cognitive Behavior Therapy" OR DE
"Conversion Therapy" OR DE "Eclectic Psychotherapy" OR DE
"Emotion Focused Therapy" OR DE "Existential Therapy" OR DE

PsycINFO search strategy search = ___

"Experiential Psychotherapy" OR DE "Expressive Psychotherapy"
OR DE "Eye Movement Desensitization Therapy" OR DE "Feminist
Therapy" OR DE "Geriatric Psychotherapy" OR DE "Gestalt
Therapy" OR DE "Group Psychotherapy" OR DE "Guided Imagery"
OR DE "Humanistic Psychotherapy" OR DE "Hypnotherapy" OR
DE "Individual Psychotherapy" OR DE "Insight Therapy" OR DE
"Integrative Psychotherapy" OR DE "Interpersonal
Psychotherapy" OR DE "Logotherapy" OR DE "Narrative Therapy"
OR DE "Network Therapy" OR DE "Persuasion Therapy" OR DE
"Primal Therapy" OR DE "Psychoanalysis" OR DE "Psychodrama"
OR DE "Psychodynamic Psychotherapy" OR DE
"Psychotherapeutic Counseling" OR DE "Rational Emotive
Behavior Therapy" OR DE "Reality Therapy" OR DE "Relationship
Therapy" OR DE "Solution Focused Therapy" OR DE "Supportive
Psychotherapy" OR DE "Transactional Analysis")

28 TI (screening) OR AB (screening)

29 (DE "Relapse Prevention")

30 TI (secondary N1 prevention) OR AB (secondary N1 prevention)

31 DE "Drug Usage Screening"

32 DE "Questionnaires" OR DE "General Health Questionnaire" OR
DE "Surveys"

33 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR
S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19
OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR
S28 OR S29 OR S30 OR S31 OR S32

34 TI (abuse) OR AB (abuse)

35 TI (addiction) OR AB (addiction)

36 TI (alcohol* N1 dependen*) OR AB (alcohol* N1 dependen*)

37 DE "Alcohol Abuse"

38 DE "Alcohol Drinking Patterns" OR DE "Social Drinking"

39 TI (alcohol* N1 drinking) OR AB (alcohol* N1 drinking)

40 TI (alcohol* N2 problem*) OR AB (alcohol* N2 problem*)

41 (DE "Alcoholic Psychosis" OR DE "Alcoholic Hallucinosi") OR DE
"Fetal Alcohol Syndrome" OR DE "Cirrhosis (Liver)")

42 DE "Alcohol Intoxication" OR DE "Chronic Alcoholic Intoxication"
OR DE "Acute Alcoholic Intoxication"

43 TI (alcoholism) OR AB (alcoholism)

44 DE "Alcoholism"

45 TI (at-risk N1 drink*) OR AB (at-risk N1 drink*)

46 DE "Binge Drinking"

47 TI (bing* N1 drink*) OR AB (bing* N1 drink*)

48 TI (dependence) OR AB (dependence)

49 TI (drinker*) OR AB (drinker*)

50 DE "Drinking Behavior"

51 TI (drink* N1 behavio#r*) OR AB (drink* N1 behavio#r*)

52 TI (excessiv* N1 drink*) OR AB (excessiv* N1 drink*)

53 TI (harmful* N1 drink*) OR AB (harmful* N1 drink*)

54 TI (hazardous N1 drink*) OR AB (hazardous N1 drink*)

55 TI (misus*) OR AB (misus*)

56 TI (problem* N1 drink*) OR AB (problem* N1 drink*)
57 TI (risk* N1 drink*) OR AB (risk* N1 drink*)
58 S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42
OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR
S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57
59 DE "Medical Education" OR DE "Medical Internship" OR DE
"Medical Residency" OR DE "Psychiatric Training"
60 DE "Continuing Education"
61 DE "Nursing Education"
62 TI (family N1 doctor*) OR AB (family N1 doctor*)
63 TI (family N1 medicine) OR AB (family N1 medicine)
64 TI (family N1 practice*) OR AB (family N1 practice*)
65 TI (general N1 practice*) OR AB (general N1 practice*)
66 DE "General Practitioners"
67 TI (general N1 practitioner*) OR AB (general N1 practitioner*)
68 (DE "Nurses")
69 TI (practice N1 nurse*) OR AB (practice N1 nurse*)
70 (DE "Family Physicians")
71 DE "Physicians"
72 DE "Primary Health Care"
73 TI (primary N1 care) OR AB (primary N1 care)
74 TI (primary N1 health*) OR AB (primary N1 health*)
75 S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67
OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74
76 S33 AND S58 AND S75

CENTRAL search strategy search = ___

1 "advice" in Trials
2 MeSH descriptor: [Attitude of Health Personnel] this term only
3 (behavio*r* near/1 chang*) in Trials
4 (brief near/1 advice) in Trials
5 (brief near/1 intervention*) in Trials
6 MeSH descriptor: [Cognitive Therapy] this term only
7 (cognitive near/1 therap*) in Trials
8 MeSH descriptor: [Counseling] this term only
9 (counsel*) in Trials
10 (detection) in Trials
11 MeSH descriptor: [Directive Counseling] explode all trees
12 (early near/1 identif*) in Trials
13 (early near/1 intervention*) in Trials
14 MeSH descriptor: [Health Communication] this term only
15 MeSH descriptor: [Health Promotion] this term only
16 (identification) in Trials
17 (implementation) in Trials
18 MeSH descriptor: [Interviews as Topic] this term only
19 MeSH descriptor: [Mass Screening] this term only
20 MeSH descriptor: [Medical History Taking] this term only
21 (minimal near/1 intervention*) in Trials

- 22 (motivat* near/1 intervention*) in Trials
- 23 (motivat* near/1 interview*) in Trials
- 24 MeSH descriptor: [Patient Education as Topic] this term only
- 25 MeSH descriptor: [Physician-Patient Relations] this term only
- 26 MeSH descriptor: [Nurse-Patient Relations] this term only
- 27 MeSH descriptor: [Practice Patterns, Physicians'] this term only
- 28 MeSH descriptor: [Physician's Role] this term only
- 29 MeSH descriptor: [Practice Patterns, Nurses'] this term only
- 30 MeSH descriptor: [Nurse's Role] this term only
- 31 MeSH descriptor: [Psychotherapy] explode all trees
- 32 (screening) in Trials
- 33 MeSH descriptor: [Secondary Prevention] this term only
- 34 (secondary near/1 prevention) in Trials
- 35 MeSH descriptor: [Substance Abuse Detection] this term only
- 36 MeSH descriptor: [Surveys and Questionnaires] this term only
- 37 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 in Trials
- 38 (abuse) in Trials
- 39 (addiction) in Trials
- 40 (alcohol* near/1 dependen*) in Trials
- 41 MeSH descriptor: [Alcohol Drinking] explode all trees
- 42 (alcohol* near/1 drinking) in Trials
- 43 (alcohol* near/2 problem*) in Trials
- 44 MeSH descriptor: [Alcohol-Induced Disorders] this term only
- 45 MeSH descriptor: [Alcohol-Related Disorders] this term only
- 46 MeSH descriptor: [Alcoholic Intoxication] this term only
- 47 (alcoholism) in Trials
- 48 MeSH descriptor: [Alcoholism] this term only
- 49 (at-risk near/1 drink*) in Trials
- 50 MeSH descriptor: [Binge Drinking] this term only
- 51 (bing* near/1 drink*) in Trials
- 52 (dependence) in Trials
- 53 (drinker*) in Trials
- 54 MeSH descriptor: [Drinking Behavior] this term only
- 55 (drink* near/1 behavio*r*) in Trials
- 56 MeSH descriptor: [Drinking] this term only
- 57 (excessiv* near/1 drink*) in Trials
- 58 (harmful* near/1 drink*) in Trials
- 59 (hazardous near/1 drink*) in Trials
- 60 (misus*) in Trials
- 61 (problem* near/1 drink*) in Trials
- 62 (risk* near/1 drink*) in Trials

- 63 #38 or #39 or #40 or #41 or #42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 or #50 or #51 or #52 or #53 or #54 or #55 or #56 or #57 or #58 or #59 or #60 or #61 or #62 in Trials
- 64 MeSH descriptor: [Education, Medical] this term only
- 65 MeSH descriptor: [Education, Medical, Continuing] this term only
- 66 MeSH descriptor: [Education, Nursing] this term only
- 67 MeSH descriptor: [Education, Nursing, Continuing] this term only
- 68 (family near/1 doctor*) in Trials
- 69 (family near/1 medicine) in Trials
- 70 MeSH descriptor: [Family Nurse Practitioners] this term only
- 71 MeSH descriptor: [Family Practice] this term only
- 72 (family near/1 practice*) in Trials
- 73 MeSH descriptor: [General Practice] this term only
- 74 (general near/1 practice*) in Trials
- 75 MeSH descriptor: [General Practitioners] this term only
- 76 (general near/1 practitioner*) in Trials
- 77 MeSH descriptor: [Health Personnel] this term only and with qualifier(s): [Education - ED]
- 78 MeSH descriptor: [Nurses] this term only
- 79 MeSH descriptor: [Nurse Practitioners] this term only
- 80 (practice near/1 nurse*) in Trials
- 81 MeSH descriptor: [Physicians, Primary Care] this term only
- 82 MeSH descriptor: [Physicians, Family] this term only
- 83 MeSH descriptor: [Physicians] this term only
- 84 MeSH descriptor: [Primary Health Care] this term only
- 85 (primary near/1 care) in Trials
- 86 (primary near/1 health*) in Trials
- 87 #64 or #65 or #66 or #67 or #68 or #69 or #70 or #71 or #72 or #73 or #74 or #75 or #76 or #77 or #78 or #79 or #80 or #81 or #82 or #83 or #84 or #85 or #86 in Trials
- 88 #37 and #63 and #87 in Trials
-

ANNEX 2

List of unobtainable full-text papers

1. Jones RW, Helrich AR. Treatment of alcoholism by physicians in private practice. A national survey. *Quarterly journal of studies on alcohol* 1972;33:117-31.
2. Neville RG, Campion PD, Heather N. Barriers to the recognition and management of problem drinking: lessons from a multicentre general practice study. *Health bulletin* 1987;45:88-94.
3. Weller DP, Litt JC, Pols RG, Ali RL, Southgate DO, Harris RD. Drug and alcohol related health problems in primary care--what do GPs think? *The Medical journal of Australia* 1992;156:43-8.
4. Roche AM, Richard GP. Early intervention for alcohol problems in general practice: an evaluation of a simple dissemination strategy. *Health Promotion Journal of Australia* 1994;4:9-12.
5. Leversha AM, Marks RE. Alcohol and pregnancy: doctors' attitudes, knowledge and clinical practice. *The New Zealand medical journal* 1995;108:428-30.
6. Perdrix A, Decrey H, Pecoud A, Burnand B, Yersin B. [Detection of alcoholism in the medical office: applicability of the CAGE questionnaire by the practicing physician. Group of Medical Practitioners PMU]. *Schweizerische medizinische Wochenschrift* 1995;125:1772-8.
7. Duszynski KR, Nieto FJ, Valente CM. Reported practices, attitudes, and confidence levels of primary care physicians regarding patients who abuse alcohol and other drugs. *Maryland medical journal* 1995;44:439-46.
8. Adams PJ, Powell A, McCormick R, Paton-Simpson G. Incentives for general practitioners to provide brief interventions for alcohol problems. *The New Zealand medical journal* 1997;110:291-4.
9. Davenport TA, Hickie IB, Naismith SL, Hadzi-Pavlovic D, Scott EM. Variability and predictors of mental disorder rates and medical practitioner responses across Australian general practices. *The Medical journal of Australia* 2001;175 Suppl:S37-41.
10. Peltzer K, Seoka P, Babor T, Obot I. Training primary care nurses to conduct alcohol screening and brief interventions in South Africa. *Curationis* 2006;29:16-21.
11. Naudet M, Miche JN. (General practice management of alcohol-related problems. Impact of the general practitioner's training and representations). *Alcoologie et Addictologie* 2006;28:41-50.
12. Michaud P, Fouilland P, Dewost AV, et al. [Early screening and brief intervention among excessive alcohol users: mobilizing general practitioners in an efficient way]. *La Revue du praticien* 2007;57:1219-26.
13. Hung DY. Improving the delivery of preventive care services. *Managed care interface* 2007;20:38-44.
14. Souza-Formigoni M, Boemgen-Lacerda R, Vianna V. Implementation of alcohol Screening and brief intervention in primary care units in two Brazilian states: A case study. *NAT Nordisk alkohol & narkotikatidskrift* 2008;25:533-64.

ANNEX 3

Excluded full-text articles and references.

Reasons for exclusion

- 1 do not have a title and an abstract
- 2 is not peer-reviewed and published in an academic journal in the public domain
- 3 is not published in one of the following languages: English, French, Spanish, or Portuguese
- 4 do not focus on alcohol
- 5 do not have a qualitative or quantitative methodology
- 6 do not focus on the implementation of the intervention in the general primary care adult population
- 7 do not focus on barriers and/or facilitators reported by general practitioners/family physicians or nurses working in primary care practice
- 8 Repeated data

Excluded full-text articles and reasons for exclusion (n=174)

First author	Year of publication	Reasons for exclusion
Aalto	2000	7
Aalto	2001	7
Aalto	2004	7
Aalto	2005	8
Aalto	2006	7
Aalto	2007	7
Abel	2002	7
Agley	2014	7
Allan	2010	7
Amaral	2010	4
Amaral	2010a	7
Angove	2001	6
Aspy	2008	7
Assanangkornchai	2013	7
Assanangkornchai	2014	7
Babor	2004	7
Babor	2005	7
Balachova	2007	7
Baldwin	2006	6
Bartek	1988	6
Bendtsen	1999	7
Boekel	2014	6
Brady	2002	5

Brett	2014	7
Bush	1988	7
Campbell-Heider	2009	7
Casswell	1983	8
Chappel	1977	5
Cho	2003	7
Cohen	1982	6
Coogle	2015	7
Copello	2000	6
Costa	2013	4
Crawford-Williams	2015	6
Cruvinel	2011	7
Cruvinel	2013	7
Curry	2003	7
Dunn	2015	4
Dyches	1999	4
Egerer	2012	6
Elwy	2013	7
Ernst	2007	5
Felice	2012	7
Fernald	2012	7
Fleming	1999	5
Fonseca	2012	4
France	2010	7
Furtado	2008	7
Fuste	2001	7
Galanter	1983	7
Garcia	1991	7
Gassman	2003	7
Gassman	2007	7
Gerace	1995	7
Gifford	2012	7
Godlaski	2012	7
Gonçalves	2011	5
Gorman	1990	7
Gottlieb	1987	7
Gray	1986	7
Groves	2002	4
Hanbury	2015	7
Happell	2002	7
Hassoun	1987	7
Heather	2004	7

Herzig	2006	7
Hile	2003	7
Holland	2009	7
Holleman	2000	7
Hore	1976	7
Hung	2007	4
Hunter	2004	7
Hyman	2010	7
Johannessen	2015	7
Johnson	2005	7
Johnson	2013	7
Kaner	1999a	7
Kaner	2001	7
Kennedy	2013	7
Kenyon	2001	4
Kessler	2014	4
Ketterer	2014	4
Lamberts	1999	7
Latorre	2007	4
Lev-Ran	2013	7
Linn	1989	7
Linn	1990	7
Linn	1990a	7
Livaudais	2005	7
Lock	2004	7
Maciel	2012	7
MacLean	2013	7
Malan	2015	4
Malan	2015a	4
Mark	2003	7
Mark	2003a	7
Matheson	2006	4
Maynard	2015	4
McCormick	2010	5
McCrary	1996	7
McDaniel	1989	2
McElwaine	2014	7
Mello	2003	7
Mellor	2013	7
Mertens	2015	7
Mignon	1996	7
Miller	2005	5

Moodley-Kunnie	1988	7
Moretti-Pires	2011	7
Mowbray	1986	5
Muench	2015	7
Munro	2007	7
Nalpas	2003	7
Nemeth	2013	7
Neushotz	2008	4
Nilsen	2011	5
Ockene	1997	7
Oliveira	2012	7
Ornstein	2013	7
Panagiotidis	2010	7
Peckover	2007	4
Peltzer	2008	7
Petersen	2015	7
Pillon	2005	7
Poikolainen	1988	7
Potamianos	1985	7
Pursch	1978	5
Rahm	2015	7
Raistrick	2008	7
Richmond	1994	5
Rieckmann	2010	4
Rivers	1998	4
Roberts	2008	4
Robertson	2015	4
Roche	2001	6
Roche	1991	7
Rohman	1987	7
Ronzani	2005	7
Ronzani	2009	7
Rose	2016	7
Rosenstock	2010	4
Rosso	1992	7
Rosta	2003	7
Rowland	1989	7
Rush	2013	4
Saitz	2002	7
Seppanen	2012	7
Sibthorpe	2002	7
Skinner	2007	7

Smith	2003	4
Soares	2013	7
Spandorfer	1999	7
Stockwell	1990	7
Stoner	2014	7
Strang	2007	4
Strayer	2012	7
Tam	2013	7
Taylor	2007	7
Thomas	2014	7
Thompson	2001	4
Tober	1990	5
Tønnesen	2010	7
Townes	1994	7
Urada	2014	4
Vadlamudi	2008	7
van Boekel	2014	4
van Boekel	2015	4
Vargas	2008	7
Vargas	2010	7
Wallston	1976	7
Waring	1975	7
Weinehall	2014	7
Whiteford	2015	7
Williams	1999	7

References of excluded full-text articles

Aalto 2000

Aalto M, Saksanen R, Laine P, Forsström R, Raikaa M, Kiviluoto M et al. Brief intervention for female heavy drinkers in routine general practice: a 3-year randomized, controlled study. *Alcoholism: Clinical & Experimental Research* 2000; 24(11):1680-1686.

Aalto 2001

Aalto M, Seppa K, Mattila P, Mustonen H, Ruuth K, Hyvarinen H et al. Brief intervention for male heavy drinkers in routine general practice: A three-year randomized controlled study. *Alcohol and alcoholism* 2001; 36(3):224-230.

Aalto 2004

Aalto M, Seppa K. Usefulness, length and content of alcohol-related discussions in primary health care: the exit poll survey. *Alcohol Alcohol* 2004; 39(6):532-535.

Aalto 2005

Aalto M, Pekuri P, Seppä K. Implementation of brief alcohol intervention in primary health care: do nurses' and general practitioners' attitudes, skills and knowledge change? *Drug Alcohol Rev* 2005; 24(6):555-558.

Aalto 2006

Aalto M, Hyvönen S, Seppä K. Do primary care physicians' own AUDIT scores predict their use of brief alcohol intervention? A cross-sectional survey. *Drug & Alcohol Dependence* 2006; 83(2):169-173.

Aalto 2007

Aalto M, Seppä K. Primary health care physicians' definitions on when to advise a patient about weekly and binge drinking. *Addict Behav* 2007; 32(7):1321-1330.

Abel 2002

Abel EL, Kruger M. Physician attitudes concerning legal coercion of pregnant alcohol and drug abusers. *Am J Obstet Gynecol* 2002; 186(4):768-772.

Agley 2014

Agley J, McIntire R, DeSalle M, Tidd D, Wolf J, Gassman R. Connecting patients to services: Screening, brief intervention and referral to treatment in primary health care. *Drugs: Education, Prevention & Policy* 2014; 21(5):370-379.

Allan 2010

Allan J. Engaging primary health care workers in drug and alcohol and mental health interventions: challenges for service delivery in rural and remote Australia. *Aust J Prim Health* 2010; 16(4):311-318.

Amaral 2010

Amaral-Sabadini MB, Saitz R, Souza-Formigoni ML. Do attitudes about unhealthy alcohol and other drug (AOD) use impact primary care professionals' readiness to implement AOD-related preventive care? *Drug & Alcohol Review* 2010; 29(6):655-661.

Amaral 2010a

Amaral MB, Ronzani TM, Souza-Formigoni ML. Process evaluation of the implementation of a screening and brief intervention program for alcohol risk in primary health care: An experience in Brazil. *Drug & Alcohol Review* 2010; 29(2):162-168.

Angove 2001

Angove R, McBride AJ. Swimming upstream: how and why an alcohol misuse screening and intervention service using the AUDIT can have limited impact in primary care. *Journal of Substance Use* 2001; 6(2):70-79.

Aspy 2008

Aspy CB, Mold JW, Thompson DM, Blondell RD, Landers PS, Reilly KE et al. Integrating screening and interventions for unhealthy behaviors into primary care practices. *Am J Prev Med* 2008; 35(5):S373-S380.

Assanangkornchai 2013

Assanangkornchai S, Balthip Q, Edwards JG. Screening and brief intervention for substance misuse in Thailand. *Public health* 2013; 127(12):1140-1142.

Assanangkornchai 2014

Assanangkornchai S, Balthip Q, Edwards JG, assistance of the ASSIST-SBI Development Co-investigators. Implementing the Alcohol, Smoking, Substance Involvement Screening Test and linked brief intervention service in primary care in Thailand. *J Public Health (Oxf)* 2014; 36(3):443-449.

Babor 2004

Babor TF, Higgins-Biddle JC, Higgins PS, Gassman RA, Gould BE. Training medical providers to conduct alcohol screening and brief interventions. *Subst Abus* 2004; 25(1):17-26.

Babor 2005

Babor TF, Higgins-Biddle J, Dauser D, Higgins P, Bureson JA. Alcohol Screening and Brief Intervention in Primary Care Settings: Implementation Models and Predictors. *J stud alcohol* 2005; 66(3):361-368.

Balachova 2007

Balachova TN, Bonner BL, Isurina GL, Tsvetkova LA. Use of focus groups in developing FAS/FASD prevention in Russia. *Subst Use Misuse* 2007; 42(5):881-894.

Baldwin 2006

Baldwin JA, Johnson RM, Wayment HA, Callahan EJ. Partnering with community-based professionals to improve substance abuse screening and intervention for youth and young adults. *Subst Abus* 2006; 26(3/4):43-47.

Bartek 1988

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ANNEX 4

Themes of barriers within each of the components of the BCW and domains of the Theoretical Domains Framework.

BCW component: Capability; TDF domain: Behaviour Regulation

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Organization for preventive counselling	Agree general practices are not organised to do preventive counselling	Anderson	2014		76.7%		
	The majority of the participants agreed that they did not have proper routines for identifying patients with high alcohol consumption	Johansson	2005a				
	Agree general practices are not organized to do preventive counselling	Kaner	1999		40%		
	Agree general practice not organized for preventive medicine	Koopman	2008		86%		
	Lack of a systematic strategy for patient identification and management	Rush	1995				
	Lack of implementation strategies	Poplas Susic	2010				

BCW component: Capability; TDF domain: Knowledge

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Alcohol being perceived as having health benefits	Drinking moderately was seen to have also some beneficial effects (moderate use does not kill anybody, on the contrary, it is medically accepted and recommendable)	Aira	2004				
	Agree that drinking alcohol moderately is important or very important in promoting the health of the average person	Geirsson	2005		88%	91%	
	Agree that drinking alcohol moderately was 'important' or 'very important' in promoting patients' health	Kaner	1999		77%		
Alcohol-related knowledge	Agree they know the definition of heavy drinking	Aalto	2001	59.0%	54.7%	61.5%	
	Agree they know structured questionnaires	Aalto	2001	19.7%	26.3%	16.5%	
	Agree they know how to talk about alcohol drinking with patients	Aalto	2001	66.7%	74.7%	62.7%	
	Agree they know how to motivate patients to undergo treatment	Aalto	2001	64.8%	70.4%	62.0%	
	Agree they know the content of brief intervention well (self-reported)	Aalto	2001	18.0%	32.5%	10.8%	
	Agree they need training in detection of heavy drinkers	Aalto	2001	47.0%	29.8%	55.7%	

