Interventions to reduce alcohol consumption and alcohol related harm associated with sports settings: systematic review protocol

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2011-000645
Article Type:	Protocol
Date Submitted by the Author:	18-Nov-2011
Complete List of Authors:	Kingsland, Melanie; The University of Newcastle; Hunter New England Population Health Wiggers, John; The University of Newcastle; Hunter New England Population Health Wolfenden, Luke; New South Wales Cancer Institute; The University of Newcastle
Primary Subject Heading:	Public health
Secondary Subject Heading:	Public health, Sports & exercise medicine
Keywords:	PUBLIC HEALTH, SPORTS MEDICINE, PREVENTIVE MEDICINE

INTERVENTIONS TO REDUCE ALCOHOL CONSUMPTION AND ALCOHOL RELATED HARM ASSOCIATED WITH SPORTS SETTINGS: SYSTEMATIC REVIEW PROTOCOL

Melanie Kingsland,[1,2] John H Wiggers,[1,2] Luke Wolfenden.[1,3]

[1]School of Medicine and Public Health, The University of Newcastle, Callaghan, New South Wales, 2308, Australia

[2]Hunter New England Population Health, Locked Bag 10, Wallsend, New South Wales, 2287, Australia

[3]NSW Cancer Institute, Australian Technology Park, Level 9, 8 Central Avenue, Eveleigh, New South Wales, 2015, Australia

Corresponding author:

Name: Melanie Kingsland

Postal address: Hunter New England Population Health, Locked Bag 10, Wallsend, New South Wales, 2287, Australia

E-mail: melanie.kingsland@hnehealth.nsw.gov.au

Telephone: +61 2 49246380 Fax: +61 2 49246215

Key words: alcohol drinking, sports, review, intervention studies

Word count: 2453

ABSTRACT

Introduction

Alcohol consumption is a primary cause of physical, psychological and social harm to both the user and to others. At both the professional and non-professional level, sports players and fans report consuming alcohol at greater levels than people not involved in sports. Limited systematic reviews have been conducted assessing interventions targeting alcohol consumption behaviour and related harms in the sporting context.

Methods and analysis

The review aims to determine if interventions implemented in the sport setting decrease alcohol consumption and related harms. Participants may include all persons regardless of age or other characteristics. Studies will be included which have implemented interventions within the sport setting and have either measured: alcohol consumption, excessive alcohol consumption or intoxication, or alcohol-related injury or violence. Randomised controlled trials, staggered enrolment trials, stepped-wedged trials, quasi-randomised trials, quasi-experimental trials and natural experiments will be included. Studies without a parallel comparison group and studies that are not published or are not in press will be excluded. Data will be sourced from a range of electronic databases and sources of grey-literature.

Two authors will independently screen all titles and abstracts of papers identified through the search strategy. Two authors will independently examine the full text of all remaining papers to determine eligibility. Two authors will independently extract data from eligible studies and independently assess risk of bias by assessing the adequacy of study characteristics.

Where studies are sufficiently homogeneous, trial results will be synthesised using a fixed-effects meta-analysis. Standardised mean differences will be used for continuous outcomes and risk ratios will be used for binary outcomes.

Dissemination

The findings of this study will be disseminated widely through mechanisms including peer-reviewed publications and conference presentations.

INTRODUCTION

Rationale

Alcohol consumption is a primary cause of physical, psychological and social harm to both the user and to others.[1, 2] Alcohol consumption that is linked to short term harm most frequently occurs in licensed venues (such as clubs and bars),[3-6] in workplaces[7] and in private homes[3-5] and occurs with greater prevalence amongst particular population groups, including people involved in sports. At both the professional (or elite) level and non-professional level, both sports players and fans have reported consuming alcohol at greater levels than people not involved in sports.[8-14]

A settings-based approach to health promotion[15] has been widely used to target alcohol consumption behaviour in licensed premises.[16-18] Such approaches have a basis in ecological and social ecological theories of health promotion,[19-21] which recognise the importance of the physical, social and cultural environment in health risk behaviours such as alcohol consumption. Given the prevalence of at risk consumption among sports players and fans, interventions targeting alcohol consumption at sporting settings may represent an effective strategy in mitigating the adverse effects of excessive alcohol consumption.

To our knowledge, to date, only one systematic review has been conducted assessing interventions targeting health behaviour change in the sporting context.[22] However, this review only examined policy interventions and focussed on alcohol consumption behaviour, rather than including broader alcohol-related harms such as violence.

Objectives

To determine if interventions implemented in the sport setting are effective relative to a comparison group in:

1. reducing alcohol consumption at the sporting venue and/or overall alcohol consumption; or
2. reducing excessive alcohol consumption or intoxication at the sporting venue and/or overall excessive alcohol consumption or intoxication; or
3. reducing alcohol-related violence or injury at the sporting venue and/or overall alcohol related violence or injury.

METHODS AND ANALYSIS

Eligibility criteria

Study characteristics

Participants

Participants may include people of all ages and may include, but are not limited to: players; fans/spectators; coaches/trainers; sporting club, venue or team management; and sporting club or venue staff or volunteers. There will be no exclusion criteria for participants.

Interventions

Interventions will be included that are implemented in a sporting setting and that primarily aim to modify alcohol consumption behaviour, alcohol-related intoxication, or alcohol-related violence or injury. Interventions that have this as a primary aim, but also aim to modify other health risk behaviours will also be included. Interventions with a treatment focus, such as those aiming to treat alcohol addiction, will be excluded. For the purposes of the review, sport settings will be defined as settings where an organised sporting event or

activity occurs, whether it is a competition game or event, a training session or another type of club or team event at a professional (elite) or non-professional (amateur/community) level. Terms used to refer to such settings may include arenas, stadiums, grounds, complexes or ovals, as used by a particular sport or for general sports use.