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree that additional education related to intervention for excessive drinking is useless; the necessary things are already known	Aalto	2003		3.1%		
	Confusion between early-phase heavy drinking and alcohol dependence	Aalto	2003a				
	They knew how to handle late alcohol problems, such as liver cirrhoses or delirium tremens, but they could not define risky limits of alcohol consumption	Aira	2003				
	Only two doctors knew the established Finnish guidelines for heavy drinking	Aira	2004				
	Agree GPs don't know how to identify without obvious symptoms	Anderson	2014		74.8%		
	GPs knowledge and confidence in their ability to actually conduct screening and brief interventions for alcohol use problems	Brennan	2013		18.27		On a scale of 7 to 28 (the higher the score, the higher the GP agreement)
	Agree GPs are well informed about management care of alcohol dependence	Charrel	2010		77.9%		
	I agree I feel I have a working knowledge of alcohol and alcohol-related problems	Clement	1986		70.4%		
	I agree I feel I know how to counsel drinkers over the long term	Clement	1986		21%		
	I agree I feel I know enough about the causes of drinking problems to carry out my role when working with drinkers	Farmer	2001		40%		
	GPs have sufficient knowledge about alcohol	Fernández	1999		3.06		From 5-point Likert scales of agreement where 1 strongly agree and 5 strongly disagree
	Very familiar with the NIAAA guidelines	Friedmann	2000		2.2		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	GPs with correct knowledge of safe drinking levels for men and women or the appropriate treatment for patients consuming above such levels	Fucito	2003		73%		
	GPs with correct knowledge of safe drinking levels during pregnancy	Fucito	2003		62%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Role adequacy	Geirsson	2005		4.56	3.72	Seven graded scale with 7 = strongly agree; 1 = strongly disagree
	Agree doctors do not know how to identify problem drinkers who have no obvious symptoms of excess consumption	Geirsson	2005		65%		
	Agree they had heard of alcohol misuse screening questionnaires	Gurugama	2003		25.7%		
	Could accurately state the recommended low risk levels of alcohol intake for men and women	Gurugama	2003		38.1%		
	Reasons for not discussing alcohol despite suspicion of alcohol-related symptoms: Uncertain how to ask	Holmqvist	2008		3.9%	23.5%	
	Reasons for not discussing alcohol despite suspicion of alcohol-related symptoms: Uncertain how to give advice	Holmqvist	2008		1.6%	10.7%	
	Agree primary care staff have good knowledge with regard to detection and intervention in patients with high alcohol consumption	Johansson	2002		10%	18%	
	GPs and the nurses rated their knowledge about identification of alcohol-related problems significantly better than their knowledge concerning intervention methods	Johansson	2002	nr			
	Lack of knowledge about what to do if the patient appears to have high alcohol consumption	Johansson	2005a				
	The content of brief intervention treatment was known slightly or not at all	Kaariainen	2001	32.8%			
	Agree feeling role adequacy	Kaner	1999		71%		
	Agree doctors do not know how to identify problem drinkers who have no obvious symptoms of excess consumption	Kaner	1999		31%		
	Agree to not knowing how to identify problem drinkers	Koopman	2008		70%		
	Agree having no or very little knowledge or skills	Lacey	2009			55%	
	Lack of strategies (knowledge and skills) to address alcohol	Lid	2015				
	Confusion about alcohol issues: what are the sensible drinking limits (what to recommend to patients?)	Lock	2002				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	GPs do not know how to identify problem drinkers who have no obvious symptoms of hazardous consumption	McAvoy	2001				
	Early intervention for hazardous alcohol consumption is not taught in medical schools	McAvoy	2001				
	Agree having received no specific education on alcohol during medical school	Miner	1990		60%		
	Lack of knowledge	Moretti-Pires	2011				
	GP being unable to define a safe level of alcohol consumption to the patient	Mules	2012				
	Doubts about what is considered normal in terms of alcohol intake	Nygaard	2011				
	Doubts about who should be tested and who should not	Nygaard	2011				
	Lack of knowledge of existing screening tools	Nygaard	2011				
	Agree to having sufficient knowledge to give advice on sensible limits of alcohol consumption	Owens	2000			53.5%	
	Nurses who believed to have sufficient knowledge indicating incorrect sensible limits for men	Owens	2000			65%	
	Nurses who believed to have sufficient knowledge indicating incorrect sensible limits for women	Owens	2000			45%	
	Perception that one had sufficient knowledge of sensible limits of alcohol consumption did not correlate with correct responses on sensible limits	Owens	2000			nr	
	Agree would welcome further information and training with regard to alcohol services	Owens	2000			96%	
	Disagreement over the recommended limits to the number of alcohol units per day/week	Poplas Susic	2010				
	Different interpretations as to the definition of an alcoholic beverage	Poplas Susic	2010				
	People who are just over the limit, people who need brief interventions I think that's much harder to pick up intuitively	Rapley	2006				
	Agree feeling role adequacy	Ribeiro	2011		67%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree I think I know enough about the causes of drinking problems to carry out my role when working with problem drinkers	Rush	1994		54.8%		
	Knowledgeable/unfamiliar with effective treatment methods for older adults	Sharp	2011		3.92		Items range from 1 (positive) to 7 (negative)
	Agree to having lack of knowledge	Van Zyl	2013		51.9%		
	Agree feeling role adequacy	Wilson	2011		78%		
	Agree that doctors do not know how to identify problem drinkers who have no obvious symptoms of excess consumption	Wilson	2011		30%		
Disease model training	In the appearance or status findings of excessive drinkers there is without exception something indicating excessive drinking	Aalto	2003		52%		
	None of the physicians was ready to ask about alcohol consumption routinely in every consultation, but only when the reason is connected to alcohol	Aira	2003				
	Doctors asked about alcohol consumption only when they suspected heavy consumption, and not with all patients	Aira	2004				
	Agree that GPs role with the alcohol misuser is to treat the medical complications only	Deehan	1998		4%		
	Agreement that the healthcare service has an important role in identifying high alcohol consumers but situations where healthcare could contribute were limited to either people with perceived alcohol related symptoms seeking care or through health checks	Johansson	2005a				
Doctors and nurses own drinking habits	Several GPs used their own drinking as a benchmark, beyond which they determined that patients were 'at-risk' due to alcohol consumption and requiring intervention	Kaner	2006				
	A normal alcohol consumption was judged in comparison with personal experiences with alcohol	Lid	2015				
	Nurses' drinking behaviour: advising taking into account their own use and enjoyment of alcohol	Lock	2002				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Knowledge of support services	Agree that uncertainty where to refer the patient is a reason for not discussing alcohol despite suspicion of alcohol-related symptoms	Holmqvist	2008		6.1%	6.2%	
	Agree they were aware of the alcohol services available in the community	Owens	2000			44%	
Patients' receptiveness to alcohol interventions	Patients do not accept being asked about alcohol use	Aira	2004				
	"Patients don't want to be asked these questions"	Friedmann	2000		2.7		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Patients expect them to ask alcohol-related questions	Rapley	2006				

BCW component: Capability; TDF domain: Memory, Attention and Decision Processes

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Demographical characteristics of the patient	Before openly asking about alcohol consumption, physicians often made an attempt to evaluate if a patient could be an excessive drinker based on patients' appearance, age, sex or profession. If they were not sure, they did not raise the issue.	Aira	2003				
	Being a female patient decreased the odds of being detected	Berner	2007		0.28		Odds ratio
	Visiting the GP more than five times within the last year increased the odds of being detected	Berner	2007		3.15		Odds ratio
	Patients' age also determines whether or not they are questioned about alcohol. Older people's alcohol consumption appears to be disregarded provided that no symptoms are apparent	Johansson	2005a				
	Factors like social status, class and age influenced the diagnosis and possibilities of intervention	Rapley	2006				
	Failure to look for alcohol problems was sometimes based upon a person's appearance or demographic features (race, age, income)	Vandermause	2007				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Feedback on the results of delivering SBI	Doctors did not receive any feedback from patients that they had advised because they did not ask patients to return for a follow-up visit only to check how they had managed to cut down their alcohol intake	Aira	2004				
Remembering	I often might forget to ask about alcohol	Aira	2003				
	It was considered easy to simply forget to ask	Johansson	2005a				

BCW component: Capability; TDF domain: Skills

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Demographical characteristics of the PHC professionals	Female GPs proved to detect problem drinkers clearly better than their male colleagues	Berner	2007		7.83		Odds ratio
	The odds of detection were higher by GPs who were at least 50 years old than by their younger counterparts	Berner	2007		4.32		Odds ratio
	Experience was weakly and negatively correlated with the use of screening instruments	Nygaard	2010		-0.085		Linear regression coefficient
Role adequacy	Agree they know how to talk about alcohol drinking with patients	Aalto	2001	66.7%	74.7%	62.7%	
	Agree they know how to motivate patients to undergo treatment	Aalto	2001	64.8%	70.4%	62.0%	
	Agree they have the skills to influence patients' drinking	Aalto	2001	62.9%	71.1%	57.9%	
	I agree I feel capable of working with drinkers	Anderson	1985		44%		
	Agree GPs don't know how to identify without obvious symptoms	Anderson	2014		74.8%		
	Lacked the right communication skills for delivering ASBI	Beich	2002				
	GPs knowledge and confidence in their ability to actually conduct screening and brief interventions for alcohol use problems	Brennan	2013		18.27		On a scale of 7 to 28 (the higher the score, the higher the GP agreement)
	I agree I feel I know how to counsel drinkers over the long term	Clement	1986		21%		
	Agree that I feel confident in my ability to work with alcohol misusers	Deehan	1999		36.8%	5.4%	
I agree I feel I know enough about the causes of drinking problems to carry out my role when working with drinkers	Farmer	2001		40%			

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	I agree I feel I can appropriately advise patients about drinking and its effects	Farmer	2001		96%		
	GPs belief they had the necessary skills to work with drinkers	Fernández	1999		2.24		From 5-point Likert scales of agreement where 1 strongly agree and 5 strongly disagree
	Very confident in alcohol history taking	Friedmann	2000		3.8		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Role adequacy	Geirsson	2005		4.56	3.72	Seven graded scale with 7 = strongly agree; 1 = strongly disagree
	Agree doctors do not know how to identify problem drinkers who have no obvious symptoms of excess consumption	Geirsson	2005		65%		
	How prepared do you feel when counselling patients	Geirsson	2005		2.38	2.47	Four graded scale with 4 = very prepared/effective; 1 = very unprepared/ineffective
	Agree not feeling confident of their ability to detect alcohol misuse	Gurugama	2003		60%		
	Agree not feeling confident of their ability to manage alcohol misuse	Gurugama	2003		55.2%		
	Reasons for not discussing alcohol despite suspicion of alcohol-related symptoms: Uncertain how to ask	Holmqvist	2008		3.9%	23.5%	
	Reasons for not discussing alcohol despite suspicion of alcohol-related symptoms: Uncertain how to give advice	Holmqvist	2008		1.6%	10.7%	
	Agree feeling role adequacy	Kaner	1999		71%		
	Agree doctors do not know how to identify problem drinkers who have no obvious symptoms of excess consumption	Kaner	1999		31%		
	Agree feeling 'prepared' or 'very prepared' for counselling	Kaner	1999		83%		
	Agree to not knowing how to identify problem drinkers	Koopman	2008		70%		
	Agree feeling prepared for counselling patients about reducing alcohol consumption	Koopman	2008		82%		
	Agree having no or very little knowledge or skills	Lacey	2009			55%	

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Lack of strategies (knowledge and skills) to address alcohol	Lid	2015				
	GPs do not know how to identify problem drinkers who have no obvious symptoms of hazardous consumption	McAvoy	2001				
	GPs are not skilled in behavioural counselling for reducing alcohol consumption	McAvoy	2001				
	Agree having communication difficulties with patients	Mistral	2001		48%		
	GP feeling they did not have the expertise needed	Mules	2012				
	Agree feeling confident in their ability to identify at-risk drinkers	Proude	2006		49%		
	Agree feeling confident in deciding what steps to take next with at-risk drinkers	Proude	2006		40%		
	Agree feeling confident in conducting brief intervention for risky alcohol use	Proude	2006		36%		
	Lack of specific skills	Rapley	2006				
	Agree feeling role adequacy	Ribeiro	2011		67%		
	Agree feeling lack of confidence in their skills	Richmond	1998		5%		
	Agree I think I know enough about the causes of drinking problems to carry out my role when working with problem drinkers	Rush	1994		54.8%		
	Agree I think I can appropriately advise my patients about drinking and its effects	Rush	1994		88.5%		
	Equipped/unequipped with necessary skills for older adults	Sharp	2011		2.4		Items range from 1 (positive) to 7 (negative)
	Equipped/unequipped with ability to diagnose alcohol abuse in older adults	Sharp	2011		2.25		Items range from 1 (positive) to 7 (negative)
	Inadequate counselling skills for alcohol problems	Poplas Susic	2010				
	Agree feeling somewhat or quite comfortable when discussing alcohol using the CAGE questionnaire	Vinson	2004		83.5%		
	Agree feeling role adequacy	Wilson	2011		78%		
	Agree that doctors do not know how to identify problem drinkers who have no obvious symptoms of excess consumption	Wilson	2011		30%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Training	Agree to having received training last year	Aalto	2001	11.6%	15.7%	9.6%	
	Agree they need training in detection of heavy drinkers	Aalto	2001	47.0%	29.8%	55.7%	
	Agree they need training in doing brief intervention	Aalto	2001	58.9%	38.8%	68.7%	
	Doctors stated that they were not trained to manage early alcohol problems during their graduate training	Aira	2003				
	Doctors stated that they had not attended any postgraduate training.	Aira	2003				
	Agree having received less than 4 hours of post-graduate training	Anderson	1985		66%		
	Agree having received less than 4 hours of post-graduate training	Anderson	2003		56.9%		
	Agree having received less than 4 hours of post-graduate training	Anderson	2014		39.9%		
	Agree GPs not trained in counselling to reduce alcohol	Anderson	2014		80.7%		
	Lack of training	Beich	2002				
	Barriers to implementation 6 months after training: difficulties identifying how to handle more chronic alcohol misuse difficulties	Brennan	2013		nr		
	Agree having received less than 10 hours of formal education on alcohol	Clement	1986		80%		
	Agree having received training since qualification as a doctor	Deehan	1997		47%		
	I agree I feel adequately trained in detecting alcohol-misusing patients	Deehan	1997		43%		
	I agree I feel adequately trained in managing alcohol-misusing patients	Deehan	1997		30%		
	Agree having received training in alcohol misuse since qualifying as a doctor	Deehan	1998		43%		
	Agree that I feel adequately trained in the detection of alcohol misuse	Deehan	1998		42%		
Agree that I feel adequately trained in the treatment of alcohol misuse	Deehan	1998		24%			

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree having received training in the management of alcohol misuse since completing their graduation	Deehan	1999		35.5%	19.7%	
	Agree that I feel adequately trained in the detection of alcohol misuse	Deehan	1999		25.6%	9.1%	
	Agree that I feel adequately trained in the treatment of alcohol misuse	Deehan	1999		17.9%	1.8%	
	I agree I feel that I have the training to cope with problem drinkers	Farmer	2001		58%		
	I agree I would like more training in the treatment of alcohol misuse	Farmer	2001		74%		
	Lack of training	Ferguson	2003		10%		
	GPs expressed the will to receive more training	Fernández	1999		2.2		From 5-point Likert scales of agreement where 1 strongly agree and 5 strongly disagree
	Physician lacks formal training in dealing with alcohol problems	Friedmann	2000		2.9		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Agree doctors are not trained in counselling for reducing alcohol consumption	Geirsson	2005		75%		
	Agree having received less than 4 hours of post-graduate training	Geirsson	2005		54%	58%	
	Agree having received some formal training	Gurugama	2003		10.5%		
	Agree I feel adequately trained to detect alcohol misuse	Gurugama	2003		18.1%		
	Agree that their medical training was adequate or excellent concerning alcohol	Haley	2000		52.5%		
	Agree having received less than 4 hours of post-graduate training	Holmqvist	2008		69%	86%	
	Agree doctors are not trained in counselling for reducing alcohol consumption	Kaner	1999		62%		
	Agree having received less than 4 hours of post-graduate training	Kaner	1999		41%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree having received less than 4 hours of post-graduate training	Kaner	2001		55.1%		
	Agree having received less than 4 hours of post-graduate training	Kaner	2003			64%	
	Agree they have insufficient training	Koopman	2008		98%		
	Agree to have no postgraduate training on alcohol	Koopman	2008		68%		
	Lack of training	Lock	2002				
	Agree their medical training in alcohol use assessment was adequate or excellent	Maheux	1999		49.7%		
	Early intervention for hazardous alcohol consumption is not taught in medical schools	McAvoy	2001				
	Agree that training received in dealing with alcohol was insufficient	Miner	1990		92.4%		
	Agree having received specific training for alcohol problems	Mistral	2001		19%		
	Lack of training	Moretti-Pires	2011				
	Agree would welcome training on giving advice to patients regarding alcohol consumption	Owens	2000			92%	
	Agree would welcome further information and training with regard to alcohol services	Owens	2000			96%	
	Agree training is lacking	Ribeiro	2011		66%		
	Agree feeling to have insufficient professional training in counselling	Segnan	1992		41%		
	Sufficiently/insufficiently trained to manage alcohol use in older adults	Sharp	2011		3.1		Items range from 1 (positive) to 7 (negative)
	Agree doctors were not trained in alcohol counselling techniques	Wilson	2011		56.7%		
	Agree having received less than 4 hours of post-graduate training	Wilson	2011		51.8%		

BCW component: Motivation; TDF domain: Beliefs about Capabilities

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Beliefs about the ability to deliver SBI and in helping patients to cut down	Agree they know how to talk about alcohol drinking with patients	Aalto	2001	66.7%	74.7%	62.7%	
	Agree they know how to motivate patients to undergo treatment	Aalto	2001	64.8%	70.4%	62.0%	
	Many doubted their ability to help heavy drinkers to reduce drinking	Aalto	2003a				
	Agree feeling confident or very confident in their ability to manage alcohol	Abouyanni	2000		68%		
	Doctors did not feel able to motivate their patients to cut down	Aira	2003				
	I agree I feel capable of working with drinkers	Anderson	1985		44%		
	Agree feeling secure in their role	Anderson	2003		83.9%		
	Agree feeling secure in their role	Anderson	2004		69.9%		
	Agree feeling secure in their role	Anderson	2014		92.1%		
	Do not think I can affect patient's alcohol habits	Arborelius	1995				
	Role security	Bendtsen	2015		21.59		On a scale of 4 to 28 (the higher the score, the more secure the provider feels)
	GPs knowledge and confidence in their ability to actually conduct screening and brief interventions for alcohol use problems	Brennan	2013		18.27		On a scale of 7 to 28 (the higher the score, the higher the GP agreement)
	Agree GPs feel they are minimally effective or ineffective in helping patients reduce alcohol consumption	Brotos	2005		63.8%		
	Agree GPs feel their advice is effective at least some of the time	Casswell	1982		78%		
	Agree general practitioners are very pessimistic about what they can do	Casswell	1982		13%		
	I agree I feel confident in my ability to treat alcohol-misusing patients	Deehan	1997		40%		
	Agree that GP advice is an effective method of reducing the general population's alcohol consumption to safe levels	Deehan	1997		31%		
Agree that General practitioner advice is an effective method for reducing the general population's drinking to safe levels	Deehan	1998		52%			

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree that I feel confident in my ability to treat alcohol misusers	Deehan	1998		29%		
	Agree that I feel confident in my ability to work with alcohol misusers	Deehan	1999		36.8%	5.4%	
	Agree that General practitioner advice is an effective method for reducing the general population's drinking to safe levels	Deehan	1999		32.2%	42.7%	
	I agree I feel I can appropriately advise patients about drinking and its effects	Farmer	2001		96%		
	I agree that all in all I am inclined to feel I am a failure with drinkers	Farmer	2001		18%		
	I agree that pessimism is the most realistic attitude to take towards drinkers	Farmer	2001		28%		
	GPs belief they had the necessary skills to work with drinkers	Fernández	1999		2.24		From 5-point Likert scales of agreement where 1 strongly agree and 5 strongly disagree
	Very confident in alcohol history taking	Friedmann	2000		3.8		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	“My efforts to facilitate a change in alcoholic patients’ drinking habits are likely to be successful”	Friedmann	2000		3.2		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	How prepared do you feel when counselling patients	Geirsson	2005		2.38	2.47	Four graded scale with 4 = very prepared/effective; 1 = very unprepared/ineffective
	How effective do you feel you are in helping patients achieve change	Geirsson	2005		2.38	2.28	Four graded scale with 4 = very prepared/effective; 1 = very unprepared/ineffective
	Agree not feeling confident of their ability to detect alcohol misuse	Gurugama	2003		60%		
	Agree not feeling confident of their ability to manage alcohol misuse	Gurugama	2003		55.2%		
	Agree I feel confident in my ability to treat persons who misuse alcohol	Gurugama	2003		45.7%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Some nurses expressed a feeling that patients might have high alcohol consumption, but they still avoided asking because of lack of self-efficacy	Johansson	2005				
	Agree feeling 'prepared' or 'very prepared' for counselling	Kaner	1999		83%		
	Agree feeling either 'effective' or 'very effective' at helping patients reduce excessive alcohol consumption	Kaner	1999		21%		
	GPs felt that alcohol-related discussion was determined by their personal qualities such as confidence or directness, and perceptions about consultation dynamics	Kaner	2006				
	Role security	Keurhorst	2014		20.19		On a scale of 4 to 28 (the higher the score, the more secure the provider feel)
	Agree feeling prepared for counselling patients about reducing alcohol consumption	Koopman	2008		82%		
	Agree feeling effective when helping patients to reduce alcohol consumption	Koopman	2008		12%		
	Agree feeling very effective or reasonably effective at helping patients to change risky drinking	Lambe	2008			36.4%	
	GP feeling they did not have the expertise needed	Mules	2012				
	Feel their own advice about alcohol was useful to patients	Mules	2012				
	Nurses who believed to have sufficient knowledge indicating incorrect sensible limits for men	Owens	2000			65%	
	Nurses who believed to have sufficient knowledge indicating incorrect sensible limits for women	Owens	2000			45%	
	Perception that one had sufficient knowledge of sensible limits of alcohol consumption did not correlate with correct responses on sensible limits	Owens	2000			nr	
	Agree feeling confident in their ability to identify at-risk drinkers	Proude	2006		49%		
	Agree feeling confident in deciding what steps to take next with at-risk drinkers	Proude	2006		40%		
	Agree feeling confident in conducting brief intervention for risky alcohol use	Proude	2006		36%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	People who are just over the limit, people who need brief interventions I think that's much harder to pick up intuitively	Rapley	2006				
	Low self-efficacy (don't believe I can make a difference)	Rapley	2006				
	Agree feeling lack of confidence in their skills	Richmond	1998		5%		
	Alcohol use is a lifestyle problem and as doctors could not change a patient's lifestyle, the problem was best ignored (low self-efficacy)	Roche	1991				
	Agree I think I can appropriately advise my patients about drinking and its effects	Rush	1994		88.5%		
	Agree feeling "very" or "somewhat" successful in reducing patients' alcohol consumption	Rush	1994		46.5%		
	Agree GPs are very effective in assisting patients with drinking problems	Rush	1994		4%		
	Agree that all in all, I'm inclined to feel I am a failure with problem drinkers	Rush	1994		49.4%		
	Agree that pessimism is the most realistic attitude to take toward problem drinkers	Rush	1994		58.9%		
	Pessimism about their ability to help their patients reduce their drinking	Rush	1995				
	Confident/uncertain in ability to diagnose in older adults	Sharp	2011		2.98		Items range from 1 (positive) to 7 (negative)
	Agree feeling somewhat or quite comfortable when discussing alcohol using the CAGE questionnaire	Vinson	2005		83.5%		
Demographical characteristics of the patient	Hard to raise the subject with people of a different age	Mules	2012				
	Difficult to raise the topic of alcohol with people of differing ethnicity and gender	Mules	2012				
Difficult task	Offering a brief intervention session demands a huge effort	Aalto	2003a				
	Difficulties in raising the issue of alcohol even when it is known that the patient drinks too much	Aira	2003				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Drinking alcohol is a more sensitive issue than smoking and it is thus sometimes more difficult for them to raise the issue	Aira	2004				
	Determination of the amount of consumption, and thus recognising excessive use, was viewed as difficult	Aira	2004				
	Agree GPs believe alcohol counselling is difficult	Anderson	2014		82.6%		
	Counselling is difficult	Beich	2002				
	Difficulty in dealing with drinking among young people	Beich	2002				
	Difficult to ask about drinking habits	Carlfjord	2012				
	Agree alcohol-misusing patients present major management problems for me to treat	Deehan	1997		61.7%		
	Agree that alcohol misusers present major management problems to treat	Deehan	1998		69%		
	Agree that alcohol misusers present major management problems to treat	Deehan	1999		76.4%	35.9%	
	Agree that problem drinkers are difficult to treat	Farmer	2001		32%		
	Agree that persons who misuse alcohol present major management problems	Gurugama	2003		51.4%		
	Agree finding it rather difficult or very difficult to inquire about alcohol	Haley	2000		41%		
	Agree that care of patients with high alcohol consumption is more tiring than the care of other patients	Johansson	2002		53%	66%	
	Agree that doctors believe that alcohol counselling involves family and wider social effects and is therefore too difficult	Kaner	1999		52%		
	Agree that alcohol counselling is too difficult	Koopman	2008		86%		
	Difficult to ask about alcohol consumption if they knew that the patient was having a hard time	Lid	2012				
	Agree finding it rather or very difficult to discuss alcohol use with patients	Maheux	1999		40.4%		
	Difficulty for GPs to discuss alcohol with patients	McAvoy	2001				
	Difficulty of raising the issue of alcohol with patients	Mules	2012				
	Difficult to ask about alcohol if it were not related to the reason for the visit	Nygaard	2011				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	The screening tool makes it difficult to establish rapport with the patient	Nygaard	2011				
	Agree It is easy to ask pregnant clients how much and how often they drink alcohol	Payne	2005		75.5%		
	Many GPs reported little difficulty in initially asking patients about drinking	Rapley	2006				
	Agree that at-risk drinkers are difficult to diagnose	Ribeiro	2011		13%		
	Often difficult to manage	Roche	1991				
	Identification and help with alcohol problems are fraught with difficulty	Rush	1995				
	Difficult to approach the patient	Souza	2012				
	Agree that doctors believe that alcohol counselling involves family and wider social effects, and is therefore too difficult	Wilson	2011		41%		
Disease model training	None of the physicians was ready to ask about alcohol consumption routinely in every consultation, but only when the reason is connected to alcohol	Aira	2003				
Time	No time to talk about alcohol	Aalto	2003a				
	Lack of time	Aira	2003				
	Lack of time	Arborelius	1995				
	Lack of time	Beich	2002				
	Time restraints	Brennan	2013				
	Sometimes we don't have that much time to ask about alcohol	Carlfjord	2012				
	Lack of time prevented routine follow up of at-risk drinkers	Clifford	2011				
	Agree having lack of time	Farmer	2001		40%		
	Agree having lack of time	Ferguson	2003		20%		
	Perceived time constraints	Friedmann	2000		3.3		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Agree It is difficult to screen because of time constraints	Geirsson	2005		67%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree persons who misuse alcohol are time consuming to deal with	Gurugama	2003		45.7%		
	Reasons for not discussing alcohol despite suspicion of alcohol-related symptoms: agree having lack of time	Holmqvist	2008		63.6%	36.3%	
	Agree that the time and resources in primary care are insufficient to care for patients with high alcohol consumption	Johansson	2002		78%	81%	
	Some nurses expressed a feeling that patients might have high alcohol consumption, but they still avoided asking because they considered alcohol intervention too time-consuming	Johansson	2005				
	Asking about alcohol habits is time consuming, especially if the patients have high alcohol consumption and need advice	Johansson	2005a				
	Lack of time (sometimes linked to the patient having several other problems that needed attention)	Lid	2015				
	Lack of time	May	2006				
	There is insufficient time to counsel problem drinkers about reducing alcohol consumption	McAvoy	2001				
	There is insufficient time to ask about every patient's alcohol consumption	McAvoy	2001				
	Agree that delivering SBI is time-consuming	Mistral	2001		69%		
	Lack of time	Mules	2012				
	Lack of time: do not believe that screening all patients is possible	Nygaard	2011				
	Lack of time	Rapley	2006				
	Did not feel that universal screening was viable	Rapley	2006				
	Agree having lack of time	Ribeiro	2011		67%		
	Agree that SBI is too time consuming	Richmond	1998		21%		
	Lack of time	Roche	1991				
	Several doctors acknowledged that they did not have the time for a general discussion	Roche	1991				
	Time constraints	Rush	1995				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Plenty of time/not enough time to screen for alcohol use for older adults	Sharp	2011		3.67		Items range from 1 (positive) to 7 (negative)
Patients' beliefs about alcohol	Working against patient perceptions that their drinking was socially acceptable, specially if the patient did not currently experience any medical, social or psychological problems	Rapley	2006				
Self-esteem when working with at-risk drinkers	Agree feeling task-specific self-esteem	Geirsson	2005		4.49	4.36	Seven graded scale with 7 = strongly agree; 1 = strongly disagree
	Agree feeling task-specific self-esteem	Kaner	1999		19%		
	Agree feeling task-specific self-esteem	Ribeiro	2011		62%		
	Agree feeling task-specific self-esteem	Wilson	2011		53.0%		
Therapeutic commitment	Agree feeling therapeutically committed	Anderson	2003		27.1%		
	Agree feeling therapeutically committed	Anderson	2004		16.4%		
	Agree feeling therapeutically committed	Anderson	2014		45.9%		
	Therapeutic commitment	Bendtsen	2015		26.76	27.61	On a scale of 6 to 42 (the higher the score, the more committed the provider feels)
	Therapeutic commitment	Keurhorst	2014		23.4		On a scale of 6 to 42 (the higher the score, the more committed the provider feels)

BCW component: Motivation; TDF domain: Beliefs about Consequences

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Alcohol being perceived as having health benefits	Drinking moderately was seen to have also some beneficial effects (moderate use does not kill anybody, on the contrary, it is medically accepted and recommendable)	Aira	2004				
	Agree that drinking alcohol moderately is important or very important in promoting the health of the average person	Geirsson	2005		88%	91%	

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree that drinking alcohol moderately was 'important' or 'very important' in promoting patients' health	Kaner	1999		77%		
Bad publicity	Agree that dealing with these patients gives the practice a bad name	Mistral	2001		7%		
Effectiveness of SBI	Agree it is worth asking about patients' alcohol consumption	Aalto	2001	66.0%	70.2%	63.9%	
	Agree it is useless to ask about patients' drinking	Aalto	2003		4.7%		
	Doctors did not believe that advising on alcohol consumption is effective	Aira	2004				
	Agree GPs don't believe patients will take advice	Anderson	2014		82.9%		
	In general the doctors were deeply sceptical about the effect of the intervention on patients' drinking behaviour	Beich	2002				
	Screening was a clinically insensitive way of finding alcohol problems	Beich	2002				
	Doctors who find giving advice ineffective raise the alcohol subject seldom or not at all	Casswell	1982		nr		
	I agree that people who have had drinking problems can never with safety return to normal drinking	Clement	1986		62%		
	GPs scepticism when it comes to treating patients with alcohol misuse	Fernández	1999		3.71		From 5-point Likert scales of agreement where 1 strongly agree and 5 strongly disagree
	Agree intervention (specialized services) has a positive impact on patients with alcohol problems/dependency	Geirsson	2005		74%		
	Agree treatment is successful in at least 50% of the time on problem drinkers	Geirsson	2005		28%		
	Agree treatment is successful in at least 50% of the time on alcohol-dependent patients	Geirsson	2005		19%		
	Reasons for not discussing alcohol despite suspicion of alcohol-related symptoms: agree it would not have an effect	Holmqvist	2008		10.0%	6.7%	
Agree that the possibility of influencing patients' alcohol habits is small	Johansson	2002		36%	31%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree that working with alcohol-related problems in primary care is worth the cost and work effort	Johansson	2002		82%	82%	
	Agree that doctors do not believe that patients would take their advice and change their behaviour	Kaner	1999		53%		
	Agree that doctors do not believe that patients would take their advice	Koopman	2008		96%		
	Brief interventions had the potential to make a real difference to public health outcomes	Lacey	2009				
	Belief that brief and occasional chats regarding alcohol, presented when relevant, in the long run had an effect	Lid	2012				
	Scepticism about the 'evidence-base' for screening and intervening with risky drinkers	May	2006				
	Agree excessive drinkers are not responsive	Richmond	1998		22%		
	Want unequivocal research results before taking a stand	Roche	1991				
	Agree they believe in the effectiveness of regular counselling provided by physicians	Segnan	1992		58.8%		
	Agree doctors do not believe that patients would take their advice and change their behaviour	Wilson	2011		39%		
Therapeutic relation with the patient	Some thought that it could damage the patient–doctor/nurse relationship	Aalto	2003a				
	Fear of spoiling relationship with patient	Arborelius	1995				
	Most doctors found that the screening conflicted with establishing rapport (especially among middle aged and elderly patients), because it set an agenda in advance	Beich	2002				
	Agree female patients suffering from an alcohol dependence broke off medical care when asked about the problem	Charrel	2010		13.3%		
	Several of the participants indicated that the patient–physician relationship could easily be disrupted by questions about their alcohol consumption	Johansson	2005a				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Nonverbal signals from the patient or a feeling that the relationship with the patient would be disturbed or come to an end if they asked about alcohol consumption were also reasons for not asking about alcohol	Johansson	2005				
	Asking about alcohol could damage your relationship with the patient	May	2006				
	Fear that raising the topic could damage the doctor–patient relationship	Mules	2012				
	Afraid of the patient’s reaction that could lead to breaking the alliance	Nygaard	2011				
	Ethical dilemmas: questions about alcohol consumption may have a negative impact on the doctor–patient relationship	Poplas Susic	2010				
	Afraid to drive the patient away on the first visit by asking too many questions	Rush	1995				
	Patients would not come back	Vandermause	2007				
Delivering SBI can make other patients suffer	Agree that other patients suffer as alcohol problems take a lot of time and energy	Johansson	2002		48%	58%	
	Agree that patients with alcohol problems upset other patients	Mistral	2001		40%		
Demographical characteristics of the patient	Overlooking excessive drinking in older people was attributed to the view that it was too late to be concerned about alcohol damaging their health	Lock	2002				
Frustrating task	Patients with alcohol-related problems are frustrating	Clement	1986				
	Agree problem drinkers are frustrating	Farmer	2001		32%		
	Frustration about the refractory nature of alcohol-related problems, particularly in alcohol-dependent patients	Kaner	2006				
	Agree feeling frustrated when dealing with these patients	Ribeiro	2011		68%		
	Identification and help with alcohol problems are fraught with frustration	Rush	1995				
Incentives	Agree delivering SBI would have a negative financial impact	Mistral	2001		13%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	It is not financially rewarding to counsel because patients who are waiting will go elsewhere	Roche	1991				
Time	Many were worried that their workload would increase when starting to do ASBI	Aalto	2003a				
	More work if more patients are detected	Arborelius	1995				
Patients' feelings when asked about their drinking	Some doctors' opinion was that it is not appropriate to ask questions about issues related to patients' private lives: reluctant to write down alcohol data on patients' health records, because there might be a chance of stigmatizing the patient	Aira	2003				
	Some doctors stated that sometimes they do not record patient's excessive drinking in medical records even if it is evident because in Finland, patients have free access to their own records, and maybe they would not be pleased to read such comments written about them	Aira	2004				
	Agree GPs believe patients would resent being asked about alcohol	Anderson	2014		62.9%		
	Agree female patients suffering from an alcohol dependence felt embarrassed when asked about the problem	Charrel	2010		33.7%		
	Agree doctors believe that the patient will be upset on being asked about his alcohol consumption	Geirsson	2005		31%		
	Health professionals were anxious about offending patients by repeatedly asking about alcohol	Hutchings	2006				
	Agree doctors believe that patients resent being asked about their alcohol consumption	Kaner	1999		21%		
	Worried about alienating the patient	Lid	2012				
	Don't ask about alcohol because of fear of alienating the patient	Lid	2015				
	Patients would resent being asked about their alcohol consumption	McAvoy	2001				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Documenting an alcohol diagnosis on the patient's medical record because of possible insurance repercussions and the stigma of an alcohol diagnosis	Miller	2006				
	Doctor and patient discomfort (because of taboo nature)	Mules	2012				
	'Taboo' nature of the subject: stigmas around [alcohol], so people don't necessarily like talking about it'	Mules	2012				
	Difficulty of asking questions about alcohol use due to the stigma and shame	Nygaard	2011				
	Fear of being regard as moralist by the patient	Nygaard	2011				
	Ethical dilemmas: questions about alcohol consumption could also embarrass a patient	Poplas Susic	2010				
	Some patients have difficulties talking about the problem fearing to be discriminated	Souza	2012				
	Patients would feel insulted	Vandermause	2007				
	Patients would feel alienated	Vandermause	2007				
	Afraid of being judgemental	Vandermause	2007				
	Societal stigma that goes along with it that makes everybody a little bit uncomfortable	Vandermause	2007				
	Agree doctors believe that patients would resent being asked about their alcohol consumption	Wilson	2011		17%		
Patients' reactions when asked about alcohol	Agree on a potentially negative patient response: reasons for not discussing alcohol despite suspicion of alcohol-related symptoms	Holmqvist	2008	15.7%	14.7%	16.5%	
	Agree most patients react negatively to questions about alcohol habits	Johansson	2002		11%	43%	
	Concern about negative reactions from patients	Lacey	2009				
	Negative reactions from patients	Lock	2002				
	Patients would be angry or annoyed if asked about their alcohol consumption	McAvoy	2001				
	Agree patients can have an aggressive behaviour	Mistral	2001		53%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree that discussing alcohol use in pregnancy will frighten or anger pregnant women	Payne	2005		6.5%		
Patients' receptiveness to alcohol interventions	Agree patients take positive attitudes towards being asked about their alcohol consumption	Aalto	2001	50.9%	51.9%	50.3%	
	Patients do not accept being asked about alcohol use	Aira	2004				
	Agree patients are not motivated	Ferguson	2003		77.5%		
	"Patients don't want to be asked these questions"	Friedmann	2000		2.7		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Agree patients might not dare to seek help in primary care if they know they would be asked about their alcohol habits	Johansson	2002		18%	28%	
	Patients' unwillingness to participate in SBI for alcohol	Poplas Susic	2010				
	Patients expect them to ask alcohol-related questions	Rapley	2006				
Reliability of the answers of the patients when asked about alcohol	Patients' intentional underestimation of alcohol consumption	Aalto	2003a				
	Patients tend to conceal or underestimate their alcohol use	Aira	2004				
	Unreliable responses	Arborelius	1995				
	Some patients did not respond honestly to the AUDIT questionnaire	Beich	2002				
	Agree patients usually lied about their drinking	Gurugama	2003		57.1%		
	Patients were not truthful about their alcohol consumption	Lock	2002				
	Doubt that the patient's answers to our questions are truthful	McAvoy	2001				
	Believed that many patients were not honest about their alcohol use	Mules	2012				
	Patients underreport their consumption	Nygaard	2011				
SBI delivery impedes caring for other patients	Agree that bringing alcohol into the discussion impedes the comprehensive care of the patient	Aalto	2003		16%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Patients with alcohol problems do not attend their appointments	Difficult to arrange follow up visits as patients would not attend	Mules	2012				
Uncomfortable task	Advising people to change their drinking habits was often seen as moralizing	Roche	1991				

BCW component: Motivation; TDF domain: Emotion

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Doctors and nurses own drinking habits	Guilt about their own consumption	Kaner	2006				
	Anxiety about hypocrisy due to engaging in a behaviour that they were trying to reduce in others	Kaner	2006				
	Nurses' drinking behaviour: advising taking into account their own use and enjoyment of alcohol	Lock	2002				
Frustrating task	Patients with alcohol-related problems are frustrating	Clement	1986				
	Agree problem drinkers are frustrating	Farmer	2001		32%		
	Frustration about the refractory nature of alcohol-related problems, particularly in alcohol-dependent patients	Kaner	2006				
	Agree feeling frustrated when dealing with these patients	Ribeiro	2011		68%		
	Identification and help with alcohol problems are fraught with frustration	Rush	1995				
Motivation to work with at-risk drinkers	Feeling disheartened or manipulated by some patients with alcohol-related problems	Rapley	2006				
Patients' feelings when asked about their drinking	Health professionals were anxious about offending patients by repeatedly asking about alcohol	Hutchings	2006				
	Worried about alienating the patient	Lid	2012				
	Don't ask about alcohol because of fear of alienating the patient	Lid	2015				
	Doctor and patient discomfort (because of taboo nature)	Mules	2012				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Fear of being regard as moralist by the patient	Nygaard	2011				
	Afraid of being judgemental	Vandermause	2007				
	Societal stigma that goes along with it that makes everybody a little bit uncomfortable	Vandermause	2007				
Satisfaction when working with at-risk drinkers	I agree I am satisfied with the way I work with drinkers	Anderson	1985		29%		
	I agree I get work satisfaction from working with drinkers	Anderson	1985		9%		
	I agree that on the whole I am satisfied with the way I work with drinkers	Clement	1986		22.5%		
	I agree that In general it is rewarding to work with drinkers	Clement	1986		9%		
	Agree that patients with alcohol-related problems are less satisfying to work with than other patients	Clement	1986		66.7%		
	Agree alcohol-misusing patients are rewarding to treat	Deehan	1997		14.8%		
	Agree that alcohol misusers are rewarding to treat	Deehan	1998		15%		
	Agree that alcohol misusers are rewarding to treat	Deehan	1999		8.0%	12.8%	
	I agree In general, it is rewarding to work with drinkers	Farmer	2001		18%		
	I agree In general, I like drinkers	Farmer	2001		20%		
	Work satisfaction	Geirsson	2005		3.79	3.83	Seven graded scale with 7 = strongly agree; 1 = strongly disagree
	Agree Persons who misuse alcohol are rewarding to treat	Gurugama	2003		61.9%		
	Agree it is rewarding to work with alcohol-related problems	Johansson	2002		28%	39%	
	Agree feeling role satisfaction	Kaner	1999		13%		
	Agree feeling satisfaction in dealing with alcohol-related problems	Miner	1990		13.2%		
Agree feeling satisfaction	Ribeiro	2011		16%			
Agree In general, it is rewarding to work with problem drinkers	Rush	1994		20.7%			
Agree In general, I like problem drinkers	Rush	1994		12.9%			
Agree feeling satisfaction	Wilson	2011		15%			

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Self-esteem when working with at-risk drinkers	Agree I feel I do not have much to be proud of when working with drinkers	Farmer	2001		38.0%		
	Agree I think I do not have much to be proud of when working with problem drinkers	Rush	1994		44.4%		
Therapeutic commitment	Agree feeling therapeutically committed	Anderson	2003		27.1%		
	Agree feeling therapeutically committed	Anderson	2004		16.4%		
	Agree feeling therapeutically committed	Anderson	2014		45.9%		
	Therapeutic commitment	Bendtsen	2015		26.76	27.61	On a scale of 6 to 42 (the higher the score, the more committed the provider feels)
	Therapeutic commitment	Keurhorst	2014		23.4		On a scale of 6 to 42 (the higher the score, the more committed the provider feels)
Uncomfortable task	Asking about drinking was considered to be a delicate task	Aalto	2003a				
	Drinking alcohol was seen as a more sensitive issue than smoking, overeating or lack of exercise	Aira	2003				
	Agree GPs feel awkward asking	Anderson	2014		68.5%		
	It feels sort of embarrassing asking about alcohol	Carlfjord	2012				
	Agree GPs felt embarrassed to ask female patients about alcohol dependence	Charrel	2010		27.5%		
	Agree doctors feel awkward about asking questions about alcohol	Kaner	1999		25%		
	Feeling embarrassment about discovering heavy drinking in patients	Kaner	2006				
	Agree doctors feel awkward about asking about alcohol	Koopman	2008		62%		
	Discomfort about raising the subject of alcohol	Lock	2002				
	Disconfort asking everyone about alcohol	May	2006				
Doctor and patient discomfort	Mules	2012					
Fear of raising the issue of alcohol with patients	Nygaard	2011					

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Alcohol is a sensitive topic	Rush	1995				
	Societal stigma that goes along with it that makes everybody a little bit uncomfortable	Vandermause	2007				
	Agree feeling somewhat or quite comfortable when discussing alcohol using a single screening question	Vinson	2004		82.7%		
	Agree doctors feel awkward about asking questions about alcohol	Wilson	2011		22%		

BCW component: Motivation; TDF domain: Goals

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Importance / Priority given to alcohol issues	I often might forget to ask about alcohol	Aira	2003				
	In many conditions, such as high blood pressure, diabetes or dyspepsia, physicians had routines for history taking. However, alcohol often was not included in those lists of lifestyle risk factors	Aira	2003				
	Agree alcohol is not an important issue in general practice	Anderson	2014		54.4%		
	The patient has given priority to other problems	Arborelius	1995				
	“My patients rarely have these problems”	Friedmann	2000		1.8		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Obtaining information about alcohol consumption less often than for other risk factors	Geirsson	2005		2.29	2.20	Four-graded scale with 4 = always; 1 = rarely/never
	Think that there are not many patients with alcohol problems	Hutchings	2006				
	It was considered easy to simply forget to ask	Johansson	2005a				
	Agree alcohol is not an important issue in general practice	Kaner	1999		30%		
	Excessive drinking patterns were not rated as a high priority	Linke	2005				
	Importance of alcohol for GPs to take a preventive approach (ranking on the top 3 of a total 5 risk factors)	McAvoy	2001				
	Not a priority	Rapley	2006				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Time	Agree alcohol is not an important issue in general practice	Wilson	2011		14%		
	Agree GPs too busy	Anderson	2014		84.6%		
	Agree doctors are just too busy dealing with the problems people present with	Kaner	1999		72%		
	Agree GPs too busy	Koopman	2008		74%		
	GPs are too busy just with the presenting complaint	McAvoy	2001				
	Working with, or choosing between, multiple presenting problems	Rapley	2006				
	Agree GPs too busy	Richmond	1998		61%		
Agree doctors were 'just too busy'	Wilson	2011		63.1%			

BCW component: Motivation; TDF domain: Intentions

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Motivation to work with at-risk drinkers	I agree I am motivated to work with drinkers	Anderson	1985		39%		
	I agree I am interested in the nature of alcohol-related problems and the response that can be made to them	Clement	1986		67.6%		
	I agree I want to work with patients who have a drinking problem	Clement	1986		29%		
	I agree I want to work with drinkers	Farmer	2001		10%		
	GPs motivation to work with drinkers	Fernández	1999		3.07		From 5-point Likert scales of agreement where 1 strongly agree and 5 strongly disagree
	Very interested in caring for patients with alcohol problems	Friedmann	2000		3.1		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Agree GPs are willing to treat alcohol-related problems	Fucito	2003		98%		
	Agree GPs are willing to treat alcohol-related problems in pregnancy	Fucito	2003		86%		
	Motivation		Geirsson	2005		4.41	3.87

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree feeling motivated	Kaner	1999		23%		
	Interest in dealing with alcohol-related problems	Miner	1990		92.5%		
	Agree to be willing to provide more for alcohol misusers	Mistral	2001		27%		
	Not aware of / not interested in either in the mild alcohol problems	Rapley	2006				
	Feeling disheartened or manipulated by some patients with alcohol-related problems	Rapley	2006				
	Agree feeling motivated	Ribeiro	2011		43%		
	Several doctors acknowledged that they did not have interest for a general discussion	Roche	1991				
	Agree I want to work with problem drinkers	Rush	1994		33.6%		
	Agree feeling motivated	Wilson	2011		42%		
Therapeutic commitment	Agree feeling therapeutically committed	Anderson	2003		27.1%		
	Agree feeling therapeutically committed	Anderson	2004		16.4%		
	Agree feeling therapeutically committed	Anderson	2014		45.9%		
	Therapeutic commitment	Bendtsen	2015		26.76	27.61	On a scale of 6 to 42 (the higher the score, the more committed the provider feel)
	Therapeutic commitment	Keurhorst	2014		23.4		On a scale of 6 to 42 (the higher the score, the more committed the provider feel)

BCW component: Motivation; TDF domain: Optimism

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Beliefs about the ability to deliver SBI and in helping patients to cut down	Agree general practitioners are very pessimistic about what they can do	Casswell	1982		13%		
	I agree that pessimism is the most realistic attitude to take towards drinkers	Farmer	2001		28%		
	Hopelessness	McAvoy	2001				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Positive results are not frequent . . . this can be discouraging for the doctor	McAvoy	2001				

BCW component: Motivation; TDF domain: Reinforcement

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Incentives	Agree government does not reimburse GPs for prevention	Anderson	2014		68%		
	Agree the government health scheme does not reimburse doctors for time spent on preventive medicine	Kaner	1999		51%		
	Agree that SBI delivery is not reimbursable under government health schemes	Koopman	2008		88%		
	The government health scheme does not reimburse GPs for time spent on preventive medicine	McAvoy	2001				
	GPs are reimbursed on a per patient basis, not a time basis	McAvoy	2001				
	Patients would not be willing to pay a fee for alcohol counselling	McAvoy	2001				
	Agree delivering SBI would have a negative financial impact	Mistral	2001		13%		
	Lack of reimbursement per patient screened	Nygaard	2011				
	Lack of funding	Poplas Susic	2010				
	Agree that there are no incentives for delivering SBI	Ribeiro	2011		47%		
	Agree with lack of financial remuneration	Richmond	1998		6%		
	It is not financially rewarding to counsel because patients who are waiting will go elsewhere	Roche	1991				
	Agree that the GPs contract did not encourage them to work with alcohol problems	Wilson	2011		48.2%		

BCW component: Motivation; TDF domain: Social/Professional Role and Identity

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Therapeutic relation with the patient	Agree that asking about the patients' alcohol use should not take place before a good patient–doctor relationship has developed	Aalto	2003		24.1%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Demographical characteristics of the PHC professionals	Doctors, because of their higher status, had no credibility with socioeconomically depressed urban dwellers	Roche	1991				
Demographical characteristics of the patient	Overlooking excessive drinking in older people was attributed to the view that it was too late to be concerned about alcohol damaging their health	Lock	2002				
Disease model training	None of the physicians was ready to ask about alcohol consumption routinely in every consultation, but only when the reason is connected to alcohol	Aira	2003				
	Doctors asked about alcohol consumption only when they suspected heavy consumption, and not with all patients	Aira	2004				
	Agree GPs have disease model training	Anderson	2014		69.8%		
	Professionals have preferred screening scenarios: when conducting a health assessment; the presenting patient condition was likely to be alcohol-related; and when they perceived the patient was at high risk of alcohol harm	Clifford	2011				
	Agree that GPs role with the alcohol misuser is to treat the medical complications only	Deehan	1998		4%		
	Agree that they inquired patients about alcohol use only when they strongly suspected that the patient was consuming excessive amounts	Gurugama	2003		58.1%		
	GPs and the nurses reported that they currently more often asked the patients about alcohol use when they believed health status was influenced, than when not influenced, by alcohol consumption	Johansson	2002	nr			
	Nurses wanted mainly to engage in patients with harmful alcohol consumption rather than in those with hazardous consumption without alcohol-related signs or symptoms	Johansson	2005				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agreement that the healthcare service has an important role in identifying high alcohol consumers but situations where healthcare could contribute were limited to either people with perceived alcohol related symptoms seeking care or through health checks	Johansson	2005a				
	Agree doctors have a disease model training and they don't think about prevention	Kaner	1999		42%		
	Agree doctors have a disease model training and they don't think about prevention	Koopman	2008		94%		
	Only enquired about alcohol when patients presented with symptoms known to be related to alcohol consumption	Linke	2005				
	GPs' own understanding of their work as being primarily treatment or a combination of treatment and prevention	Nygaard	2011				
	Agree doctors have a disease model training and they don't think about prevention	Wilson	2011		21%		
Doctors' and nurses' attitudes towards discussing alcohol with patients	Personnel have positive attitudes towards discussing alcohol with patients	Aalto	2001	75.9%	86.7%	70.5%	
	Attitudes towards EIBI were mostly positive	Aalto	2003a				
	In some cases, Doctors own attitudes were inappropriate to deliver ASBI	Beich	2002				
Doctors and nurses own drinking habits	Agree GPs may have alcohol problems	Anderson	2014		65.1%		
	GPs have not reflected on their own use of alcohol	Johansson	2005a				
	Agree doctors themselves may have alcohol problems	Kaner	1999		41%		
	Several GPs used their own drinking as a benchmark, beyond which they determined that patients were 'at-risk' due to alcohol consumption and requiring intervention	Kaner	2006				
	A normal alcohol consumption was judged in comparison with personal experiences with alcohol	Lid	2015				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Nurses' drinking behaviour: advising taking into account their own use and enjoyment of alcohol	Lock	2002				
	Agree that your own drinking behaviour (or lack of) influences your ability to diagnose problem drinking	Nevin	2002		12%		
	GPs own drinking	Poplas Susic	2010				
	Agree doctors themselves may have alcohol problems	Wilson	2011		28%		
Doctors' and nurses' permissiveness towards alcohol	Doctors are members of the community, and they have the same attitudes towards alcohol drinking as their patients	Aira	2003				
	Agree GPs have liberal attitude to alcohol	Anderson	2014		60.6%		
	Agree doctors themselves have a liberal attitude to alcohol	Geirsson	2005		21%		
	Widespread acceptance of heavy drinking	Lock	2002				
	Hesitating to diagnose AUD was a part of practitioners' awareness that alcohol use is common in society	Vandermause	2007				
	Practitioners' social experiences factor into their understanding of issues regarding alcohol dependency and its clinical assessment	Vandermause	2007				
	Doctors themselves have a liberal attitude to alcohol	Wilson	2011		27%		
Patients' feelings when asked about their drinking	Some doctors' opinion was that it is not appropriate to ask questions about issues related to patients' private lives: reluctant to write down alcohol data on patients' health records, because there might be a chance of stigmatizing the patient	Aira	2003				
	Some doctors stated that sometimes they do not record patient's excessive drinking in medical records even if it is evident because in Finland, patients have free access to their own records, and maybe they would not be pleased to read such comments written about them	Aira	2004				
	Documenting an alcohol diagnosis on the patient's medical record because of possible insurance repercussions and the stigma of an alcohol diagnosis	Miller	2006				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes	
Professional responsibility	Agree that the GP should at some point in patient care ask about the patients' alcohol use	Aalto	2003		87.5%			
	Agree that the GPs are primarily responsible for brief intervention in excessive alcohol drinking	Aalto	2003		51.6%			
	Agree that the primary responsibility for undertaking brief intervention belongs to special addiction clinics	Aalto	2003		14%			
	Agree that discussion of alcohol use should take place only if the patient initiates the discussion	Aalto	2003		1.6%			
	Several participants considered that other professionals than themselves should be responsible for preventing alcohol problems	Aalto	2003a					
	Agree GPs think preventive health not their responsibility	Anderson	2014		67.2%			
	Agree that GPs believe that they should assume the responsibility of raising the issue of alcohol-related problems	Casswell	1982		33.3%			
	Agree GPs see one of their roles as that of referring alcohol dependent patients on to a specialist agency	Casswell	1982			almost two-thirds		
	Agree that general practice is an appropriate setting for the detection of alcohol misuse	Deehan	1997			61%		
	Agree that General practice is an appropriate setting to detect alcohol misusers at an early stage	Deehan	1998			87%		
	Agree that General practice is an appropriate setting to detect alcohol misusers at an early stage	Deehan	1999			66.4%	71.3%	
	Agree that general practice is an appropriate place to treat alcohol misuse	Farmer	2001			66%		
	"These problems are not a physician's responsibility"	Friedmann	2000			1.6		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Agree that a PHC setting was ideal for detection and for delivering health education	Gurugama	2003			81%		
Agree that primary care should have the main responsibility for patients with high alcohol consumption with regard to early detection and intervention	Johansson	2002			67%	62%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Nurses considered the health care sector as one important actor among others with responsibility for alcohol prevention	Johansson	2005				
	Agreement that the healthcare service has an important role in identifying high alcohol consumers but situations where healthcare could contribute were limited to either people with perceived alcohol related symptoms seeking care or through health checks	Johansson	2005a				
	Agree Doctors think that preventive health should be the patient's responsibility not theirs	Kaner	1999		40%		
	Agree that preventive health is patient's concern	Koopman	2008		64%		
	Primary care has an important role to play in preventing harm from	Mules	2012				
	I see my responsibility as getting them to see they have a problem	Rapley	2006				
	Felt that they should have some role in providing alcohol-related advice	Rapley	2006				
	Several doctors acknowledged that they would have a general discussion only for established patients	Roche	1991				
	Agree doctors think that preventive health should be the patients' responsibility not theirs	Wilson	2011		23%		
Role legitimacy	Agree that detection and treatment of early phase alcohol abusers is appropriate for their work	Aalto	2001	70.7%	80.5%	65.9%	
	Agree that asking about the patients' alcohol use is only allowed when there is a strong suspicion of excessive drinking	Aalto	2003		12.5%		
	Asking about alcohol is more justified when a patient has a symptom or finding which can be related to alcohol	Aalto	2003a				
	Doctors would not be ready to use laboratory test for easy and objective recognition of excessive alcohol use it for ethical reasons	Aira	2004				
	I agree I feel I have a legitimate role to work with drinkers	Anderson	1985		91%		
	Doctors felt that systematic interventions for young drinkers were not a natural part of their job	Beich	2002				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Some doctors did not arrange for a follow-up because they felt that they had been intruding into the private life of their patient	Beich	2002				
	GPs endorsed high levels of agreement with the premise that a significant part of their role was to identify and respond to alcohol problems	Brennan	2013		22.6		On a scale of 7 to 28 (the higher the score, the higher the GP agreement)
	Agree GPs feel their role includes both referral and treatment	Casswell	1982		58%		
	I agree I feel I have the right to ask a patient for any information that is relevant to their drinking problem	Clement	1986		88.7%		
	I agree I feel that my patients believe I have the right to ask them questions about drinking when necessary	Clement	1986		81.7%		
	I agree that I feel that I have the right to ask patients about their drinking when necessary	Farmer	2001		94%		
	I agree that I feel that my patients believe that I have a right to ask about their drinking	Farmer	2001		74%		
	I agree that After detoxification GPs have an active role to play	Farmer	2001		86%		
	GPs considered alcohol a legitimate part of their work	Fernández	1999		nr		
	Role legitimacy	Geirsson	2005		6.07	5.35	Seven graded scale with 7 = strongly agree; 1 = strongly disagree
	Agree patients' alcohol consumption is a private matter	Johansson	2002		6%	3%	
	Nurses perceived it as inconvenient to ask all patients	Johansson	2005				
	The majority of the participants did not find it convenient to ask all patients about their alcohol habits	Johansson	2005a				
	Some of the participating GPs expressed a need to establish a relationship with the patient before asking about alcohol	Johansson	2005a				
	Agree that early recognition as well as the treatment of heavy drinkers was considered quite appropriate, very or extremely appropriate for their work	Kaariainen	2001	75%			
	Agree feeling role legitimacy	Kaner	1999		87%		
	Agree GPs should be 'involved' or 'definitely involved' in promoting non-hazardous alcohol consumption	Kaner	1999		88%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree GPs should be 'involved' or 'definitely involved' in providing alcohol information	Kaner	1999		86%		
	Agree GPs feel that they should be involved in promoting non-hazardous alcohol consumption	Koopman	2008		100%		
	Agree GPs feel that they should be involved in providing alcohol information	Koopman	2008		100%		
	Agree GPs feel that they should be involved in treating alcohol-dependent drinkers	Koopman	2008		66%		
	Brief alcohol intervention is part of the nurses' job	Lock	2002				
	Felt asking about alcohol use was 'intruding into other people's lives unnecessarily	Mules	2012				
	GPs did not feel that they were the right people to start early detection of alcohol problems	Nygaard	2011				
	Ethical dilemmas: GPs do not have the right to meddle in the lives of their patients	Poplas Susic	2010				
	Prevention of hazardous or harmful alcohol drinking is not considered an integral part of general practice	Poplas Susic	2010				
	Felt that they should have some role in providing alcohol-related advice	Rapley	2006				
	Some GPs felt that certain 'new drinking problems' (for example binge drinking) were beyond the scope of general practice to change	Rapley	2006				
	Agree feeling role legitimacy	Ribeiro	2011		90%		
	Agree I think I have the right to ask patients questions about drinking when necessary	Rush	1994		99.2%		
	Agree I think that my patients believe I have the right to ask them questions about drinking when necessary	Rush	1994		88.5%		
	Family physician had the authority and credibility to ask about drinking	Rush	1995				
	Concern about the appropriateness of screening all adult patients	Rush	1995				
	Viewed the identification of patients who use alcohol as clearly within their role	Rush	1995				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree feeling role legitimacy	Wilson	2011		88%		
Role security	Agree feeling secure in their role	Anderson	2003		83.9%		
	Agree feeling secure in their role	Anderson	2004		69.9%		
	Agree feeling secure in their role	Anderson	2014		92.1%		
	Role security	Bendtsen	2015		21.59	20.29	On a scale of 4 to 28 (the higher the score, the more secure the provider feel)
	Role security	Keurhorst	2014		20.19		On a scale of 4 to 28 (the higher the score, the more secure the provider feel)
Feedback on the results of delivering SBI	Doctors did not receive any feedback from patients that they had advised because they did not ask patients to return for a follow-up visit only to check how they had managed to cut down their alcohol intake	Aira	2004				

BCW component: Opportunity; TDF domain: Environmental Context and Resources

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Delivering SBI can make other patients suffer	Agree that other patients suffer as alcohol problems take a lot of time and energy	Johansson	2002		48%	58%	
	Agree that patients with alcohol problems upset other patients	Mistral	2001		40%		
Familiarity with the patient	Under or over-familiarity with patients	Rapley	2006				
Incentives for patients	Agree insurance does not reimburse patients for alcohol counselling	Anderson	2014		39.5%		
	Agree private health insurance does not reimburse patients for alcohol counselling by doctors in general practice	Kaner	1999		31%		
	Agree it is not reimbursable from medical aids	Koopman	2008		90%		
	Need for patients to take time off work to get treatment	Linke	2005				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Organisation for preventive counselling	Private health insurance does not reimburse patients for alcohol counselling by general practitioners	McAvoy	2001				
	Agree they do not use available techniques considered effective because the National Health System does not reimburse patients for	Segnan	1992		47%		
	Agree that costs and travel/transportation issues are a barrier	Slaunwhite	2015		28.4%		
	Agree general practices are not organised to do preventive counselling	Anderson	2014		76.7%		
	Insufficient opportunity for practice	Brennan	2013		nr		
	The majority of the participants agreed that they did not have proper routines for identifying patients with high alcohol consumption	Johansson	2005a				
	Agree general practices are not organized to do preventive counselling	Kaner	1999		40%		
	Agree general practice not organized for preventive medicine	Koopman	2008		86%		
	Receptionists don't know what a unit of alcohol is	Lock	2002				
	Lack of implementation strategies	Poplas Susic	2010				
Resources	The health care system touts health promotion but is not budging in terms of letting us do it	Rush	1995				
	Lack of a systematic strategy for patient identification and management	Rush	1995				
	Agree additional resources are needed for undertaking brief intervention	Aalto	2003		39.7%		
	Physicians do not have many tools for handling alcohol problems	Aira	2003				
	I have a leaflet for quitting smoking but for alcohol I have nothing	Aira	2004				
	Agree GPs lack suitable screening device	Anderson	2014		69.1%		
	Agree GPs lack suitable counselling materials	Anderson	2014		76.9%		
	Resources did not optimally target the 'weekend boozer'	Clifford	2011				
	Lack of resources prevented routine follow up of at-risk drinkers	Clifford	2011				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree there is a lack of community resources	Ferguson	2003		20%		
	Agree there are adequate resources for treatment of early problem drinking	Geirsson	2005		6%		
	Agree there are adequate resources for treatment of alcohol dependent persons	Geirsson	2005		4%		
	Agree that doctors do not have suitable screening devices to identify problem drinkers who have no obvious symptoms of excess consumption	Geirsson	2005		56%		
	Agree doctors do not have suitable counselling materials available	Geirsson	2005		63%		
	Only two of the 10 urban practices had educational materials on alcohol	Harris	2005				
	Insufficient screening tools	Johansson	2005a				
	Agree doctors do not have suitable screening devices to identify alcohol problems	Kaner	1999		41%		
	Agree doctors do not have suitable counselling materials available	Kaner	1999		51%		
	Agree to have inadequate material for screening	Koopman	2008		98%		
	Agree to have inadequate material for counselling	Koopman	2008		98%		
	Lack of specific guidelines	Poplas Susic	2010				
	Lack of tangible materials for patient identification and management	Rush	1995				
	Agree doctors do not have a suitable screening device to identify problem drinkers who have no obvious symptoms of excess	Wilson	2011		28%		
	Agree doctors do not have suitable counselling materials available	Wilson	2011		46%		
Support	Scored low on the perception that they were working in a supportive environment	Anderson	2003		72.9%		
	Agree government health policies in general do not support prevention	Anderson	2014		74.5%		
	Agree having problems in using existing referral facilities	Casswell	1982		56%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree there is the need for a partnership between primary care and centers specializing in the management of alcohol dependence	Charrel	2010		75.9%		
	I agree that If I felt the need I could easily find someone who would be able to help me formulate the best approach to a drinker	Clement	1986		67.1%		
	Agree that I feel that there is adequate specialist support available to me when working with alcohol misusers	Deehan	1998		35%		
	Agree that distance to treatment program is an issue	Ferguson	2003		22.5%		
	Long wait for substance abuse treatment appointments	Friedmann	2000		2.6		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Agree that uncertainty where to refer the patient is a reason for not discussing alcohol despite suspicion of alcohol-related symptoms	Holmqvist	2008		6.1%	6.2%	
	Lack of support	Hutchings	2006				
	Agree that their employers find it important or very important to treat heavy drinkers	Kaariainen	2001	52.3%			
	Agree that government health policies in general do not support doctors who want to practise preventive medicine	Kaner	1999		56%		
	Lack of public responsibility (government) in selling and advertising alcohol	Kolsek	2008				
	Agree that government health policies are unsupportive	Koopman	2008		98%		
	Alcohol services were regarded as inconveniently located	Linke	2005				
	Alcohol services were regarded as involving long waiting times before treatment could commence	Linke	2005				
	Government health policies in general do not support GPs who want to practise preventive medicine	McAvoy	2001				
	There is little support for GPs from specialist drug and alcohol services	McAvoy	2001				
	Lack of support	Moretti-Pires	2011				
	Agree they were aware of the alcohol services available in the community	Owens	2000			44%	

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Availability support services was often perceived as inadequate	Rapley	2006				
	Felt that support services tended to focus on drugs	Rapley	2006				
	Agree If I felt the need, I could easily find someone who would be able to help me formulate the best approach to a problem drinker	Rush	1994		47.8%		
	Conflicting message that it was acceptable, if not beneficial to one's health, to drink alcohol	Rush	1995				
	Agree to having limited services to refer to	Slaunwhite	2015		35.8%		
	Agree to having service suitability concerns	Slaunwhite	2015		10%		
	Agree that wait-lists when referring patients creates implementation difficulties	Slaunwhite	2015		29.9%		
	Agree there is a lack of multidisciplinary support	Van Zyl	2013		75.3%		
	Agree there is a lack of inpatient facilities	Van Zyl	2013		68.8%		
	Agree there is a lack of visible referral structures	Van Zyl	2013		67.5%		
Time	No time to talk about alcohol	Aalto	2003a				
	Lack of time	Aira	2003				
	Agree GPs too busy	Anderson	2014		84.6%		
	Lack of time	Arborelius	1995				
	Lack of time	Beich	2002				
	Time restraints	Brennan	2013				
	Sometimes we don't have that much time to ask about alcohol	Carlfjord	2012				
	Lack of time prevented routine follow up of at-risk drinkers	Clifford	2011				
	Agree alcohol-misusing patients takes up more surgery time than other patients	Deehan	1997		70.4%		
	Agree that an alcohol misuser takes up more surgery time than other patients	Deehan	1998		77%		
	Agree that an alcohol misuser takes up more surgery time than other patients	Deehan	1999		87.5%	41.8%	
	Agree having lack of time	Farmer	2001		40%		
	Agree having lack of time	Ferguson	2003		20%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Perceived time constraints	Friedmann	2000		3.4		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Agree It is difficult to screen because of time constraints	Geirsson	2005		67%		
	Agree persons who misuse alcohol are time consuming to deal with	Gurugama	2003		45.7%		
	Reasons for not discussing alcohol despite suspicion of alcohol-related symptoms: agree having lack of time	Holmqvist	2008		63.6%	36.3%	
	Most of the nurses felt 'overloaded' with new work	Hutchings	2006				
	Agree that the time and resources in primary care are insufficient to care for patients with high alcohol consumption	Johansson	2002		78%	81%	
	Some nurses expressed a feeling that patients might have high alcohol consumption, but they still avoided asking because they considered alcohol intervention too time-consuming	Johansson	2005				
	Asking about alcohol habits is time consuming, especially if the patients have high alcohol consumption and need advice	Johansson	2005a				
	Agree doctors are just too busy dealing with the problems people present with	Kaner	1999		72%		
	Agree GPs too busy	Koopman	2008		74%		
	Lack of time (sometimes linked to the patient having several other problems that needed attention)	Lid	2015				
	Lack of time	May	2006				
	GPs are too busy just with the presenting complaint	McAvoy	2001				
	There is insufficient time to counsel problem drinkers about reducing alcohol consumption	McAvoy	2001				
	There is insufficient time to ask about every patient's alcohol	McAvoy	2001				
	Several nurses felt that ASBI slowed down the flow in the office	Miller	2006				
	Agree that delivering SBI is time-consuming	Mistral	2001		69%		
	Lack of time	Mules	2012				
	Screening questions 'too rigid' for the flow of consultation	Mules	2012				
	Lack of time: do not believe that screening all patients is possible	Nygaard	2011				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Overload of GPs (insufficient time)	Poplas Susic	2010				
	Lack of time	Rapley	2006				
	Agree having lack of time	Ribeiro	2011		67%		
	Agree GPs too busy	Richmond	1998		61%		
	Agree that SBI is too time consuming	Richmond	1998		21%		
	Lack of time	Roche	1991				
	Several doctors acknowledged that they did not have the time for a general discussion	Roche	1991				
	Time constraints	Rush	1995				
	Plenty of time/not enough time to screen for alcohol use for older adults	Sharp	2011		3.67		Items range from 1 (positive) to 7 (negative)
	Estimating duration of the alcohol-related discussion <1min using a single screening question	Vinson	2004		85.3%		
	Estimating duration of the alcohol-related discussion <1min using the	Vinson	2004		86.3%		
	Agree doctors were 'just too busy'	Wilson	2011		63.1%		
Patients' beliefs about alcohol	Agree patients do not necessarily know they are drinking excessively	Aalto	2003		87.5%		
	Uncertainty among patients about what is too much	Aalto	2003a				
	Patients lack of knowledge about sensible drinking limits: patients were obtaining information from misleading media sources	Lock	2002				
	Patients don't know what a unit of alcohol is	Lock	2002				
	Media says that red wine is good for you, so, patients drink bottles of the stuff because it's good for your heart	Lock	2002				
	Patients believe that alcohol relieves stress	Lock	2002				
	Social and coping functions that drinking appeared to have for patients	Lock	2002				
	Alcohol acceptance in some social frameworks	Rapley	2006				
Patients with alcohol problems do not attend their appointments	Patients' lack of interest in the follow up consultations	Beich	2002				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree that patients fail to keep appointments	Mistral	2001		73%		
	Difficult to arrange follow up visits as patients would not attend	Mules	2012				
	Feel that an unpopular intervention might discourage further visits	Rapley	2006				
Patients' feelings when asked about their drinking	Agree GPs believe patients would resent being asked about alcohol	Anderson	2014		62.9%		
	Agree female patients suffering from an alcohol dependence felt embarrassed when asked about the problem	Charrel	2010		33.7%		
	Agree doctors believe that the patient will be upset on being asked about his alcohol consumption	Geirsson	2005		31%		
	Health professionals were anxious about offending patients by repeatedly asking about alcohol	Hutchings	2006				
	Agree doctors believe that patients resent being asked about their alcohol consumption	Kaner	1999		21%		
	Patients would resent being asked about their alcohol consumption	McAvoy	2001				
	Doctor and patient discomfort (because of taboo nature)	Mules	2012				
	'Taboo' nature of the subject: stigmas around [alcohol], so people don't necessarily like talking about it'	Mules	2012				
	Ethical dilemmas: questions about alcohol consumption could also embarrass a patient	Poplas Susic	2010				
	Patients would feel insulted	Vandermause	2007				
Societal stigma that goes along with it that makes everybody a little bit uncomfortable	Vandermause	2007					
	Agree doctors believe that patients would resent being asked about their alcohol consumption	Wilson	2011		17%		
Patients' receptiveness to alcohol interventions	Many heavy drinkers declined screening or gave poor excuses for not being able to participate	Beich	2002				
	Patients were not receptive to discussion about alcohol	Rapley	2006				

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Patients openness to screening: Clinician perceives patients to be very candid or fairly open using a single screening question	Vinson	2004		88.7%		
	Patients openness to screening: Clinician perceives patients to be very candid or fairly open using the CAGE	Vinson	2004		89.7%		
Patients' denial of the problem and resistance to accepting treatment	Physicians mentioned patients' denial of alcohol problems as an obstacle	Aira	2003				
	Patients often are reluctant to go to specialist clinics for alcohol problems, even when they are given a referral	Aira	2003				
	Patient resistance	Brennan	2013		nr		
	Agree that female patients suffering from an alcohol dependence minimized the problem when asked about it	Charrel	2010		27.7%		
	Agree that female patients suffering from an alcohol dependence were in denial when asked about the problem	Charrel	2010		63%		
	Agree that female patients suffering from an alcohol dependence refused to receive medical care	Charrel	2010		26%		
	Nurses felt that patients suspected to have alcohol dependence were resistant to specialist treatment	Clifford	2011				
	Agree patient denial is an important barrier	Ferguson	2003		87.5%		
	Patients refuse to accept the diagnosis	Friedmann	2000		3.3		From 5-point Likert scales of agreement where 1 strongly disagree and 5 strongly agree
	Agree patients do not want any help	Johansson	2002		48%	53%	
	Denial was common among patients	Lid	2012				
	Patient not accepting that their drinking was a health issue	Mules	2012				
	Agree patients are willing to attend treatment	Slaunwhite	2015		4.5%		
Some patients have difficulties admitting they abuse alcohol	Souza	2012					

BCW component: Opportunity; TDF domain: Social Influences

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
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Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
Doctors' and nurses' permissiveness towards alcohol	Doctors are members of the community, and they have the same attitudes towards alcohol drinking as their patients	Aira	2003				
	Agree GPs have liberal attitude to alcohol	Anderson	2014		60.6%		
	Agree doctors themselves have a liberal attitude to alcohol	Geirsson	2005		21%		
	Widespread acceptance of heavy drinking	Lock	2002				
	Hesitating to diagnose AUD was a part of practitioners' awareness that alcohol use is common in society	Vandermause	2007				
	Practitioners' social experiences factor into their understanding of issues regarding alcohol dependency and its clinical assessment	Vandermause	2007				
	Doctors themselves have a liberal attitude to alcohol	Wilson	2011		27%		
Support	Lack of public education and mass media campaigns	Kolsek	2008				
	Alcohol is not seen as a public health issue by the media	Nygaard	2011				
	Absence of societal support (lack of a national policy on alcohol)	Poplas Susic	2010				
Patients seeking help	Alcohol has always been taken out of sight and you cannot confess your drinking	Aira	2003				
	Patients rarely initiated a discussion about their alcohol use	Aira	2004				
	Agree female patients suffering from an alcohol-related problem do not often directly ask GPs for medical care	Charrel	2010		80.6%		
	Patients do not see primary care as a place to be treated	Souza	2012				
Patients' feelings when asked about their drinking	Agree GPs believe patients would resent being asked about alcohol	Anderson	2014		62.9%		
	Agree female patients suffering from an alcohol dependence felt embarrassed when asked about the problem	Charrel	2010		33.7%		
	Agree doctors believe that the patient will be upset on being asked about his alcohol consumption	Geirsson	2005		31%		

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Health professionals were anxious about offending patients by repeatedly asking about alcohol	Hutchings	2006				
	Agree doctors believe that patients resent being asked about their alcohol consumption	Kaner	1999		21%		
	Patients run the risk of being seen attending the alcohol service	Linke	2005				
	Patients would resent being asked about their alcohol consumption	McAvoy	2001				
	Documenting an alcohol diagnosis on the patient's medical record because of possible insurance repercussions and the stigma of an alcohol diagnosis	Miller	2006				
	Doctor and patient discomfort (because of taboo nature)	Mules	2012				
	'Taboo' nature of the subject: stigmas around [alcohol], so people don't necessarily like talking about it'	Mules	2012				
	Difficulty of asking questions about alcohol use due to the stigma and shame	Nygaard	2011				
	Ethical dilemmas: questions about alcohol consumption could also embarrass a patient	Poplas Susic	2010				
	Some patients have difficulties talking about the problem fearing to be discriminated	Souza	2012				
	Patients would feel insulted	Vandermause	2007				
	Patients would feel alienated	Vandermause	2007				
	Societal stigma that goes along with it that makes everybody a little bit uncomfortable	Vandermause	2007				
	Agree doctors believe that patients would resent being asked about their alcohol consumption	Wilson	2011		17%		
Patients' reactions when asked about alcohol	Almost all the doctors experienced negative reactions from some patients	Beich	2002				
	Agree on a potentially negative patient response: reasons for not discussing alcohol despite suspicion of alcohol-related symptoms	Holmqvist	2008	15.7%	14.7%	16.5%	

Theme	Barrier	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree most patients react negatively to questions about alcohol habits	Johansson	2002		11%	43%	
	Concern about negative reactions from patients	Lacey	2009				
	Had experienced patients getting angry	Lid	2012				
	Negative reactions from patients	Lock	2002				
	Patients would be angry or annoyed if asked about their alcohol consumption	McAvoy	2001				
	Agree patients can have na aggressive behaviour	Mistral	2001		53%		
	Agree that discussing alcohol use in pregnancy will frighten or anger pregnant women	Payne	2005		6.5%		
	Sometimes patients react badly but these are the exception rather than the rule	Rapley	2006				
Patients' receptiveness to alcohol interventions	Many heavy drinkers declined screening or gave poor excuses for not being able to participate	Beich	2002				
	Patients were not receptive to discussion about alcohol	Rapley	2006				
	Patients openness to screening: Clinician perceives patients to be very candid or fairly open using a single screening question	Vinson	2004		88.7%		
	Patients openness to screening: Clinician perceives patients to be very candid or fairly open using the CAGE	Vinson	2004		89.7%		
Presence of third parties in the consultation	Presence of third parties, commonly family members, made it inappropriate to raise the issue	Mules	2012				
Role legitimacy	In some contexts use of alcohol is taboo	Nygaard	2011				
	Providers think alcohol is taboo	Vandermause	2007				

ANNEX 5

Facilitators linked to themes of barriers identified

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
Importance/Priority given to alcohol issues	GPs felt that by creating a specific billing code for this area, the healthcare system would send a signal that early detection of alcohol problems was a priority, which might motivate GPs to use the forms and conduct more screenings	Nygaard	2011				
Alcohol-related knowledge	Following expertise-enhancement training would increase knowledge	Abidi	2016				
	An educational intervention through E-learning would increase knowledge	Abidi	2016				
	Learning through examples and insights into favorable results of ASBI would increase knowledge	Abidi	2016				
	Knowledge about how to work with problematic alcohol users is needed to increase motivation to discuss alcohol use with patients	Abidi	2016				
	More insight into how symptoms are associated with problematic alcohol use is needed to increase motivation to discuss alcohol use with patients	Abidi	2016				
	Distinguishing problematic alcohol users from dependent drinkers is needed to increase motivation to discuss alcohol use with patients	Abidi	2016				
	Enhancement of knowledge about the referral options is needed to utilize low-threshold referral options in general practice	Abidi	2016				
	Increasing knowledge and skills is needed to make the subject "alcohol use" easier to discuss in general practice	Abidi	2016				
	Factual knowledge on alcohol abuse, dependency and social problems associated with and indicative of alcohol abuse	Casswell	1982				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Improved knowledge about counselling techniques for use when alcohol-related symptoms are evident	Holmqvist	2008		77%	89%	
	Improved knowledge about simple pen-and-paper screening instruments	Holmqvist	2008		72%	80 to 90%	
	More knowledge about laboratory markers	Holmqvist	2008		30 to 40%		
	More knowledge about how alcohol influences health	Holmqvist	2008		40 to 50%	80 to 90%	
	Further education to identify heavy drinking was considered necessary	Johansson	2002	96.7%			
	GPs who reported higher levels of alcohol-related CME were more prepared to counsel patients about reducing alcohol consumption	Kaner	2001				
	GPs who reported higher levels of alcohol-related CME were more likely to report regularly obtaining information about alcohol consumption	Kaner	2001				
	Significant association between the number of patients managed per year for alcohol problems and experience of alcohol-related CME	Kaner	2001				
	GPs who reported higher levels of alcohol-related CME were more confident about being able to help alleviate drinking problems	Kaner	2001				
	Knowledge of interventions was associated with a greater likelihood of using interventions	Nygaard	2010		1.43		Odds ratio
Beliefs about the ability to deliver SBI and in helping patients to cut down	The method (patient-centered) reduced feelings of frustration and powerlessness	Arborelius	1995				
	Doctors felt that were they to improve their counselling skills they might become more effective as health counsellors	Beich	2002				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
Effectiveness of SBI	In general, given adequate information and training, how effective do you feel GPs/nurses could be in helping patients change	Geirsson	2005				
	Feedback on successful cases (It would be nice to have a sense if you achieved a target in how many people stopping drinking and you were able to add something to improve your services and the practice)	Hutchings	2006		58%		
	Felt that they could be: 'effective' or 'very effective' given adequate information and training	Kaner	1999		78%		
	Agree feeling effective when helping patients to reduce alcohol consumption (given adequate training and support)	Koopman	2008				
	More information about brief intervention studies	Aalto	2001	63.4%			
	More insight into the effectiveness of ASBI is needed to increase motivation to discuss alcohol use with patients	Abidi	2016				
	More insight into the health profits of ASBI for patients are needed to effectively implement ASBI in routine practice	Abidi	2016				
	Sharing of positive experiences is needed to utilize low-threshold referral options in general practice	Abidi	2016				
	Early intervention proof of success would encourage me	Anderson	2014		87.1%		
	Believing that a brief intervention could be useful for patients who were not aware of how much they were drinking or what the recommended levels were	Hutchings	2006				
Some GPs reported that they valued evidence of intervention effectiveness above payment for clinical activity	Hutchings	2006					

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Feedback on successful cases (It would be nice to have a sense if you achieved a target in how many people stopping drinking and you were able to add something to improve your services and the practice)	Hutchings	2006				
	Early intervention for alcohol was proven to be successful	Kaner	1999		80%		
	Benefits of opportunistic interventions were identified as valuable	Lacey	2009				
	Reassurance that addressing alcohol is worthwhile	Lid	2015				
	GPs would spend more time on early intervention for alcohol if early intervention for hazardous alcohol consumption was proven to be effective	McAvoy	2001				
	Feedback on performance	Rush	1995				
	Early intervention for alcohol was proven to be successful	Wilson	2011		81.2%		
Therapeutic relation with the patient	Most doctors considered their relationships with their patients robust enough for them to give systematic advice on sensible drinking	Beich	2002				
	Some participants expressed the opinion that if questions are presented in a proper context, for example, in connection with other lifestyle questions, they did not consider the patient–physician relationship to be influenced by questions about alcohol	Johansson	2005a				
	Importance of building good working relationships with clients and patients was raised by all participants in relation to feeling able to raise the subject of alcohol intake	Lacey	2009				
	Good communication in the patient–doctor relation	Nygaard	2011				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
Difficult task	More awareness about attitudes regarding discussing alcohol use with patients is needed to make the subject "alcohol use" easier to discuss in general practice	Abidi	2016				
	Exchanging positive experiences with colleagues about discussing alcohol use with patients is needed to make the subject "alcohol use" easier to discuss in general practice	Abidi	2016				
	Discussing alcohol on the basis of various physical, social, or psychological signs of risky drinking is needed to make the subject "alcohol use" easier to discuss in general practice	Abidi	2016				
	If there was an abnormal laboratory finding, it formed a useful basis for inquiring about a patient's level of alcohol consumption	Aira	2003				
	Found the AUDIT-C drink risk score useful for initiating patient feedback and discussions about drinking	Clifford	2011				
	Opening discussion on patients' drinking was often easier when their intake was threatening physical health	Farmer	2001				
	Knowing patients over several years makes it easier to address alcohol	Hutchings	2006				
	Raised blood pressure was a useful trigger for discussion of alcohol	Hutchings	2006				
	Being a GP with multiple consultations with the same patient was seen as a facilitator because GPs could always ask or come back to alcohol on a next appointment	Lid	2015				
If the relationship with the patient was good, then they could be more straightforward (asking about alcohol)	Lid	2012					

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Easier to ask about alcohol without any obvious reason when it was an integral part of questions about health and lifestyle	Lid	2012				
	Pragmatic case finding as a useful method for detecting excessive alcohol consumption	Lid	2015				
	Including alcohol in discussions about hypertension or other changes in biological parameters	Lid	2012				
	Family members prompting the doctor to confront the patient with their concern	Lid	2012				
	Easier if a questionnaire was incorporated into a medical records computer programme	Mules	2012				
	Using the screening window (on the computer) as an excuse for asking	Mules	2012				
	Modifying screening questions that are too rigid	Mules	2012				
	General health checks would be suitable situations to bring up questions about alcohol	Nygaard	2011				
	Having an evaluation tool integrated in the health record keeping systems	Nygaard	2011				
	Early identification of patients when GPs suspect an alcohol problem	Nygaard	2011				
	Embedding alcohol in a list of questions about other lifestyle behaviour or generalising it	Rapley	2006				
	Combine it with asking about smoking	Rapley	2006				
	GPs legitimised the need to discuss alcohol by referring to test results or casualty reports or the needs of the computer, for instance in prompts about updating notes	Rapley	2006				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Annual health exams are the one place where physicians are given permission to ask about alcohol	Rush	1995				
Familiarity with patients	Knowing patients over several years makes it easier to address alcohol	Hutchings	2006				
Frustrating task	The method (patient-centered) reduced feelings of frustration and powerlessness	Arborelius	1995				
Incentives	Extra pay	Aalto	2001	23.9%			
	Financial reimbursements from health insurance companies	Abidi	2016				
	More financial contributions to projects in general practice about problematic alcohol use	Abidi	2016				
	Reimbursement of extra time per patient	Abidi	2016				
	Financial reimbursements from health insurance companies for better cooperation with addiction care centers	Abidi	2016				
	Financial aid for low-threshold referral possibilities	Abidi	2016				
	Agree they would be incentivized if training programs for early intervention for alcohol are available	Geirsson	2005		72%		
	Agree they would be incentivized if they would have better practical skills in suitable interview technique	Geirsson	2005		52%		
	Agree they would be incentivized if special reimbursement were given	Geirsson	2005		24%		
	Improving salary and working conditions	Kaner	1999		60%		
	Training in early intervention for alcohol was recognized for continuing medical education	Kaner	1999		52%		

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Providing early intervention for alcohol was recognized for quality assurance credits	Kaner	1999		35%		
	Patients willing to pay a fee for alcohol counselling	Kaner	1999		24%		
	Extra payment	Kersnik	2009				
	Financial reimbursement for training in early intervention for hazardous alcohol consumption programmes	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if training in early intervention for hazardous alcohol consumption was recognized for continuing medical education credits	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if providing early intervention for hazardous alcohol consumption was recognized for quality assurance credits	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if health scheme reimbursements were available	McAvoy	2001				
	More screening if higher reimbursement was weakly positively correlated with the use of screening instruments	Nygaard	2010		0.097		Linear regression Beta coefficient
	Incentivisation (If you want doctors to do it, make it a quality indicator. Attach some money to it)	Rapley	2006				
	Providing early intervention for alcohol was included in the Quality and Outcomes Framework	Wilson	2011		63.0%		
	Improving salary and working conditions	Wilson	2011		39.0%		
Organisation for preventive counselling	Adding a question about alcohol to a frequently used questionnaire	Abidi	2016				
	Using a short and simple screening instrument such as the AUDIT-C	Abidi	2016				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Implementing a short questionnaire in the registration system	Abidi	2016				
	Composing a cooperation protocol with task descriptions	Abidi	2016				
	Supportive materials such as Web sites	Abidi	2016				
	A screening method where patients are asked about alcohol use when they present specific symptoms, such as high blood pressure or gastrointestinal symptoms which might be related to problem drinking	Abidi	2016				
	A screening method in which patient groups such as diabetics or obstructive pulmonary disease patients are all screened during periodic checkups	Abidi	2016				
	Offering an easily accessible consult where patients can go without appointment for advice and treatment	Abidi	2016				
	Health nurses were not used as aids in counselling a healthy lifestyle in the way that they were used in diabetes or hypertension	Aira	2003				
	Fortunate to have the nurse already sent out a questionnaire that covers alcohol	Carlford	2012				
	Agree with improved professional team work regarding patients with risk consumption	Holmqvist	2008		73%	87%	
	Receptionists giving patients screening tools	Hutchings	2006				
	Agree that the community nurse is an important resource in the intervention for alcohol problems	Johansson	2002		63%	75%	
	Receptionists delivering AUDIT	Kaner	2003				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	To divide the medical documentation into preventive and curative sections. The preventive section would include the patients' risk factors and a fixed plan for addressing these	Kersnik	2009				
	Having a nurse screening	May	2006				
	Involving staff other than nurses	Miller	2006				
	Using standardised questionnaires, ideally administered by nurses prior to the consultation	Mules	2012				
	Screening in the waiting room	Nygaard	2011				
Resources	I wish that we would have tools to do it	Aalto	2003a				
	Some kind of guidelines are absolutely welcomed	Aalto	2003a				
	Displaying posters and information in the waiting room about responsible alcohol use	Abidi	2016				
	Supportive materials such as practical tools (e.g., screening instruments or protocols)	Abidi	2016				
	Online screening tools	Abidi	2016				
	Practical tools for patients	Abidi	2016				
	Doctors stated that it would be useful to have a laboratory test for easy and objective recognition of excessive alcohol use	Aira	2004				
	Agree that quick and easy questionnaires would encourage me	Anderson	2014		87.9%		
	Agree that quick and easy counselling materials would encourage me	Anderson	2014		90.2%		
	Specific treatment guidelines	Casswell	1982		58%		
	More information on referral resources available	Casswell	1982		just over half		
	Agree they would be incentivized if quick and easy screening questionnaires were available	Geirsson	2005		74%		

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Agree they would be incentivized if quick and easy counselling materials were available	Geirsson	2005		65%		
	Agree that greater supply of information materials is needed	Holmqvist	2008		50%	70 to 80%	
	Agree they would be incentivized if quick and easy counselling materials were available	Kaner	1999		60%		
	Agree they would be incentivized if quick and easy screening questionnaires were available	Kaner	1999		51%		
	GPs perceived the web-based programme as offering potentially important advantages, as it provided greater flexibility and privacy, and its use could be kept separate from the patients' records	Linke	2005				
	GPs would spend more time on early intervention for alcohol if quick and easy diagnostic questionnaires were available	McAvoy	2001				
	An 'objective' measurement for 'healthy alcohol consumption' would be helpful	Nygaard	2011				
	Agree they would be incentivized if quick and easy counselling materials were available	Wilson	2011		76.0%		
	Agree they would be incentivized if quick and easy screening questionnaires were available	Wilson	2011		70.0%		
Support	Better engagement of management	Aalto	2001	13.2%			
	Someone to talk about it	Aalto	2003a				
	Participants wished to have support in implementing SBI in their everyday work	Aalto	2003a				
	An app with information about SBI	Abidi	2016				
	Involving an addiction consultant in general practice	Abidi	2016				
	More publicity and attention in the media and in the general practice setting	Abidi	2016				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Standardizing discussing alcohol through clearer guidelines	Abidi	2016				
	Protocols and norms is needed to discuss alcohol use with patients	Abidi	2016				
	Clear instructions for treatment	Abidi	2016				
	More accessible referral options and consultations with experts for support and cooperation	Abidi	2016				
	More publicity about the possibilities of ASBI by means of E-health	Abidi	2016				
	Implementing a practice nurse specialized in addiction problems	Abidi	2016				
	Providing general information and publicity about the implementation of addiction consultants in general practice	Abidi	2016				
	Actively creating and strengthening connections with addiction care centers	Abidi	2016				
	Having fixed contact persons is needed to utilize low-threshold referral options in general practice	Abidi	2016				
	Faster communication and accessibility to addiction care settings	Abidi	2016				
	Telephone and online consultations with addiction care settings	Abidi	2016				
	Composing a cooperation protocol with task descriptions	Abidi	2016				
	Deploying an addiction prevention expert	Abidi	2016				
	Faster feedback from addiction care centers about patient information	Abidi	2016				
	Shortening of waiting lists in addiction care centers	Abidi	2016				
	Health education campaigns would encourage me	Anderson	2014		91.1%		

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Support service availability would encourage me	Anderson	2014		91.2%		
	I agree that access to a Community Alcohol Team would make me more willing to manage alcohol-misusing patients	Deehan	1997		59.0%		
	I agree that support from local services would make me more willing to work with alcohol-misusing patients	Deehan	1997		57.0%		
	I agree that greater access to a Community Alcohol Team would make me more willing to provide care for alcohol-misusing patients	Deehan	1999		52.7%	57.2%	
	I agree that more support from local services would make me more willing to provide care for alcohol-misusing patients	Deehan	1999		61.6%	48.2%	
	I would play a more active role in the treatment of problem drinkers if there was more back-up available	Farmer	2001		68%		
	Agree they would be incentivized if support services are readily available to refer patients to	Geirsson	2005		81%		
	Agree they would be incentivized if better support from specialized health services to primary health care	Geirsson	2005		68%		
	Agree they would be incentivized if better co-operation with the local community alcohol service	Geirsson	2005		62%		
	Agree support from local services would make me more willing to deal with persons who misuse alcohol	Gurugama	2003		64.8%		
	Clearer management level decisions about their obligations to work with risk drinkers	Holmqvist	2008		62%	87%	
	Improved opportunities for referral to specialists	Holmqvist	2008		77%	83%	
	Need of a lifestyle counsellor	Hutchings	2006				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Support services were readily available to refer patients to	Kaner	1999		85%		
	Public health education campaigns in general make society more concerned about alcohol	Kaner	1999		65%		
	Support from professional institutions that deal with alcohol-related problems, e.g. by providing treatment suggestions, by providing a telephone support line, by organizing seminars, and by providing guidelines and booklets	Kersnik	2009				
	SBI should be part of a national strategy and, possibly, a national plan	Kersnik	2009				
	Clear network to deal with alcohol-related health problems, set up and supported by society (i.e. government supported)	Kersnik	2009				
	Organisational support and appropriate training were important factors	Lacey	2009				
	Demand on the part of the community	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if society in general was more concerned about alcohol	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if government policy favoured preventive medicine	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if there was professional recognition by peers of early intervention for hazardous alcohol consumption	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if preventive medicine had a higher status in the medical profession	McAvoy	2001				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	More support was needed to facilitate discussions of alcohol use with patients	Mules	2012				
	Support should come from raising public awareness of the adverse health effects of alcohol	Mules	2012				
	Physicians with easier access to specialized treatment for alcohol problems (support) were more likely to use interventions	Nygaard	2010		1.18		Odds ratio
	A public campaign focusing on early detection of alcohol problems was seen as an opportunity to get doctors to put more emphasis on the problem	Nygaard	2011				
	A public campaign could even bring patients to raise the issue themselves	Nygaard	2011				
	Felt that this responsibility should be shared with other agencies such as the government, education bodies and the alcohol industry	Rapley	2006				
	Having a drugs and alcohol worker or counsellor working within (or with) the practice	Rapley	2006				
	Agree health education is an important factor which can facilitate the physicians' intervention against alcohol abuse	Segnan	1992		63.1%		
	Agree mass media advertising is an important factor which can facilitate the physicians' intervention against alcohol abuse	Segnan	1992		78%		
	Agree public health education campaigns in general made society more concerned about alcohol	Wilson	2011		66.0%		
	General support services (self-help/counselling) were readily available to refer to	Wilson	2011		87.2%		
Time	Using a short and simple screening instrument such as the AUDIT-C	Abidi	2016				
	Giving patients a self-report questionnaire	Abidi	2016				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Implementing a short questionnaire in the registration system	Abidi	2016				
	Increasing knowledge about the fact that a short intervention costs little time and can be effective	Abidi	2016				
	More time per consultation	Abidi	2016				
	An alcohol-consultation with more time to discuss alcohol use with patients	Abidi	2016				
	GPs who had experience and interest in addressing drug and alcohol issues reported being consistent in assessing alcohol intake	Ampt	2009				
	More time devoted to health-oriented work	Holmqvist	2008			93%	
	Time and provision are needed to implement ASBI	Hutchings	2006				
	Lowering the number of daily contacts for GPs or increasing the number of employed physicians	Kersnik	2009				
	GPs would spend more time on early intervention for alcohol if more time was available	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if quick and easy counselling techniques were available	McAvoy	2001				
	With experience, alcohol screening can be incorporated into the nurse's routine and does not represent an undue time burden	Miller	2006				
	Longer consultations	Mules	2012				
Training	More practical training	Aalto	2001	89.6%			
	Personal training	Aalto	2001	48.8%			
	More lectures	Aalto	2001	36.1%			

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Peer-to-peer coaching about professional attitude to become more aware of own reference frames, alcohol norms, and behavior is needed to discuss alcohol use with patients	Abidi	2016				
	Trainings organized by addiction care centers to improve informal contacts is needed to improve collaboration with addiction treatment centers	Abidi	2016				
	Increasing knowledge and skills is needed to make the subject "alcohol use" easier to discuss in general practice	Abidi	2016				
	Importance of the method being patient-centred	Arborelius	1995				
	Less guilty of asking about alcohol after the course	Arborelius	1995				
	GPs reported that the training was relevant to their work	Brennan	2013				
	GPs reported that the training was relevant for improving their knowledge	Brennan	2013				
	GPs reported that the training was relevant for improving their confidence in implementing screening and intervention	Brennan	2013				
	GPs reported that the training was likely to yield an impact on their use of screening and motivational interviewing in the future	Brennan	2013				
	More training on general advice to give the patient	Casswell	1982			55%	
	Additional skills were needed to master brief intervention in practice	Johansson	2002	89.6%			
	Training contributed to better knowledge about hazardous and harmful consumption levels	Johansson	2005				
	Training increased awareness that patients might have high alcohol consumption without symptoms	Johansson	2005				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Training improved skills regarding alcohol screening	Johansson	2005				
	Refresher courses to maintain their competency	Johansson	2005				
	Training programmes for early intervention for alcohol were available	Kaner	1999		57%		
	Significant association between the number of blood tests requested per year because of concern about alcohol	Kaner	2001				
	Additional expertise would help GPs to manage these patients	Kersnik	2009				
	Need for alcohol brief interventions training	Lacey	2009				
	GPs would spend more time on early intervention for alcohol if There was greater emphasis on alcohol and disease in medical school training	McAvoy	2001				
	Felt that they would be happy to be involved in caring for patients with alcohol-related problems in the community only if further training was provided	Owens	2000			62.9%	
	Training programmes for early intervention for alcohol were available	Wilson	2011		69.0%		
Motivation to work with at-risk drinkers	Knowledge about how to work with problematic alcohol users is needed to increase motivation to discuss alcohol use with patients	Abidi	2016				
	More insight into how symptoms are associated with problematic alcohol use is needed to increase motivation to discuss alcohol use with patients	Abidi	2016				
	Distinguishing problematic alcohol users from dependent drinkers is needed to increase motivation to discuss alcohol use with patients	Abidi	2016				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Available training for early intervention would encourage me	Anderson	2014		90.3%		
	Training in early intervention with CME credits would encourage me	Anderson	2014		82.8%		
	Patients willing to pay for counselling would encourage me	Anderson	2014		61.7%		
	Quality Assurance credits for early intervention provision would encourage me	Anderson	2014		81.1%		
	Salary & working condition improvement would encourage me	Anderson	2014		75.8%		
	Financial incentives would encourage GPs to discuss alcohol more often	Arborelius	1995				
	I agree more training would encourage me to work with alcohol-misusing patients	Deehan	1997		45.0%		
	I agree that further training would encourage me to work with alcohol-misusing patients	Deehan	1999		58.0%	77.7%	
	I agree that an enhanced capitation fee would make me more willing to work with alcohol-misusing patients	Deehan	1997		33.0%		
	I agree I would be willing to work with alcohol misusing patients if these patients attracted an enhanced capitation fee	Deehan	1999		31.7%		
	Agree more training would encourage me to manage persons who misuse alcohol	Gurugama	2003		69.5%		
	Agree an additional fee would make me more willing to manage persons who misuse alcohol	Gurugama	2003		17.1%		

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
Patients seeking help	GPs felt that by creating a specific billing code for this area, the healthcare system would send a signal that early detection of alcohol problems was a priority, which might motivate GPs to use the forms and conduct more screenings	Nygaard	2011				
	Easier if patients were seeking help for their alcohol problem or raised the issue themselves	Aira	2003				
	Patients requesting advice would encourage me	Anderson	2014		93.4%		
	Patients requested health advice about alcohol consumption	Kaner	1999		77%		
	Patients to be more interested in prevention of disease	McAvoy	2001				
	GPs would spend more time on early intervention for alcohol if more patients requested advice about alcohol consumption	McAvoy	2001				
Patients' beliefs about alcohol	Patients requested health advice about alcohol consumption	Wilson	2011		79.8%		
	Support should come from raising public awareness of the adverse health effects of alcohol	Mules	2012				
Patients' feelings when asked about their drinking	No patient showed discomfort or resistance to screening	Clifford	2011				
	With increasing experience with screening, nursing staff found that concerns of offending patients were unfounded, with the majority of patients being receptive to alcohol screening	Miller	2006				

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Importance of normalizing alcohol questions (i.e., “we are asking all our hypertensive patients”) so patients do not feel threatened or singled out	Miller	2006				
Patients' reactions when asked about alcohol	Patients' reactions were more positive than doctors had expected	Aira	2003				
	The method led to the patients taking more responsibility themselves	Arborelius	1995				
	Doctors said that the few negative reactions were counterbalanced by a positive reaction in most patients, who felt that the screening was implemented out of concern for their health and wellbeing	Beich	2002				
Patients' receptiveness to alcohol interventions	Nurses felt that patients suspected to have alcohol dependence were generally aware and willing to discuss the health and social implications of their drinking	Clifford	2011				
	Patients screened with AUDIT-C showed interest in their level of drinking risk	Clifford	2011				
	Patients were often more willing to disclose information than anticipated, men more so than women	Lid	2015				
	Importance of the patient’s willingness to talk for discussion to be successful	Mules	2012				
Self-esteem when working with at-risk drinkers	Feeling as if you’re going to make a difference	Hutchings	2006		1.51		Odds ratio

Theme	Facilitator	First author	Year	GP + Nurse	GP	Nurse	Notes
	Feedback on successful cases (It would be nice to have a sense if you achieved a target in how many people stopping drinking and you were able to add something to improve your services and the practice)	Hutchings	2006		2.97	3.37	Four graded scale with 4 = very prepared/effective; 1 = very unprepared/ineffective
	Physicians who were more confident about talking to their patients about alcohol issues had a greater likelihood of using interventions	Nygaard	2010				
Uncomfortable task	Destigmatization of problematic alcohol use is needed to discuss alcohol use with patients	Abidi	2016				

ANNEX 7. Description of the first module of the training programme

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)
Introduction	To present the training and support programme	Introduction	Expository method	Lack of support	Social support (unspecified)	30
	Introduction of trainers and participants		Active method: ice breaking activity	Lack of opportunities for sharing experiences with other professionals	Social comparisons	
	To understand the contribution of alcohol for the global disease burden	Global impact of alcohol consumption	Expository method	Lack of knowledge	Information about health consequences	10
	To be aware of alcohol as a substance causing harm to users and to others					
	To identify the differences between men and women concerning the metabolism of alcohol					
	To know the average annual consumption of alcohol in Portugal					
	To relate the average daily consumption to the lifetime risk of dieing from alcohol use					
	To relate the average daily consumption to the relative risk for alcohol-related diseases					
	Questions and partial summary		Interrogative method	---	---	
			Expository method			
	To know the national and local death rates for liver cirrhosis and transport accidents	Impact of alcohol consumption in the Health Region of Dão Lafões	Expository method	Lack of knowledge	Information about health consequences	15
	To recognize alcohol as a major contributor for liver cirrhosis and transport accidents			Alcohol is not a priority	Information about social and environmental consequences	
	To realize that alcohol is a local health priority			Professionals' frustration and sense of low self-efficacy with unsuccessful attempts to counsel patients to cutdown	Antecipated regret	
	To recognize delivery of alcohol SBI as a preventive activity for primary care professionals	Primary care actions for reducing the impact of alcohol consumption	Active method: group discussion	Preventive health should be patients' responsibility	Imaginary reward	
	To know the evidence supporting the efficacy/effectiveness of alcohol SBI			Alcohol SBI are not effective	Social comparisons	
	To realize that alcohol SBI is a cost-effective activity when delivered in primary care				Incompatible beliefs	
	Questions and partial summary		Interrogative method	---	---	
			Expository method			

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)	
Development	<p>To know the definition of standard drink</p> <p>To understand the consumption of alcohol as a risk continuum</p> <p>To know the "recommended drinking limits" for men and women as defined on the national guideline</p> <p>To know the definition of low risk drinking, binge drinking, hazardous drinking, harmful drinking, and alcohol dependence</p>	Terminology	Expository method	Lack of knowledge	Information about health consequences	15	
			Interrogative method		Information about social and environmental consequences		
	Questions and partial summary		Interrogative method		---		---
				Expository method			
	<p>To know that blood tests for diagnosing alcohol misuse have low sensitivity</p> <p>To recognize AUDIT as the recommend screening questionnaire by the national guideline</p> <p>To get familiar with the AUDIT questions</p> <p>To know how to score the AUDIT questions</p> <p>To know how to classify the risk level in accordance with the AUDIT scoring</p> <p>To know the proper action depending on the AUDIT scoring, as recommended by the national guideline</p> <p>To watch a demonstration of how to apply the AUDIT</p>	Screening for alcohol	Expository method	Reliance on blood tests to diagnose alcohol misuse	Information about health consequences	35	
			Demonstrative method	Lack of knowledge	Information about social and environmental consequences		
	Questions and partial summary		Interrogative method	---	---		
				Expository method			
	Coffee-break						
		To practice screening with the AUDIT	Screening with the AUDIT	Active method: clinical case discussion	Lack of training	Behaviour practice / rehearsal Habit formation	40
	Questions and partial summary	Interrogative method		---	---		
		Expository method					

Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)
<p>To understand simple advice as a simplified form of brief intervention</p> <p>To watch a demonstration of how to deliver simple advice</p> <p>To practice delivering simple advice</p>	<p>Simple advice</p>	<p>Expository method</p> <p>Demonstrative method</p> <p>Active method: role play</p>	<p>Lack of knowledge</p> <p>Lack of training</p> <p>BIs are complex and counselling is difficult</p> <p>BIs are complex and counselling is difficult</p> <p>Lack of time</p>	<p>Instruction on how to perform a behaviour</p> <p>Demonstration of the behaviour</p> <p>Behaviour practice / rehearsal</p> <p>Habit formation</p> <p>Verbal persuasion about capability</p>	<p>80</p>
<p>Questions and partial summary</p>		<p>Interrogative method</p> <p>Expository method</p>	<p>---</p>	<p>---</p>	
<p>Lunch-break</p>					
<p>To know that primary care professionals support alcohol SBI</p> <p>To realize that primary care professionals believe that asking about alcohol is part of their job</p> <p>To know that primary care professionals believe they deliver alcohol SBI regularly</p> <p>To realize that alcohol SBI are seldomly delivered</p> <p>To find reasons for the contradiction why primary care professionals believe alcohol SBI rates are high when they are actually quite low</p>		<p>Expository method</p> <p>Active method: group discussion</p>	<p>Lack of motivation/willingness to engage with drinkers</p> <p>Preventive health should be patients' responsibility</p> <p>Professionals think they screen frequently about alcohol</p> <p>Lack of opportunities for sharing experiences with other professionals</p>	<p>Information about others' approval</p> <p>Social comparisons</p> <p>Incompatible beliefs</p>	<p>50</p>
			<p>Lack of motivation / willingness to engage with drinkers</p> <p>Patients do not want / would resent being asked about their alcohol consumption</p> <p>Patients lie about alcohol use</p>	<p>Pros and cons</p> <p>Information about others' approval</p> <p>Behavioural experiments</p> <p>Information about social and environmental consequences</p> <p>Verbal persuasion about capability</p>	

Supplementary Material S2 (cont.). Description of the first module of the training programme

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)
	<p>To be aware of the benefits for the patients and for health professionals of implementing alcohol SBI</p> <p>To be aware of the barriers hindering the implementation of alcohol SBI and how to overcome them</p>	Barriers and facilitators	<p>Active method: group work</p> <p>Expository method</p>	<p>Patients' misbeliefs about alcohol</p> <p>Lack of structured action protocol</p> <p>Lack of screening and counselling materials</p> <p>Lack of support</p> <p>Professionals believe that alcohol SBI are not effective / patients will not follow the advice to cutdown</p> <p>Alcohol is not a priority</p> <p>Professionals are too busy dealing with other problems</p> <p>Lack of time</p> <p>Frustration and sense of low self-efficacy with unsuccessful cases</p> <p>Belief that BIs are complex and counselling is difficult</p> <p>Difficult to remember to screen systematically</p> <p>Alcohol SBI could damage doctor-patient relationship</p>	<p>'Instruction on how to perform a behaviour</p> <p>Adding objects to the environment</p> <p>Problem solving</p> <p>Action planning</p> <p>'Prompts / cues</p> <p>'Social support (unspecified)</p> <p>'Information about others' approval</p> <p>Framing / reframing</p> <p>'Imaginary reward</p> <p>Restructuring the social environment</p> <p>'Comparative imagining of future outcomes</p> <p>'Information about emotional consequences</p> <p>Focus on past success</p> <p>Habit formation</p>	150
Conclusion	To summarize the first training session	Final summary	Interrogative method	---	---	10
		Conclusion	Expository method			

ANNEX 8. Description of the second module of the training programme

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)	
Introduction	To review the contents of the first training day	Introduction	Expository method	---	---	15	
	To present the contents of the second training day		Interrogative method				
Development	To present the alcohol SBI rates in each PHC unit	Implementation efforts	Active method: group discussion Expository method	Lack of opportunities for sharing experiences with other professionals	Problem solving	90	
	To allow participants to discuss implementation difficulties			Lack of training	Action planning		
	To find solutions for the difficulties encountered			Lack of incentives	Feedback on behaviour		
				Lack of structured action protocol	Social comparisons		
				Lack of motivation/willingness to engage with drinkers	Social reward		
		Difficult to remember to screen systematically	Verbal persuasion about capability				
	Coffee-break						
		To know the different types of brief interventions	Brief intervention Transtheoretical Model	Expository method Interrogative method Demonstrative method	Lack of knowledge	Instruction on how to perform a behaviour	120
		To understand the five major steps to a brief intervention: Ask, Advise, Assess, Assist, and Arrange			Lack of training	Demonstration of the behaviour	
		To know the Transtheoretical Model of behaviour change			Lack of structured action protocol	Habit formation	
	To integrate the Transtheoretical Model into the brief intervention steps	Belief that BIs are complex and counselling is difficult			Graded tasks		
	To understand how to tailor the approach to the patient taking into account the patient's stage of change						
	Questions and partial summary	Interrogative method	---	---			
		Expository method					
Lunch-break							
	To understand the principles of motivational		Expository method	Lack of knowledge Lack of training	Instruction on how to perform a behaviour Demonstration of the behaviour		

Supplementary Material S3 (cont.). Description of the second module of the training programme

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)
	interviewing To know the major techniques of motivational interviewing (OARS skills) To learn how to use the OARS skills for helping patients changing their behaviour	Motivational Interviewing	Interrogative method Demonstrative method Active method: group work and role play	Lack of training Belief that BIs are complex and counselling is difficult Lack of time Lack of opportunities for sharing experiences with other professionals	Behaviour practice / rehearsal Habit formation Graded tasks Verbal persuasion about capability Social comparisons	200
Conclusion	To summarize the second training session	Final summary	Interrogative method Expository method	---	---	10
		Conclusion	Expository method			

ANNEX 9. Description of the third module of the training programme

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)
Introduction	To review the contents of the first and second training days	Introduction	Expository method	---	---	15
	To present the contents of the third training day		Interrogative method			
Development	To improve the OARS skills	Brief Intervention Transtheoretical Model	Active method: group discussion	Lack of opportunities for sharing experiences with other professionals	Instruction on how to perform a behaviour Demonstration of the behaviour Behaviour practice / rehearsal	90
	To tailor the OARS skills to the stage of change of the patient		Expository method	Lack of knowledge	Habit formation	
			Interrogative method	Lack of training	Graded tasks	
			Demonstrative method	Belief that BIs are complex and counselling is difficult	Information about emotional consequences	
	Questions and partial summary		Interrogative method	Professionals' frustration and sense of low self-efficacy with unsuccessful attempts to counsel patients to cutdown	Social comparisons Comparative imagining of future outcomes Verbal persuasion about capability Focus on past success	
Coffee-break						
Development					Instruction on how to perform a behaviour Demonstration of the behaviour Behaviour practice / rehearsal Habit formation	
				Lack of opportunities for sharing experiences with other professionals Lack of knowledge	Graded tasks	

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)
	To improve the OARS skills To tailor the OARS skills to the stage of change of the patient	Brief Intervention Transtheoretical Model	Interrogative method Demonstrative method Active method: group work, group discussion	Lack of training Professionals' frustration and sense of low self-efficacy with unsuccessful attempts to counsel patients to cutdown Belief that BIs are complex and counselling is difficult	Graded tasks Information about emotional consequences Social comparisons Social reward Comparative imagining of future outcomes Verbal persuasion about capability Focus on past success	120
	Questions and partial summary		Interrogative method Expository method	---	---	
	Lunch-break					
	To understand the concept of alcohol dependence To know how to diagnose alcohol dependence To understand the principles for treating alcohol dependence	Alcohol dependence	Expository method Interrogative method Demonstrative method Active method: group discussion	Lack of knowledge Lack of training Reliance on blood tests to diagnose alcohol misuse Lack of support services Lack of opportunities for sharing experiences with other professionals	Information about health consequences Information about social and environmental consequences Social support (unspecified) Credible source	200
Conclusion	To summarize the third training session	Final summary	Interrogative method Expository method	---	---	10
		Conclusion	Expository method			

ANNEX 10. Description of the fourth module of the training programme

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)
Introduction	To review the contents of the previous three training days	Introduction	Expository method	---	---	15
	To present the contents of the fourth training day		Interrogative method			
Development	To improve the OARS skills	Brief Intervention Transtheoretical Model	Active method: group discussion of a video	Lack of opportunities for sharing experiences with other professionals	Instruction on how to perform a behaviour	90
	To tailor the OARS skills to the stage of change of the patient			Lack of knowledge	Demonstration of the behaviour	
				Lack of training	Habit formation	
	Questions and partial summary		Interrogative method	---	---	
Coffee-break						
				Lack of opportunities for sharing experiences with other professionals	Instruction on how to perform a behaviour	

	Objectives	Content	Methodology	Barriers addressed	Behaviour Change Techniques applied	Time (minutes)
	To improve the OARS skills To tailor the OARS skills to the stage of change of the patient	Brief Intervention Transtheoretical Model	Interrogative method	Lack of knowledge	Demonstration of the behaviour	120
			Active method: group work, group discussion	Lack of training Belief that BIs are complex and counselling is difficult	Behaviour practice / rehearsal Habit formation Graded tasks Social comparisons	
	Questions and partial summary		Interrogative method Expository method	---	---	
Lunch-break						
	To practice alcohol screening and brief interventions	Screening Brief interventions	Active method: group work, role play	Lack of training Lack of time Lack of opportunities for sharing experiences with other professionals	Behaviour practice / rehearsal Habit formation Graded tasks Social comparisons Verbal persuasion about capability	200
Conclusion	To summarize the training course	Final summary	Interrogative method Expository method	---	---	10
		Conclusion	Expository method			

Research Article

Differences between Groups of Family Physicians with Different Attitudes towards At-Risk Drinkers: A Post Hoc Study of the ODHIN Survey in Portugal

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Introduction. We have recently shown that family physicians can be classified into two groups based on their attitudes towards at-risk drinkers: one with better and the other with worse attitudes. **Objective.** To compare the two groups regarding demographics, alcohol-related clinical practice, knowledge of sensible drinking limits, and barriers and facilitators to working with at-risk drinkers. **Methods.** A random sample of 234 Portuguese family physicians who answered the Optimizing Delivery of Health Care Interventions survey was included. The questionnaire asked questions on demographics, alcohol-related clinical practice, knowledge of sensible drinking limits, and barriers and facilitators to working with at-risk drinkers. **Results.** Family physicians with better attitudes were younger ($p = 0.005$) and less experienced ($p = 0.04$) and with higher male proportion ($p = 0.01$). This group had more hours of postgraduate training ($p < 0.001$), felt more prepared to counsel risky drinkers ($p < 0.001$), and considered themselves to have better counselling efficacy ($p < 0.001$). More family physicians in the group with worse attitudes considered that doctors cannot identify risky drinkers without symptoms ($p = 0.01$) and believed counselling is difficult ($p = 0.005$). **Conclusions.** Family physicians with better attitudes had more education on alcohol and fewer barriers to work with at-risk drinkers. These differences should be taken into account when designing implementation programs seeking to increase alcohol screening and brief advice.

1. Introduction

A significant proportion of patients seen by family physicians drink alcoholic beverages above recommended limits [1–3], putting them at risk of developing alcohol-related diseases [4]. Family physicians stand as the ideal health professionals to identify and advise patients to cut down on their drinking [5], and the majority of them declare their support for alcohol screening and advice [6, 7]. However, most family physicians remain unwilling to implement alcohol screening and brief interventions in routine clinical practice [5].

Several studies dwelled on the reasons why such contradiction exists [8–15]. They came out with a vast number

of barriers standing between physicians' support for early intervention for alcohol problems and their uptake of these practices. These barriers go from environmental constraints (lack of time, lack of counselling materials, and lack of support) to physician-related limitations (lack of training, fear to antagonize the patient, and physicians' own attitudes towards at-risk drinkers). It seems clear that only broadband implementation programs covering all these dimensions can successfully help family physicians jump over all these hurdles.

Physicians' attitudes towards excessive drinkers are a key aspect to have into consideration when designing alcohol screening and brief interventions implementation programs.

A previous study showed that training and support increased physicians' intervention rates but only of those who already felt secured and committed in working with risky drinkers; those feeling insecure and uncommitted in the first place worsened their attitudes [10]. These findings suggest the existence of distinct attitude-based family physicians groups with specific training and support needs. The identity of these groups remained elusive up until recently, when we were able to identify them in a sample of Portuguese family physicians [16]. Briefly, we measured Portuguese family physicians' attitudes towards risky drinkers with the Short Alcohol and Alcohol Problems Perception Questionnaire (SAAPPQ). SAAPPQ's scores were submitted to cluster analysis. With this analysis we were able to distinguish two different groups of Portuguese family physicians with unequal sizes: the first, comprising nearly 60% of the sample, formed by physicians with lower attitude scores towards at-risk drinkers; the second, comprising the remaining 40%, formed by physicians with higher attitude scores. We believe these findings will help to better design implementation programs by tailoring them to the emotional needs of physicians in each group.

This paper aims to characterize the above-mentioned groups by comparing their characteristics and views on barriers and facilitators for alcohol screening and brief advice. We hypothesize that family physicians with better attitudes towards at-risk drinkers report fewer constraints in working with them.

2. Methods

2.1. Sampling. A proportional random sampling strategy was conducted from April to June 2012. The Portuguese family physician national database, from which the sample was extracted, was stratified by age, sex, and health region. Selected family physicians were invited by e-mail to fill in the online questionnaire, available at a specifically designed and secured website. The survey was part of the Optimizing Delivery of Health Care Interventions (ODHIN) project. This was a four-year research project (2011–2014), cofinanced by the European Union, which included nine European countries. The project focused on the implementation of screening and brief intervention programs for hazardous and harmful drinking in primary health care. The survey instrument is available at the ODHIN project webpage [17].

A response rate of 30% was assumed based on previous studies showing that e-mailed surveys' response rates are usually low [18]. With this in mind, 850 family physicians were invited to participate in order to achieve the project's requested sample of 250 physicians. To increase participation rate, two e-mail reminders with a three-week interval were sent encouraging family physicians to fill in the survey.

2.2. Survey Instrument. The questionnaire was adapted from questionnaires applied in the World Health Organization Phase III strand I study [19] and in a primary care survey conducted in England [13]. The questionnaire asked family physicians to report on demographics; education and training on alcohol; what family physicians considered to be the

upper limit for alcohol consumption before advising a healthy man or a nonpregnant healthy woman to reduce or stop drinking; alcohol-related clinical practice; attitudes towards risky drinkers, measured with the SAAPPQ (data on attitudes is reported elsewhere [20] and will not be described here); and barriers and facilitators for implementation of alcohol screening and brief advice.

2.3. Data Collection. Participants answered the survey through a secured website. They received an e-mail invitation explaining the study's objectives, survey filling details, and a direct website link. The data collection method was completely anonymous and did not retain any information that could be used to differentiate respondents from nonrespondents.

2.4. Data Management. Previous education and training on alcohol was dichotomized from a self-reported ordinal scale into "less than four hours" or "four or more hours" of alcohol specific education and training. Beliefs about family physicians' effectiveness after being adequately trained in reducing patients' alcohol consumption were dichotomized into "effective" or "ineffective."

According to the Portuguese guidelines [21], upper limit of alcohol consumption was dichotomized as two standard drinks/day or any other answer for a healthy man and one standard drink/day or any other answer for a nonpregnant healthy woman.

Alcohol-related clinical practice questions were recoded from a self-reported ordinal scale as follows: asking patients about alcohol even if they do not was dichotomized into "All the time/Most of the time" or "Some of the time/Rarely or never"; obtaining information on patients drinking alcohol moderately was dichotomized into "Always/As indicated" or "Occasionally/Rarely or Never"; preparedness to counsel patients reducing alcohol consumption was dichotomized into "Very prepared/Prepared" or "Unprepared/Very unprepared"; effectiveness in reducing patients' alcohol consumption was dichotomized into "Very effective/effective" or "Ineffective/Very ineffective"; number of times a blood test was requested in the last year because of concern about alcohol consumption was dichotomized into "More than twelve times" or "Twelve times or less"; number of self-reported patients managed specifically for their hazardous drinking or alcohol-related problems in the last year was dichotomized into "Less than seven" or "Seven or more."

Finally, barriers and facilitators were recoded as "Don't know/Not at all" or "Little/Quite a bit/Very much" to differentiate between physicians who expressed agreement with the statement and those in disagreement or who had no opinion.

2.5. Statistical Analysis. Data are shown as mean \pm standard deviation or frequency distribution as appropriate. Family physicians groups were compared with independent samples *t*-test for continuous variables and chi-square or Fisher's exact test for categorical variables, as appropriate. A two-tailed *p* value < 0.05 was considered for significance. Analysis was

TABLE 1: Demographic characteristics of the sample of Portuguese family physicians participating in the survey.

Demographics	Group with worse attitudes	Group with better attitudes	<i>p</i>
Age	53.7 ± 7.7	50.3 ± 9.8	0.005 ^a
Years practicing as a family physician	24.0 ± 8.6	21.4 ± 10.3	0.04 ^a
Sex <i>N</i> (%)			
Male	41 (29.3)	43 (45.7)	0.01 ^b
Female	99 (70.7)	51 (54.3)	
Practice characteristic <i>N</i> (%)			
Urban	62 (44.3)	42 (44.7)	0.57 ^b
Rural	23 (16.4)	11 (11.7)	
Mixed urban/rural	55 (39.3)	41 (42.7)	

^aIndependent samples *t*-test; ^bchi-square test.

TABLE 2: Number of hours of training on alcohol received and views on effectiveness in reducing patients' alcohol consumption if properly trained.

Training	Group with worse attitudes <i>N</i> (%)	Group with better attitudes <i>N</i> (%)	<i>p</i> ^a
Hours of any form of postgraduate training on alcohol ever received			
<4 hours	98 (70.0)	43 (45.7)	<0.001
≥4 hours	42 (30.0)	51 (54.3)	
Would family physicians be effective with adequate information and training?			
Effective	128 (91.4)	92 (97.9)	0.04
Ineffective	12 (8.6)	2 (2.1)	

^aChi-square test.

performed with R[®] 3.0.2 (The R Foundation for Statistical Computing).

3. Results

3.1. Demographics. Sampled family physicians were on average 52.3 ± 8.7 years old and had 23.0 ± 9.4 years of experience working as family physicians, and the majority were female (*N* = 150, 64.1%). Almost all family physicians were working in an urban (*N* = 104, 44.5%) or mixed urban/rural (*N* = 96, 41.0%) practice; the remainder (*N* = 34, 14.5%) were working in a rural practice.

Family physicians with better attitudes towards at-risk drinkers were younger and less experienced and with higher proportion of male doctors than the group with worse attitudes (Table 1). The groups had similar practice distributions.

3.2. Education and Training on Alcohol. A majority of physicians (*N* = 141, 60.3%) reported having less than 4 hours of training on alcohol and alcohol-related problems. Almost all doctors (*N* = 220, 94.0%) believed that with adequate information and training family physicians would achieve higher effectiveness in helping patients to cut down on their drinking. Family physicians with better attitudes towards risky drinkers reported higher training in this specific area (Table 2). More doctors in this group also believed family physicians could be more effective with proper training.

3.3. Drinking Limits. Ninety-eight participants (41.9%) reported they would consider two standard drinks as the upper limit for alcohol consumption before they would advise a healthy adult man to cut down. A similar proportion (*N* = 102, 43.6%) answered one unit per day when asked the same question for a nonpregnant healthy woman.

We found no differences between the groups in respect to sensible drinking limits (Table 3).

3.4. Alcohol-Related Clinical Practice. Most family physicians (*N* = 178, 76.1%) indicated they ask patients frequently about alcohol even if patients do not ask about it. A majority also reported obtaining information on alcohol always or at least as indicated (*N* = 210, 89.7%); feeling prepared to counsel patients to cut down (*N* = 190, 81.2%); and feeling effective in helping patients to change their alcohol habits (*N* = 141, 60.3%). Nearly six out of ten family physicians (*N* = 138, 59.0%) said they have taken or requested a blood test more than 12 times in the last year because of concern about alcohol consumption, and 69.7% (*N* = 163) reported having managed in the last year at least 7 patients specifically for their hazardous drinking or alcohol-related problems.

Both groups gave similar answers concerning alcohol-related clinical practice except when it comes to feeling prepared to counsel, and effective in helping, patients to cut down on their drinking: more family physicians with better attitudes felt prepared and effective in doing so (Table 4).

TABLE 3: Family physicians' knowledge about sensible drinking limits.

Sensible drinking limits	Group with worse attitudes N (%)	Group with better attitudes N (%)	<i>p</i> ^a
Upper daily limit for a healthy man			
=2 standard drinks/units per day	57 (40.7)	41 (43.6)	0.66
≠2 standard drinks/units per day	83 (59.3)	53 (56.4)	
Upper daily limit for a nonpregnant healthy woman			
=1 standard drink/unit per day	62 (44.3)	40 (42.6)	0.79
≠1 standard drink/unit per day	78 (55.7)	54 (57.4)	

^aChi-square test.

TABLE 4: Alcohol-related clinical practice behaviours.

	Group with worse attitudes N (%)	Group with better attitudes N (%)	<i>p</i> ^a
Ask about alcohol even if patients do not			
All the time/Most of the time	102 (72.9)	76 (80.9)	0.16
Some of the time/Rarely or never	38 (27.1)	18 (18.9)	
Extent to which information was obtained on patients' drinking alcohol moderately			
Always/As indicated	124 (88.6)	86 (91.5)	0.47
Occasionally/Rarely or Never	16 (11.4)	8 (8.5)	
Feel prepared to counsel patients reducing alcohol consumption			
Very prepared/Prepared	104 (74.3)	86 (91.5)	<0.001
Unprepared/Very unprepared	36 (25.7)	8 (8.5)	
Feel effective in helping patients reducing alcohol consumption			
Very effective/effective	68 (48.6)	73 (77.7)	<0.001
Ineffective/Very ineffective	72 (51.4)	21 (22.3)	
Number of times a blood test was requested in the last year because of alcohol concern			
>12 times	77 (55.0)	61 (64.9)	0.13
≤12 times	63 (45.0)	33 (35.1)	
Number of patients managed for alcohol in the last year			
≥7 patients	92 (65.7)	71 (75.5)	0.11
<7 patients	48 (34.3)	23 (24.5)	

^aChi-square test.

3.5. Barriers to Alcohol Screening and Brief Advice. In general, nearly half or more participants agreed with all suggested barriers.

In respect to health provider-related barriers, family physicians agreed doctors believe counselling is too difficult ($N = 212, 90.6\%$); are not trained in counselling for reducing alcohol consumption ($N = 196, 83.8\%$); do not know how to identify problem drinkers who have no obvious symptoms of excess consumption ($N = 173, 73.9\%$); feel awkward asking patients questions about alcohol ($N = 172, 73.5\%$); may have alcohol problems ($N = 161, 68.8\%$); have disease model training ($N = 156, 66.6\%$); have a liberal attitude towards alcohol ($N = 149, 63.7\%$); and think preventive health should be patients' responsibility and not theirs ($N = 112, 47.9\%$).

Regarding patient-related barriers, family physicians agreed doctors believe patients would disregard their advice

($N = 190, 81.2\%$) and they would resent being asked about alcohol ($N = 134, 57.3\%$).

Concerning organizational barriers, family physicians agreed doctors lack suitable counselling materials available ($N = 196, 83.8\%$); are too busy dealing with other patients' problems ($N = 194, 82.9\%$); are not sufficiently encouraged by their contract to work with alcohol problems ($N = 193, 82.5\%$); and lack a suitable screening device available ($N = 184, 78.6\%$).

Family physicians from both groups overlapped their views on most suggested barriers (Table 5). Their opinions differed only on two health provider-related barriers since more family physicians from the worse attitudes group agreed doctors do not know how to identify problem drinkers who have no obvious symptoms of excess consumption ($p = 0.01$) and believe counselling is too difficult ($p = 0.005$). We also

TABLE 5: Agreement with selected barriers for the implementation of alcohol screening and brief interventions.

Barriers	Group with worse attitudes N (%)	Group with better attitudes N (%)	<i>p</i> ^a
Doctors are too busy dealing with other problems	120 (85.7)	74 (78.7)	0.16
Doctors have a disease model training and do not think about prevention	99 (70.7)	57 (60.6)	0.11
Doctors think preventive health should be patients' responsibility not theirs	71 (50.7)	41 (43.6)	0.29
Doctors are not sufficiently encouraged to work with alcohol problems	111 (79.3)	82 (87.2)	0.12
Doctors feel awkward about asking questions about alcohol consumption	109 (77.9)	63 (67.0)	0.07
Doctors do not know how to identify problem drinkers who have no obvious symptoms	112 (80.0)	61 (64.9)	0.01
Doctors do not have a suitable screening device to identify problem drinkers	115 (82.1)	69 (73.4)	0.11
Doctors do not have suitable counselling materials available	117 (83.6)	79 (84.0)	0.92
Doctors are not trained in counselling for reducing alcohol consumption	124 (88.6)	78 (83.0)	0.22
Doctors believe that alcohol counselling is too difficult	133 (95.0)	79 (84.0)	0.005
Doctors do not believe that patients would take their advice	117 (83.6)	73 (77.7)	0.26
Doctors themselves have a liberal attitude towards alcohol	91 (65.0)	58 (61.7)	0.61
Doctors themselves may have alcohol problems	96 (68.6)	65 (69.1)	0.93
Doctors believe that patients would resent being asked about their alcohol consumption	82 (58.6)	52 (55.3)	0.62

^aChi-square test.

TABLE 6: Agreement with selected facilitators for the implementation of alcohol screening and brief interventions.

Facilitators	Group with worse attitudes N (%)	Group with better attitudes N (%)	<i>p</i>
Public health education campaigns	136 (97.1)	92 (97.9)	1.0 ^a
Patients requesting advice about alcohol	139 (99.3)	90 (95.7)	0.16 ^a
Having quick and easy screening questionnaires	134 (95.7)	88 (93.6)	0.55 ^a
Having quick and easy counselling materials	136 (97.1)	92 (97.9)	1.0 ^a
Proof of alcohol's early intervention effectiveness	136 (97.1)	90 (95.7)	0.72 ^a
Training programs for early intervention for alcohol	136 (97.1)	90 (95.7)	0.72 ^a
General support services (self-help/counselling)	137 (97.9)	92 (97.9)	1.0 ^a
Better salary and working conditions	115 (82.1)	77 (81.9)	0.96 ^b

^aFisher's exact test; ^bchi-square test.

found a trend towards more family physicians from the worse attitudes group agreeing doctors feel awkward asking patients questions about alcohol ($p = 0.07$).

3.6. Facilitators of Alcohol Screening and Brief Advice. The vast majority agreed with all suggested incentives to implement alcohol screening and brief intervention.

In respect to health provider-related facilitators, family physicians agreed they would be encouraged to do more early intervention for hazardous alcohol consumption if early intervention for alcohol was proven to be successful ($N = 226, 96.6\%$).

Concerning patient-related facilitators, family physicians agreed they would be encouraged to do more early interventions if patients requested health advice about alcohol consumption ($N = 229, 97.9\%$) and if public health education campaigns in general made society more concerned about alcohol ($N = 228, 97.4\%$).

As to organizational facilitators, participants agreed they would be encouraged to do more early interventions if general support services (self-help/counselling) were readily available to refer patients to ($N = 229, 97.9\%$); quick and easy counselling materials were available ($N = 228, 97.4\%$); training programs for early intervention were available ($N = 226, 96.6\%$); quick and easy screening questionnaires were available ($N = 222, 94.1\%$); and salary and working conditions were improved ($N = 192, 82.1\%$).

Family physicians from both groups showed similar views on all suggested barriers (Table 6).

4. Discussion

This study shows that family physicians with better attitudes towards risky drinkers report fewer constraints to implement alcohol screening and brief advice, specifically when it comes to physician-related barriers. Both groups

reported similar views on organizational and patient-related barriers and differed only in two physician-related barriers concerning beliefs about knowledge and skills fundamental to approach patients' alcohol-drinking habits. We also found a trend towards more doctors in the worse attitudes group feeling uncomfortable asking patients about alcohol. Taken together, these findings suggest that doctors with worse attitudes have higher knowledge and skills-training needs and also lower confidence levels in their abilities to implement alcohol screening and brief advice. This claim finds support in the differences found in education and training on alcohol: the group with better attitudes had more hours of postgraduate training, which may imply that previous training may have boosted physicians' knowledge, skills, and confidence; they also believed that family physicians can increase their counselling effectiveness if they receive proper training. However, this was a cross-sectional study, which means that causality cannot be inferred. It is possible that physicians already with better attitudes prior to training sought to obtain education on alcohol simply because they had interest in alcohol issues. On the other hand, having more education and training on alcohol does not seem to improve knowledge of daily drinking limits, which points to the need of improving the way information is delivered during training.

Despite the differences found on the above-mentioned barriers, the groups shared similar views on all suggested facilitators. It seems that family physicians in both groups can equally benefit from changes in the primary care infrastructure. Possible changes are the availability of screening and counselling materials (e.g., having a screening tool installed on the electronic health record software, leaflets to hand over to patients), easy access to support services (e.g., specialist advice on difficult cases, a working referral network), and better payment and working conditions overall. Social pressure may also play an important part in increasing alcohol consumption discussions as most physicians would like to see patients asking for advice on this specific issue, pointing public health education campaigns as a possible way to achieve this.

Other interesting results relate to clinical practice issues. When advising patients to cut down, more family physicians with better attitudes reported feeling prepared and effective in reducing alcohol consumption. Despite this, we found similar self-reported practice behaviours on the number of patients advised, blood tests required, and information obtained on alcohol from patients. It seems that having more positive feelings towards at-risk drinkers does not necessarily translate into more self-reported screening and advice. This suggests that, despite its importance, addressing only physicians' emotional aspects may fail to significantly increase screening and advice rates.

Groups differed also in demographic variables. Younger, less experienced family physicians reported better attitudes towards patients with excessive alcohol consumption. When it comes to gender, male physicians reported feeling more role-secured and therapeutically committed towards working with at-risk drinkers than female doctors. How to interpret these results remains elusive.

4.1. Comparison with Previous Research. Physicians' agreement with barriers and facilitators found in this study mirrors that reported in the literature. Many studies point to organizational factors as a major impediment to implement screening and brief interventions. The most common organizational barriers cited in these studies are lack of time [6, 9, 12, 22–25]; lack of screening tools [9, 12]; lack of counselling materials [9, 12]; and lack of support [6, 7, 24]. Evidence also underlines similar patient- and physician-related factors as important barriers. Patient-related barriers most often reported relate to fear of upsetting patients [5, 6, 15] and belief that patients will disregard advice to cut down [5, 12, 22]. As to physician-related barriers, doctors often report lack of training [5, 6, 9, 15, 22]; lack of knowledge and skills, [6, 9, 15]; and low confidence and motivation to identify risky drinkers and deliver advice [9, 15]. Literature also shows physicians agree that tackling these organizational barriers would facilitate implementation [6, 12]. These similarities strengthen the reliability of the results found in our study.

4.2. Implications for Implementation Research. Based on the findings of this study it seems reasonable to postulate that differences between groups relate essentially to their views on alcohol issues and to the way they feel about addressing those issues with patients. As such, we hypothesize that fine-tuning implementation programs only to the differences found may set the ground to an improvement in the way physicians think and feel about alcohol-related problems but will probably fail to achieve higher screening and advice rates. We believe we need a more comprehensive strategy to address the way family physicians deal with these issues in their daily practice. For example, we must carefully consider the role of other primary health care professionals. Nurses doing screening and even delivering brief advice might have a positive impact on family physicians own screening and advice rates. Receptionists handing self-administered screening tools to patients might boost screening rates. Including residents in the program may also be a positive influence. Implementation programs must be carefully planned if one wants to change deeply rooted routine clinical practice, which usually obviates alcohol screening and brief advice.

4.3. Limitations. The results of this study must be interpreted having its limitations in mind. The first is the low response rate achieved. Electronic surveys usually result in low response rates, but they seem to allow for generalization when the sampling method is conducted using probability samples of full populations [18]. However, we cannot be certain the sample represents the views of all Portuguese family physicians.

As mentioned earlier, this was a cross-sectional study, which does not allow establishing causality paths. The example given earlier is illustrative: we cannot ascertain the direction of the association between training and physicians' attitudes. It is possible that training may have improved physicians' attitudes but is also conceivable that physicians with better attitudes to begin with sought to get training on alcohol-related problems. Nevertheless, results are consistent

with similar studies previously reported, which gives support to the conclusions drawn.

Finally, data are self-reported and no external data validation was conducted. Some variables such as number of patients advised on alcohol, number of blood tests required, or frequency of asking about alcohol consumption are personal estimations and possibly subjected to bias.

5. Conclusions

Family physicians with better attitudes towards problem drinkers report fewer physician-related barriers to implement alcohol screening and brief interventions. They face similar difficulties concerning organizational and patient-related barriers and also enablers of these practices. We plan to integrate these results in the design of a new implementation program for alcohol problems in Portugal, seeking to increase family physicians' screening and brief advice.

Ethical Approval

The study protocol was approved by the Ethics Committee of the Faculty of Medicine of Lisbon.

Conflict of Interests

The authors report no conflict of interests.

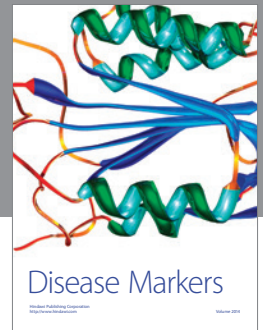
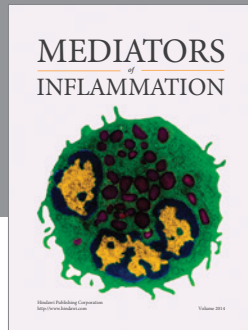
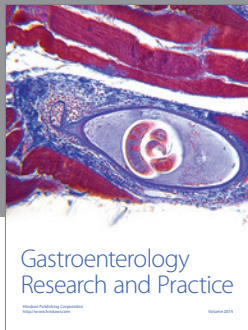
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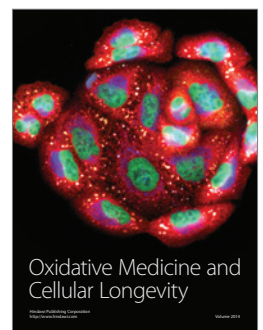
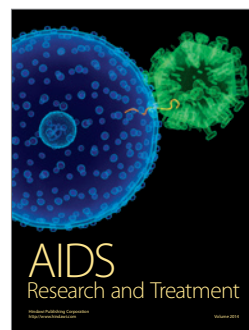
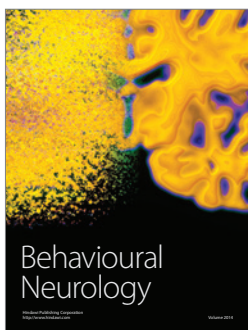
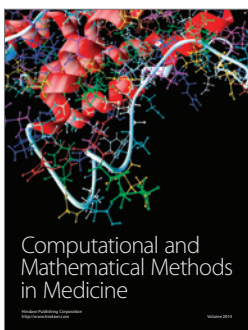
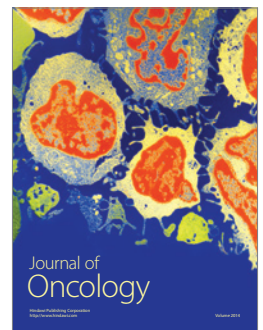
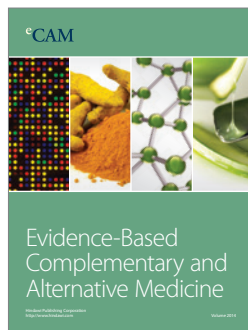
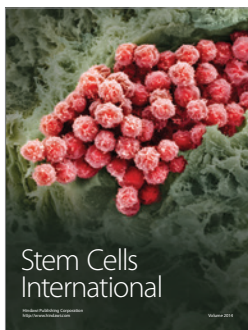
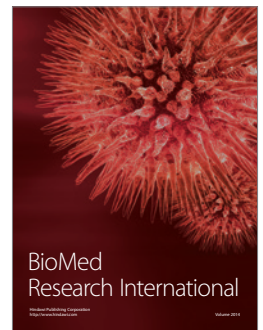
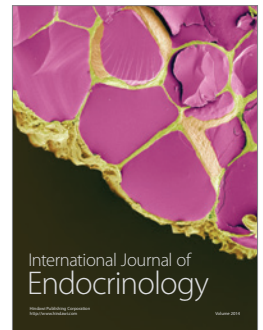
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Factors Influencing the Implementation of Screening and Brief Interventions for Alcohol Use in Primary Care Practices: A Systematic Review Protocol



Fatores Condicionantes da Implementação da Detecção Precoce e Intervenções Breves no Consumo Excessivo de Álcool nos Cuidados de Saúde Primários: Protocolo de Revisão Sistemática da Literatura

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ABSTRACT

Introduction: Alcohol is a leading risk factor contributing to the global burden of disease. National and international agencies recommend evidence-based screening and brief interventions in primary care settings in order to reduce alcohol consumption. However, the majority of primary care professionals do not routinely deliver such interventions.

Objective: To identify factors influencing general practitioners/family physicians' and primary care nurses' routine delivery of alcohol screening and brief intervention in adults.

Material and Methods: A systematic literature search will be carried out in the following electronic databases: Medline, CINAHL, CENTRAL, and PsycINFO. Two authors will independently abstract data and assess study quality using the NIH National Heart, Lung, and Blood Institute quality assessment tools for quantitative studies, and the CASP checklist for qualitative studies. A narrative synthesis of the findings will be provided, structured around the barriers and facilitators identified. Identified barriers and facilitators will be further analysed using the Behavioural Change Wheel/Theoretical Domains Framework.

Discussion: This review will describe the barriers to, and facilitators for, the implementation of alcohol screening and brief interventions by general practitioners/family physicians and nurses at primary care practices. By mapping the barriers and facilitators to the domains of the Behavioural Change Wheel/Theoretical Domains Framework, this review will also provide implementation researchers with a useful tool for selecting promising practitioner-oriented behavioural interventions for improving alcohol screening and brief intervention delivery in primary care.

Conclusion: This review will provide important information for implementing alcohol screening and brief intervention in primary health care.

Systematic Review Registration: PROSPERO CRD42016052681

Keywords: Alcohol Drinking; Alcoholism; Directive Counseling; Health Promotion; Mass Screening; Portugal; Primary Health Care

RESUMO

Introdução: O consumo de álcool é um importante fator de risco a nível mundial. Apesar de serem recomendadas por muitas instâncias nacionais e internacionais, a deteção e intervenção breve no consumo de álcool ainda não está integrada na prática da maioria dos profissionais de saúde dos Cuidados de Saúde Primários.

Objetivo: Identificar as barreiras e os facilitadores à implementação da deteção e intervenção breve nos consumos de álcool nos Cuidados de Saúde Primários por parte dos Médicos e Enfermeiros de Família.

Material e Métodos: Será realizada uma revisão sistemática da literatura nas seguintes bases de dados: Medline, CINAHL, CENTRAL, e PsycINFO. Dois autores irão, de forma independente, extrair os dados, e avaliar a qualidade dos estudos selecionados. A qualidade dos estudos quantitativos será avaliada através das *checklists* do NIH National Heart, Lung, and Blood Institute, enquanto a dos estudos qualitativos será avaliada através da *checklist* CASP. Os resultados serão apresentados numa síntese narrativa, estruturada em torno das barreiras e facilitadores identificados, e analisados à luz dos domínios teóricos da *Behavioural Change Wheel/Theoretical Domains Framework*.

Discussão: Esta revisão sistemática descreverá as barreiras e os facilitadores à implementação da deteção e intervenção breve nos consumos de álcool nos Cuidados de Saúde Primários. Ao estabelecer a ligação entre estes fatores e os diferentes domínios teóricos da *Behavioural Change Wheel/Theoretical Domains Framework*, esta revisão sistemática vai facilitar o desenho de programas que visem a implementação destas boas práticas neste nível de cuidados.

Conclusão: Esta revisão contribuirá com informação importante para a implementação da deteção e intervenção breve nos consumos de álcool nos Cuidados de Saúde Primários.

Registo: PROSPERO CRD42016052681

Palavras-chave: Aconselhamento Directivo; Alcoolismo; Consumo de Bebidas Alcoólicas; Cuidados de Saúde Primários; Portugal; Programas de Rastreio; Promoção da Saúde

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INTRODUCTION

Alcohol is a leading risk factor contributing to the global burden of disease.¹ The World Health Organization estimates that 3.3 million people die each year because of alcohol consumption.² This represents 5.9% of all deaths worldwide. Alcohol also contributes to more than 200 disease and injury conditions, accounting for 5.1% of the global burden of disease and injury. Alcohol-related harm increases exponentially with the average daily consumption,³ therefore even small reductions can substantially decrease the risk of dying due to alcohol.

Screening and brief interventions (SBI) in primary care settings has long been advocated for preventing harm from excessive alcohol use. Several randomized controlled trials and meta-analysis have found alcohol SBI to be highly effective, cost-effective, and even cost-saving.⁴⁻¹¹ However, there has been recent debate concerning the validity of this effectiveness evidence.^{12,13} Most trials use self-reported alcohol consumption as their primary outcome measure rather than alcohol-related morbidity or mortality problems, and such self-reported outcomes may be subject to social desirability bias or other research participation effects.^{14,15} Furthermore, the active ingredients of SBI have yet to be determined.^{16,17} Notwithstanding these discussions, it is clear that alcohol increases the risk of and/or exacerbates many conditions that present in primary care.^{3,18} Furthermore, of the many patients visiting primary care who are at-risk drinkers,¹⁹⁻²¹ few currently receive any alcohol-related advice or intervention from their doctor.²²⁻²⁸ They are therefore denied the opportunity to understand the risks and make an informed decision about whether or not to cut down.

Several studies have examined barriers and facilitators affecting whether or not primary care professionals address alcohol use with patients. Lack of training, lack of time, lack of motivation, and lack of suitable counselling materials are among the most commonly cited barriers^{23,29-37}; whereas having patients who seek advice for alcohol issues, more training, and ready availability of support services, screening and counselling materials are commonly reported facilitators.^{23,30,31,38} Whilst several studies have documented or tested training, financial or other interventions designed to increase the implementation of alcohol SBI in primary care,^{26,39} few are theoretically informed⁴⁰ and reporting of the content of training and follow up support is often poor.⁴¹ Johnson *et al* reviewed the barriers and facilitators for implementing alcohol screening and brief intervention in 2009,⁴² giving priority to studies judged to best inform the UK practice. The review reported on 47 articles focusing on different healthcare settings. Lack of resources, absence of training and support from management, and workload were the main barriers to implementation. Adequate resources, training and the identification of those at risk without stereotyping were pointed as the main facilitators. This review will update the Johnson *et al* review, employ a more comprehensive search strategy, and have an international focus.

Our review will also be theoretically informed as it is important to understand how identified barriers and facilitators fit with theoretical understandings of behaviour change in order to inform the design of implementation interventions that may have a higher chance of successfully changing practitioner behaviour. There are many theories of behaviour change, though with considerable overlap between them, and striking differences in terminology, definitions and key constructs.⁴³ Several frameworks have been proposed to overcome these limitations including⁴³⁻⁴⁶ the Behaviour Change Wheel (BCW), which is comprehensive, coherent and widely used. The BCW is linked to an overarching model of behaviour and can be further expanded by the Theoretical Domains Framework (TDF), which was derived from an analysis of 33 theories of behaviour change, and comprises fourteen domains consisting of 84 component constructs of behaviour change.⁴⁷ This review will therefore analyse the identified barriers and facilitators using the BCW/TDF system as outlined further in the methods section below.

OBJECTIVE

This review aims to identify factors influencing general practitioners/family physicians' and primary care nurses' routine delivery of alcohol screening and brief interventions in adults. The specific research questions we will address are:

1. What are the barriers to routine delivery of alcohol screening and brief interventions by general practitioners/family physicians and nurses in primary care settings?
2. What factors help to facilitate routine delivery of alcohol screening and brief interventions by general practitioners/family physicians and nurses in primary care settings?
3. How do the identified barriers and facilitators map to the BCW/TDF frameworks?

MATERIAL AND METHODS

The review methods are outlined here in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) statement^{48,49} [see Appendix 1 (PRISMA-P Checklist): <https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/9753/5312>].

Inclusion and exclusion criteria

Study designs. Studies with abstracts published in a peer-reviewed scientific journal which report primary data will be included; studies without abstracts and studies published as conference abstracts will be excluded. If more than one publication describing a single study and presenting the same data is found, then only the most recent publication will be included. The review will consider quantitative and qualitative studies. Quantitative studies will be included if they are randomized controlled trials, before-after studies with no control group, cohort, case-control, or

cross-sectional studies. Qualitative studies will be included if they use Delphi methodology, focus groups, in-depth interviews, or semi-structured interviews.

Participants. Studies will be included if the participants include general practitioners/family physicians or nurses working in primary care practices. 'Primary care practices' will be defined as follows, adapted from the definition of the American Academy of Family Physicians.⁵⁰ Primary care practices typically serve as the patient's first point of entry into the health care system and provide services such as health promotion, disease prevention, health maintenance, counselling, patient education, diagnosis and treatment of acute and chronic illnesses. Primary care practices are generally located in the community of the patients, thereby facilitating access to healthcare. The structure of the primary care practice may include a team of physicians and other health professionals.

Studies relating only to medical practitioners other than general practitioners/family physicians will be excluded. Studies relating only to medical practitioners or nurses not working in primary care practices, or only to other professionals working in primary care will also be excluded.

Interventions. The targeted intervention will be the implementation of activities aiming to reduce alcohol consumption, conducted in primary care practices, and defined as follows:

- a) early identification of patients who drink at a level deemed to merit intervention as defined by the authors;
- b) brief interventions, defined as one to four sessions of a structured conversation (e.g. 5 - 30 minutes each) about alcohol with patients from a).

Outcomes. The outcomes of interest in this review are barriers and facilitators potentially influencing the implementation of screening and brief interventions for alcohol use. Studies will be included if they report from primary data at least one clearly defined barrier or facilitator potentially influencing the implementation of the interventions as defined above. In this review, barriers are clearly defined factors that decrease the probability of the implementation of the intervention by general practitioners/family physicians or nurses working in primary care practices. Facilitators are clearly defined factors that increase the probability of the implementation of the intervention by general practitioners/family physicians or nurses working in primary care practices.

Studies will be excluded if they report on: implementation barriers and/or facilitators for patients with conditions that present rarely to primary care providers; factors influencing implementation on populations with specific co-morbidities such as HIV, autoimmune diseases, psychosis, personality disorders, post-traumatic stress or major anxiety disorders, dementia (list not exhaustive) and; factors influencing the implementation of the intervention on people who are less than 18 years of age, or in which this age group is included and no clear distinction can be made between the barriers to implementation in this age group and those aged 18 or above.

Setting. The intervention must be offered in a primary care practice (as defined above). All other settings will be excluded.

Language. Studies will be included if they are reported in any of the following languages: English, French, Spanish, and Portuguese. Studies in other languages will be excluded.

Information sources and search strategy

The following electronic databases will be searched, from onset of literature database until May 2016, for studies meeting the inclusion criteria stated above: MEDLINE, CINAHL, Cochrane Central Register of Controlled Trials (CENTRAL), and PsycINFO. The search strategy will be developed with a health information specialist (KA), based on a list of relevant keywords identified from an exploratory search of the literature and by exploring the Medical Subject Headings (MeSH terms) of the US National Library of Medicine. The final search will be performed by KA, after adapting the MEDLINE strategy to the syntax of the other databases [see Appendix 2 (Search strategy): <https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/9753/5313>]. To ensure literature saturation, we will scan the reference lists of relevant systematic reviews and meta-analysis identified through the search for potentially eligible papers.

Data management and study selection

The results of the literature search will be uploaded to Reference Manager Version 10 software. One reviewer will scan the titles and/or abstracts to eliminate duplicate results. Next, two reviewers will independently screen titles and abstracts of identified references. Studies will be excluded if they: 1) do not have a title and an abstract; 2) are not peer-reviewed and published in an academic journal in the public domain; 3) are not published in one of the following languages: English, French, Spanish, or Portuguese; 4) do not focus on alcohol; 5) do not have a qualitative or quantitative methodology as defined above; 6) do not focus on the implementation of the intervention as defined above in the general primary care adult population or; 7) do not focus on barriers and/or facilitators reported by general practitioners/family physicians or nurses working in primary care practice. Disagreements will be resolved through consensus. If consensus cannot be reached, a third reviewer will be contacted. Full text copies of all studies meeting inclusion criteria and of those with unclear eligibility based on title and abstract will be sought and the selection process repeated. Reasons for excluding papers from the analysis will be recorded in a table describing the characteristics of the studies excluded. Reviewers will not be blinded for any aspect of the studies identified and selected. This review will be reported in accordance with the PRISMA guidelines which will include a flow diagram (Fig. 1) and a table detailing the studies selected.⁵¹⁻⁵²

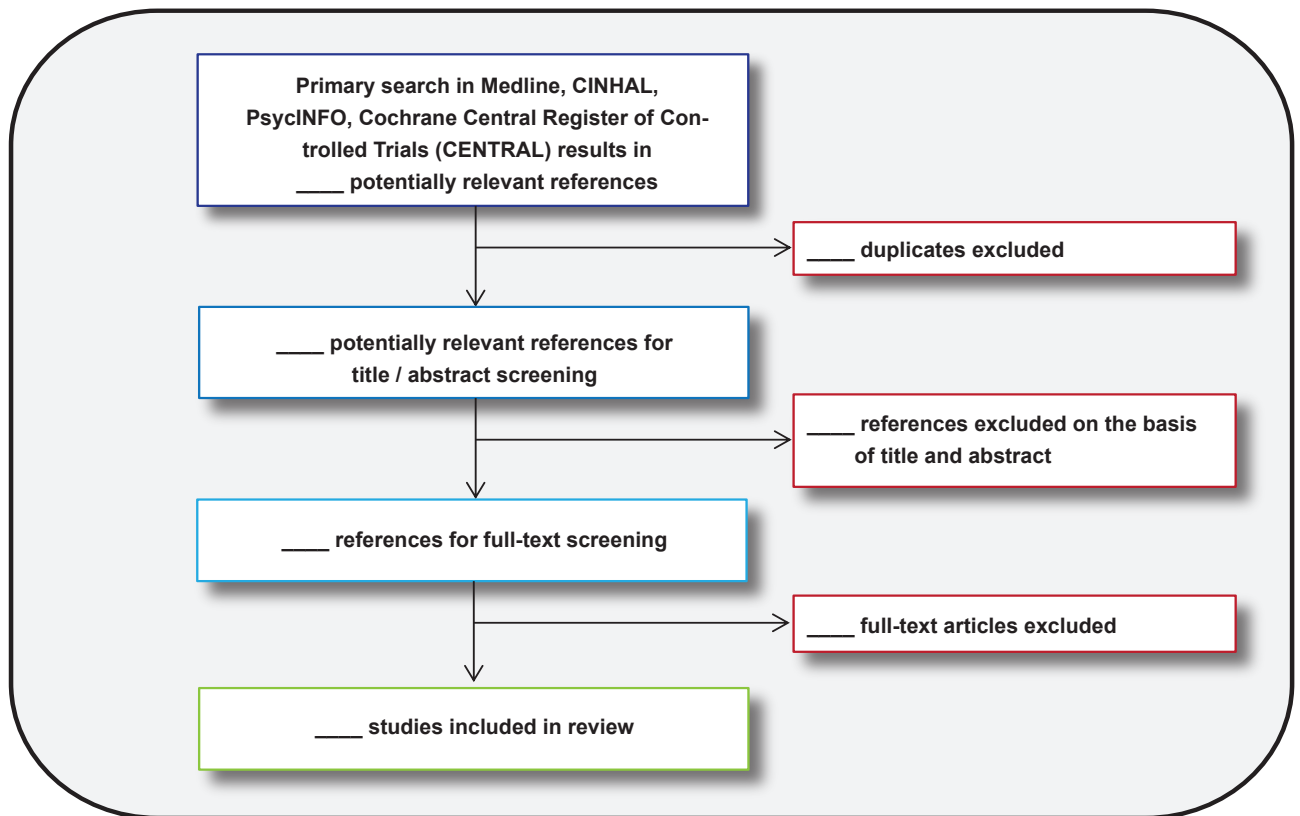


Figure 1 – Flow diagram of screening process

Data extraction

Two authors will independently extract data to a data extraction form specifically designed for this review and later entered into a Microsoft Excel sheet. Disagreements will be resolved as described above.

Studies will be grouped according to whether they are quantitative or qualitative. Data to be extracted will include: first author; year of publication; title; country of origin; language of publication; main objective of the study; study design; study sample (sampling strategy, type and number of care providers, response/attrition rate); operational definition of identified barriers and facilitators studied; main results; relation with outcomes or process variables in intervention studies.

Assessment of methodological quality

To inform our synthesis of the evidence a critical appraisal of the validity of the included qualitative and quantitative studies will be conducted. Two reviewers will independently assess the methodological quality of the studies selected for the systematic review. Disagreements will be resolved through consensus. If consensus cannot be reached, a third reviewer will be contacted.

Quantitative studies will be appraised with the NIH National Heart, Lung, and Blood Institute quality assessment tools for controlled intervention studies, before-after (pre-post) studies with no control group, observational cohort and cross-sectional studies and case-controlled studies.⁵³ The quality of qualitative studies will be assessed with the critical appraisal skills program (CASP) qualitative

research checklist.⁵⁴ As this review will consider quantitative and qualitative studies, we will additionally appraise all selected studies as recommended by the Supplementary Guidance for Inclusion of Qualitative Research in Cochrane Systematic Reviews of Interventions.⁵⁵

Data synthesis

The review will start by reporting the results of the literature searched. PRISMA flowcharts and tables will be used to present reasons for inclusion and exclusion, as well as to describe the methodology of studies included. Next, a descriptive analysis of the barriers and facilitators extracted from the studies selected will be conducted. The classification of the retained factors will be achieved through consensus between two independent research team members. If any disagreement persists a third member of the research team will be contacted. The results of the review will be reported in a table and a narrative synthesis of the findings will be provided, structured around the barriers and facilitators identified, the professional group, the population target group, and the alcohol related intervention (detection/advice/follow up). The barriers and facilitators will be further analysed using the BCW/TDF framework. Due to the nature of the review, we do not anticipate conducting a meta-analysis.

DISCUSSION

This systematic review will describe the barriers and facilitators for implementing alcohol screening and brief interventions by general practitioners/family physicians

and nurses in primary care practices. Knowing the factors influencing the implementation of alcohol screening and brief advice in primary care is important for designing effective implementation programs. By mapping the barriers and facilitators to the domains of the BCW/TDF framework, this review will also provide implementation researchers with a useful tool for selecting promising practitioner-oriented behavioural interventions for improving alcohol screening and brief intervention. If possible, we will use this approach to analyse if the barriers and facilitators suggest gaps in current theory and/or if there are current theoretical concepts not reflected in the literature.

Due to the mixed methods in the studies under review, and our emphasis on identifying, rather than quantifying, the impact of specific barriers and facilitators, data will not be pooled quantitatively or meta-analysed. For the same reason, studies will not be excluded based on their quality, but the quality of the included studies will be assessed to enable those using the findings to better understand and assess the value of the findings from each study and overall.

CONCLUSION

This review will identify gaps in empirical and theoretical understanding about the barriers and facilitators of the delivery of alcohol SBI in primary care practices. The findings will be of interest to those designing, commissioning or implementing interventions to promote such interventions in primary care, including training. It will also help to open one of the 'black boxes' that has been identified as meriting further investigation in relation to alcohol SBI: "what should primary care clinicians say and how should they say it when addressing alcohol consumption with patients; and secondly, what training do they need to enable them to do so effectively?"⁵⁶ Randomized controlled trials investigating the effectiveness

of interventions need to address barriers and facilitators to recruit primary care practitioners and ensure they deliver the interventions under study; those investigating training should be designing the training based on the best available evidence. A comprehensive and up to date understanding of the barriers and facilitators relating to alcohol SBI delivery is therefore important for both research and practice in this field.

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PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

CONFLICTS OF INTEREST

None.

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PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

Section/topic	#	Checklist item	Information reported		Page
			Yes	No	
ADMINISTRATIVE INFORMATION					
Title					
Identification	1a	Identify the report as a protocol of a systematic review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	45
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable
Registration	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	<input checked="" type="checkbox"/>	<input type="checkbox"/>	45
Authors					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	<input checked="" type="checkbox"/>	<input type="checkbox"/>	45
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable
Support					
Sources	5a	Indicate sources of financial or other support for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	49
Sponsor	5b	Provide name for the review funder and/or sponsor	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	<input checked="" type="checkbox"/>	<input type="checkbox"/>	46
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	46

Section/topic	#	Checklist item	Information reported		Page
			Yes	No	
METHODS					
Eligibility criteria	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	46-47
Information sources	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	47
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Appendix 2
STUDY RECORDS					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	47
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	47-48
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	<input checked="" type="checkbox"/>	<input type="checkbox"/>	48
Data items	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	48
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	<input checked="" type="checkbox"/>	<input type="checkbox"/>	47-48
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	<input checked="" type="checkbox"/>	<input type="checkbox"/>	48
DATA					
Synthesis	15a	Describe criteria under which study data will be quantitatively synthesized	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., I^2 , Kendall's tau)	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	48
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	<input checked="" type="checkbox"/>	<input type="checkbox"/>	48

Section/topic	#	Checklist item	Information reported		Page
			Yes	No	
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable

Additional File 2 – Electronic search strategy for the retrieval of studies from multiple databases

Databases	Search strategy
Medline search strategy search = ___	<ol style="list-style-type: none"> 1 advice.tw. 2 Attitude of Health Personnel/ 3 (behavio?r* adj1 chang*).tw. 4 (brief adj advice).tw. 5 (brief adj intervention*).tw. 6 Cognitive Therapy/ 7 (cognitive adj therap*).tw. 8 Counseling/ 9 counsel*.tw. 10 detection.tw. 11 exp Directive Counseling/ 12 (early adj1 identif*).tw. 13 (early adj1 intervention*).tw. 14 Health Communication/ 15 Health Promotion/ 16 identification.tw. 17 implementation.tw. 18 Interviews as Topic/ 19 Mass Screening/ 20 Medical History Taking/ 21 (minimal adj intervention*).tw. 22 (motivat* adj intervention*).tw. 23 (motivat* adj interview*).tw. 24 Patient Education as Topic/ 25 Physician-Patient Relations/ 26 Nurse-Patient Relations/ 27 Physician's Practice Patterns/ 28 Physician's Role/ 29 Practice Patterns, Nurses'/ 30 Practice Patterns, Physicians'/ 31 exp Psychotherapy/ 32 Nurse's Role/ 33 screening.tw. 34 Secondary Prevention/ 35 (secondary adj prevention).tw. 36 Substance Abuse Detection/ 37 "Surveys and Questionnaires"/ 38 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 39 abuse.tw. 40 addiction.tw.

- 41 (alcohol* adj1 dependen*).tw.
- 42 exp Alcohol drinking/
- 43 (alcohol* adj1 drinking).tw.
- 44 (alcohol* adj2 problem*).tw.
- 45 Alcohol-Induced Disorders/
- 46 Alcohol-Related Disorders/
- 47 Alcoholic Intoxication/
- 48 alcoholism.tw.
- 49 Alcoholism/
- 50 (at-risk adj1 drink*).tw.
- 51 Binge Drinking/
- 52 (bing* adj drink*).tw.
- 53 dependence.tw.
- 54 drinker*.tw.
- 55 Drinking Behavior/
- 56 (drink* adj behavio?r*).tw.
- 57 Drinking/
- 58 (excessiv* adj1 drink*).tw.
- 59 (harmful* adj1 drink*).tw.
- 60 (hazardous adj1 drink*).tw.
- 61 misus*.tw.
- 62 (problem* adj1 drink*).tw.
- 63 (risk* adj1 drink*).tw.
- 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or
- 64 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or
- 61 or 62 or 63
- 65 Education, medical/
- 66 Education, medical, continuing/
- 67 Education, nursing/
- 68 Education, nursing, continuing/
- 69 (family adj doctor*).tw.
- 70 (family adj medicine).tw.
- 71 Family Nurse Practitioners/
- 72 Family Practice/
- 73 (family adj practice*).tw.
- 74 General Practice/
- 75 (general adj practice*).tw.
- 76 General Practitioners/
- 77 (general adj practitioner*).tw.
- 78 Health Personnel/ed [Education]
- 79 Nurses/
- 80 Nurse Practitioners/
- 81 (practice adj nurse*).tw.
- 82 Physicians, Primary Care/
- 83 Physicians, Family/

CINAHL search strategy search = ___

- 84 Physicians/
- 85 Primary Health Care/
- 86 (primary adj care).tw.
- 87 (primary adj health*).tw.
- 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or
- 88 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87
- 89 38 and 64 and 88
- 1 TI (advice) OR AB (advice)
- 2 (MH "Attitude of Health Personnel") OR (MH "Physician Attitudes") OR (MH "Nurse Attitudes")
- 3 TI (behavio#r* N1 chang*) OR AB (behavio#r* N1 chang*)
- 4 TI (brief N1 advice) OR AB (brief N1 advice)
- 5 TI (brief N1 intervention*) OR AB (brief N1 intervention*)
- 6 (MH "Cognitive Therapy")
- 7 TI (cognitive N1 therap*) OR AB (cognitive N1 therap*)
- 8 (MH "Counseling")
- 9 TI (counsel*) OR AB (counsel*)
- 10 TI (detection) OR AB (detection)
- 11 TI (early N1 identif*) OR AB (early N1 identif*)
- 12 TI (early N1 intervention*) OR AB (early N1 intervention*)
- 13 (MH "Health Promotion")
- 14 TI (identification) OR AB (identification)
- 15 TI (implementation) OR AB (implementation)
- 16 (MH "Interviews+")
- 17 (MH "Health Screening+")
- 18 (MH "Patient Assessment") OR (MH "Nursing Assessment")
- 19 (MH "Patient History Taking")
- 20 TI (minimal N1 intervention*) OR AB (minimal N1 intervention*)
- 21 TI (motivat* N1 intervention*) OR AB (motivat* N1 intervention*)
- 22 TI (motivat* N1 interview*) OR AB (motivat* N1 interview*)
- 23 (MH "Motivational Interviewing")
- 24 (MH "Patient Education")
- 25 (MH "Professional-Patient Relations") OR (MH "Physician-Patient Relations")
- 26 MH "Nurse-Patient Relations"
- 27 (MH "Physician's Role")
- 28 (MH "Practice Patterns")
- 29 (MH "Psychotherapy+")
- 30 (MH "Nursing Role")
- 31 TI (screening) OR AB (screening)
- 32 (MH "Recurrence/PC")
- 33 TI (secondary N1 prevention) OR AB (secondary N1 prevention)
- 34 (MH "Substance Abuse Detection+")
- 35 (MH "Surveys") OR (MH "Questionnaires+")

- 36 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35
- 37 TI (abuse) OR AB (abuse)
- 38 TI (addiction) OR AB (addiction)
- 39 TI (alcohol* N1 dependen*) OR AB (alcohol* N1 dependen*)
- 40 (MH "Alcohol Abuse")
- 41 (MH "Alcohol Drinking+")
- 42 TI (alcohol* N1 drinking) OR AB (alcohol* N1 drinking)
- 43 TI (alcohol* N2 problem*) OR AB (alcohol* N2 problem*)
- 44 (MH "Alcohol-Induced Disorders, Nervous System")
- 45 (MH "Alcohol-Related Disorders+")
- 46 (MH "Alcoholic Intoxication+")
- 47 (MH "Alcoholics")
- 48 TI (alcoholism) OR AB (alcoholism)
- 49 (MH "Alcoholism")
- 50 TI (at-risk N1 drink*) OR AB (at-risk N1 drink*)
- 51 (MH "Binge Drinking")
- 52 TI (bing* N1 drink*) OR AB (bing* N1 drink*)
- 53 TI (dependence) OR AB (dependence)
- 54 TI (drinker*) OR AB (drinker*)
- 55 MH (Drinking Behavior)
- 56 TI (drink* N1 behavio#r*) OR AB (drink* N1 behavio#r*)
- 57 TI (excessiv* N1 drink*) OR AB (excessiv* N1 drink*)
- 58 TI (harmful* N1 drink*) OR AB (harmful* N1 drink*)
- 59 TI (hazardous N1 drink*) OR AB (hazardous N1 drink*)
- 60 TI (misus*) OR AB (misus*)
- 61 TI (problem* N1 drink*) OR AB (problem* N1 drink*)
- 62 TI (risk* N1 drink*) OR AB (risk* N1 drink*)
- 63 S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60 OR S61 OR S62
- 64 (MH "Education, Medical+")
- 65 (MH "Education, Medical, Continuing")
- 66 (MH "Education, Nursing+")
- 67 (MH "Education, Nursing, Continuing")
- 68 TI (family N1 doctor*) OR AB (family N1 doctor*)
- 69 TI (family N1 medicine) OR AB (family N1 medicine)
- 70 (MH "Family Nurse Practitioners")
- 71 (MH "Family Practice")
- 72 TI (family N1 practice*) OR AB (family N1 practice*)
- 73 TI (general N1 practice*) OR AB (general N1 practice*)
- 74 TI (general N1 practitioner*) OR AB (general N1 practitioner*)
- 75 (MH "Health Personnel/ED")
- 76 (MH "Nurses")

PsycINFO search strategy search = ___

- 77 (MH "Nurse Practitioners+")
- 78 TI (practice N1 nurse*) OR AB (practice N1 nurse*)
- 79 (MH "Physicians, Family")
- 80 (MH "Physicians")
- 81 (MH "Primary Health Care")
- 82 TI (primary N1 care) OR AB (primary N1 care)
- 83 TI (primary N1 health*) OR AB (primary N1 health*)
- 84 S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74 OR S75 OR S76 OR S77 OR S78 OR S79 OR S80 OR S81 OR S82 OR S83
- 85 S36 AND S63 AND S84
- 1 TI (advice) OR AB (advice)
- 2 (DE "Health Personnel Attitudes")
- 3 TI (behavio#r* N1 chang*) OR AB (behavio#r* N1 chang*)
- 4 TI (brief N1 advice) OR AB (brief N1 advice)
- 5 TI (brief N1 intervention*) OR AB (brief N1 intervention*)
- 6 (DE "Cognitive Therapy")
- 7 TI (cognitive N1 therap*) OR AB (cognitive N1 therap*)
- 8 (DE "Counseling")
- 9 TI (counsel*) OR AB (counsel*)
- 10 TI (detection) OR AB (detection)
- 11 TI (early N1 identif*) OR AB (early N1 identif*)
- 12 TI (early N1 intervention*) OR AB (early N1 intervention*)
- 13 (DE "Health Promotion")
- 14 TI (identification) OR AB (identification)
- 15 TI (implementation) OR AB (implementation)
- 16 (DE "Interviews") OR (DE "Interview Schedules")
- 17 DE "Health Screening" OR DE "Physical Examination"
- 18 (DE "Patient History")
- 19 TI (minimal N1 intervention*) OR AB (minimal N1 intervention*)
- 20 TI (motivat* N1 intervention*) OR AB (motivat* N1 intervention*)
- 21 TI (motivat* N1 interview*) OR AB (motivat* N1 interview*)
- 22 (DE "Motivational Interviewing")
- 23 (DE "Client Education")
- 24 (DE "Therapeutic Processes")
- 25 (DE "Professional Role")
- 26 (DE "Health Care Delivery")
- 27 (DE "Psychotherapy" OR DE "Adlerian Psychotherapy" OR DE "Adolescent Psychotherapy" OR DE "Affirmative Therapy" OR DE "Analytical Psychotherapy" OR DE "Autogenic Training" OR DE "Behavior Therapy" OR DE "Brief Psychotherapy" OR DE "Brief Relational Therapy" OR DE "Child Psychotherapy" OR DE "Client Centered Therapy" OR DE "Cognitive Behavior Therapy" OR DE "Conversion Therapy" OR DE "Eclectic Psychotherapy" OR DE "Emotion Focused Therapy" OR DE "Existential Therapy" OR DE "Experiential Psychotherapy" OR DE "Expressive Psychotherapy")

OR DE "Eye Movement Desensitization Therapy" OR DE "Feminist Therapy" OR DE "Geriatric Psychotherapy" OR DE "Gestalt Therapy" OR DE "Group Psychotherapy" OR DE "Guided Imagery" OR DE "Humanistic Psychotherapy" OR DE "Hypnotherapy" OR DE "Individual Psychotherapy" OR DE "Insight Therapy" OR DE "Integrative Psychotherapy" OR DE "Interpersonal Psychotherapy" OR DE "Logotherapy" OR DE "Narrative Therapy" OR DE "Network Therapy" OR DE "Persuasion Therapy" OR DE "Primal Therapy" OR DE "Psychoanalysis" OR DE "Psychodrama" OR DE "Psychodynamic Psychotherapy" OR DE "Psychotherapeutic Counseling" OR DE "Rational Emotive Behavior Therapy" OR DE "Reality Therapy" OR DE "Relationship Therapy" OR DE "Solution Focused Therapy" OR DE "Supportive Psychotherapy" OR DE "Transactional Analysis")

28 TI (screening) OR AB (screening)

29 (DE "Relapse Prevention")

30 TI (secondary N1 prevention) OR AB (secondary N1 prevention)

31 DE "Drug Usage Screening"

32 DE "Questionnaires" OR DE "General Health Questionnaire" OR DE "Surveys"

33 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32

34 TI (abuse) OR AB (abuse)

35 TI (addiction) OR AB (addiction)

36 TI (alcohol* N1 dependen*) OR AB (alcohol* N1 dependen*)

37 DE "Alcohol Abuse"

38 DE "Alcohol Drinking Patterns" OR DE "Social Drinking"

39 TI (alcohol* N1 drinking) OR AB (alcohol* N1 drinking)

40 TI (alcohol* N2 problem*) OR AB (alcohol* N2 problem*)

41 (DE "Alcoholic Psychosis" OR DE "Alcoholic Hallucinosi") OR DE "Fetal Alcohol Syndrome" OR DE "Cirrhosis (Liver)")

42 DE "Alcohol Intoxication" OR DE "Chronic Alcoholic Intoxication" OR DE "Acute Alcoholic Intoxication"

43 TI (alcoholism) OR AB (alcoholism)

44 DE "Alcoholism"

45 TI (at-risk N1 drink*) OR AB (at-risk N1 drink*)

46 DE "Binge Drinking"

47 TI (bing* N1 drink*) OR AB (bing* N1 drink*)

48 TI (dependence) OR AB (dependence)

49 TI (drinker*) OR AB (drinker*)

50 DE "Drinking Behavior"

51 TI (drink* N1 behavio#r*) OR AB (drink* N1 behavio#r*)

52 TI (excessiv* N1 drink*) OR AB (excessiv* N1 drink*)

53 TI (harmful* N1 drink*) OR AB (harmful* N1 drink*)

54 TI (hazardous N1 drink*) OR AB (hazardous N1 drink*)

55 TI (misus*) OR AB (misus*)

56 TI (problem* N1 drink*) OR AB (problem* N1 drink*)

57 TI (risk* N1 drink*) OR AB (risk* N1 drink*)
 58 S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42
 OR S43 OR S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR
 S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57
 59 DE "Medical Education" OR DE "Medical Internship" OR DE
 "Medical Residency" OR DE "Psychiatric Training"
 60 DE "Continuing Education"
 61 DE "Nursing Education"
 62 TI (family N1 doctor*) OR AB (family N1 doctor*)
 63 TI (family N1 medicine) OR AB (family N1 medicine)
 64 TI (family N1 practice*) OR AB (family N1 practice*)
 65 TI (general N1 practice*) OR AB (general N1 practice*)
 66 DE "General Practitioners"
 67 TI (general N1 practitioner*) OR AB (general N1 practitioner*)
 68 (DE "Nurses")
 69 TI (practice N1 nurse*) OR AB (practice N1 nurse*)
 70 (DE "Family Physicians")
 71 DE "Physicians"
 72 DE "Primary Health Care"
 73 TI (primary N1 care) OR AB (primary N1 care)
 74 TI (primary N1 health*) OR AB (primary N1 health*)
 75 S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67
 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74
 76 S33 AND S58 AND S75

CENTRAL search strategy search = ___

- 1 "advice" in Trials
- 2 MeSH descriptor: [Attitude of Health Personnel] this term only
- 3 (behavio*r* near/1 chang*) in Trials
- 4 (brief near/1 advice) in Trials
- 5 (brief near/1 intervention*) in Trials
- 6 MeSH descriptor: [Cognitive Therapy] this term only
- 7 (cognitive near/1 therap*) in Trials
- 8 MeSH descriptor: [Counseling] this term only
- 9 (counsel*) in Trials
- 10 (detection) in Trials
- 11 MeSH descriptor: [Directive Counseling] explode all trees
- 12 (early near/1 identif*) in Trials
- 13 (early near/1 intervention*) in Trials
- 14 MeSH descriptor: [Health Communication] this term only
- 15 MeSH descriptor: [Health Promotion] this term only
- 16 (identification) in Trials
- 17 (implementation) in Trials
- 18 MeSH descriptor: [Interviews as Topic] this term only
- 19 MeSH descriptor: [Mass Screening] this term only
- 20 MeSH descriptor: [Medical History Taking] this term only
- 21 (minimal near/1 intervention*) in Trials
- 22 (motivat* near/1 intervention*) in Trials

- 23 (motivat* near/1 interview*) in Trials
- 24 MeSH descriptor: [Patient Education as Topic] this term only
- 25 MeSH descriptor: [Physician-Patient Relations] this term only
- 26 MeSH descriptor: [Nurse-Patient Relations] this term only
- 27 MeSH descriptor: [Practice Patterns, Physicians'] this term only
- 28 MeSH descriptor: [Physician's Role] this term only
- 29 MeSH descriptor: [Practice Patterns, Nurses'] this term only
- 30 MeSH descriptor: [Nurse's Role] this term only
- 31 MeSH descriptor: [Psychotherapy] explode all trees
- 32 (screening) in Trials
- 33 MeSH descriptor: [Secondary Prevention] this term only
- 34 (secondary near/1 prevention) in Trials
- 35 MeSH descriptor: [Substance Abuse Detection] this term only
- 36 MeSH descriptor: [Surveys and Questionnaires] this term only
- 37 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 in Trials
- 38 (abuse) in Trials
- 39 (addiction) in Trials
- 40 (alcohol* near/1 dependen*) in Trials
- 41 MeSH descriptor: [Alcohol Drinking] explode all trees
- 42 (alcohol* near/1 drinking) in Trials
- 43 (alcohol* near/2 problem*) in Trials
- 44 MeSH descriptor: [Alcohol-Induced Disorders] this term only
- 45 MeSH descriptor: [Alcohol-Related Disorders] this term only
- 46 MeSH descriptor: [Alcoholic Intoxication] this term only
- 47 (alcoholism) in Trials
- 48 MeSH descriptor: [Alcoholism] this term only
- 49 (at-risk near/1 drink*) in Trials
- 50 MeSH descriptor: [Binge Drinking] this term only
- 51 (bing* near/1 drink*) in Trials
- 52 (dependence) in Trials
- 53 (drinker*) in Trials
- 54 MeSH descriptor: [Drinking Behavior] this term only
- 55 (drink* near/1 behavio*r*) in Trials
- 56 MeSH descriptor: [Drinking] this term only
- 57 (excessiv* near/1 drink*) in Trials
- 58 (harmful* near/1 drink*) in Trials
- 59 (hazardous near/1 drink*) in Trials
- 60 (misus*) in Trials
- 61 (problem* near/1 drink*) in Trials
- 62 (risk* near/1 drink*) in Trials
- 63 #38 or #39 or #40 or #41 or #42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 or #50 or #51 or #52 or #53 or #54 or #55 or #56 or #57 or #58 or #59 or #60 or #61 or #62 in Trials

- 64 MeSH descriptor: [Education, Medical] this term only
 - 65 MeSH descriptor: [Education, Medical, Continuing] this term only
 - 66 MeSH descriptor: [Education, Nursing] this term only
 - 67 MeSH descriptor: [Education, Nursing, Continuing] this term only
 - 68 (family near/1 doctor*) in Trials
 - 69 (family near/1 medicine) in Trials
 - 70 MeSH descriptor: [Family Nurse Practitioners] this term only
 - 71 MeSH descriptor: [Family Practice] this term only
 - 72 (family near/1 practice*) in Trials
 - 73 MeSH descriptor: [General Practice] this term only
 - 74 (general near/1 practice*) in Trials
 - 75 MeSH descriptor: [General Practitioners] this term only
 - 76 (general near/1 practitioner*) in Trials
 - 77 MeSH descriptor: [Health Personnel] this term only and with
qualifier(s): [Education - ED]
 - 78 MeSH descriptor: [Nurses] this term only
 - 79 MeSH descriptor: [Nurse Practitioners] this term only
 - 80 (practice near/1 nurse*) in Trials
 - 81 MeSH descriptor: [Physicians, Primary Care] this term only
 - 82 MeSH descriptor: [Physicians, Family] this term only
 - 83 MeSH descriptor: [Physicians] this term only
 - 84 MeSH descriptor: [Primary Health Care] this term only
 - 85 (primary near/1 care) in Trials
 - 86 (primary near/1 health*) in Trials
 - 87 #64 or #65 or #66 or #67 or #68 or #69 or #70 or #71 or #72 or
#73 or #74 or #75 or #76 or #77 or #78 or #79 or #80 or #81 or
#82 or #83 or #84 or #85 or #86 in Trials
 - 88 #37 and #63 and #87 in Trials
-