Comparisons

Comparisons will be included that are no intervention controls, attention controls or waitlist controls, or that are alternative interventions.

Outcomes

Studies with the following outcome measures will be included:

- alcohol consumption, such as number of drinks consumed or alcohol consumed at excessive/risky levels, as assessed via survey or direct observation;
- alcohol-related intoxication, such as proportion of people intoxicated or average level of intoxication, measured by surveys, observations or biochemical measures; and
- alcohol-related violence or injury, such as number of incidents of alcohol-related assault or number of alcohol-related injuries, measured by surveys, observations, or records kept by police, medical facilities or sporting facilities, which may include incidents that are either self-reported or witnessed.

Study design

Studies with the following study designs will be included:

- randomised controlled trials, including cluster randomised controlled trials;
- staggered enrolment trials[23] or stepped-wedged trials;[24]

- quasi-randomised trials, where group allocation is not purely random, but may be determined by a factor such as birth date;[25, 26]
- quasi-experimental trials with comparison/control groups, including non-randomised pre-post (before-after) trials with one or more intervention and control groups,[27] time-series/interrupted time-series trials (including multiple baseline trials) with independent control groups,[23, 27] preference trials[24] and regression discontinuity trials;[23]
- natural experiment studies that have a comparison group.[28]

Any trials without parallel comparison or control groups will be excluded.

Length of follow-up

There will be no eligibility criteria based on length of follow-up.

Publication characteristics

There will be no eligibility criteria based on year of study publication or language other than that the study must be published in a year that is included in the electronic databases that are searched. Only studies that are published or in press will be included.

Information sources

Electronic databases

The following electronic databases will be searched: the Cochrane Central Registry of Controlled Trials (CENTRAL, The Cochrane Library); MEDLINE; EMBASE; PsychINFO; SPORTDiscus; Dissertations and Theses; ERIC; and PsycEXTRA.

Other sources

Studies will also be obtained from the following sources:

- Reference lists of included studies.
- Hand searching of three relevant journals in the field (volumes from the past 5 years).
- Freely available internet databases including: Alcohol and Alcohol Problems Science Database (Available at: http://etoh.niaaa.nih.gov/); BiblioMap (Available at: http://eppi.ioe.ac.uk/webdatabases/Intro.aspx?ID=7); Lifestyle Information Network (Available at: http://lin.ca/recreation-database); SportScan Article Database (Available at: http://www.ausport.gov.au/information/nsic/catalogue/sportscan_article_database).
- Internet searches engines, such as Google Scholar.
- Corresponding authors of all included trials.

Search strategy

The search strategy for MEDLINE is in Appendix I. This strategy will be applied to the other electronic databases where relevant, with any modifications reported in the review manuscript. Authors will be contacted via email to obtain any studies that are identified through searching other sources.

Study selection

Two review authors will independently screen all titles and abstracts of papers identified as a result of the search documented above. Endnote (version X4.02) will be used for the screening process, with review authors employing a standardised, pre-piloted screening tool to assess study eligibility. The abstracts of papers that are in a language other than English

will be translated using Google Translate and, if considered eligible or eligibility is unclear, professional translation of the full paper will be undertaken. Based on an assessment of paper title and abstract, papers will be excluded which do not meet the eligibility criteria of the review. Two review authors will independently examine the full text of all remaining papers to determine study eligibility. Reasons for study ineligibility will be recorded for all full-text articles and this information will be documented in a table accompanying the published review. For papers where there is insufficient information to determine eligibility, the study authors will be contacted for clarification. If following this process there is still insufficient information to determine trial eligibility, the trial will be excluded from the review, with the reasons for exclusion documented in the published review. Disagreement regarding study eligibility will be attempted to be resolved through discussion between the two reviewers responsible for trial screening. The decision of a third reviewer will determine study eligibility in instances where consensus cannot be reached. Review authors will not be blind to the name or institution of study authors or to journal titles.

Data extraction

Two review authors will independently extract data from eligible studies. A pre-piloted form designed specifically for this review will be used to extract data from eligible studies for assessment of study quality and evidence synthesis. Disagreement regarding data extraction will be attempted to be resolved through discussion between the two reviewers. A third review author will review any papers on which consensus cannot be reached. One review author will transcribe data from data extraction forms into the systematic review software Review Manager (RevMan) and the second review author will check this process. In instances where data is unclear or is not available from the published manuscript, attempt will

be made to contact study authors. Review authors will not be blind to the name or institution of study authors or to journal titles.

Data items

Extracted information will include: authors; study funding and/or other sources of conflicts of interest; study setting (including country, type of sport and level of professionalism); study population and participants demographics (including age, gender and role, such as player or spectator/fan); study design; intervention and control conditions (including number of conditions, content, duration and intensity); trial outcomes and results (including study consent rates and attrition, sample size, number of participants per experimental condition and per cluster if relevant, inter-class coefficients if relevant and results of the primary outcomes described above); and information for assessment of study bias (see below).

Attempts will be made to contact the corresponding authors of included trials in instances where data is unavailable in the published manuscript. Any assumptions or simplifications made in the data extraction or management process due to unavailable information will be documented in the final manuscript.

Assessment of risk of bias

Two review authors will independently assess risk of bias in eligible studies by assessing the adequacy of the following study characteristics, as outlined in the Cochrane Handbook for Systematic Reviews of Interventions: sequence generation; concealment of treatment allocation from participants and research personnel at time of study enrolment; blinding of research personnel (including data collection and analysis personnel) throughout the trial;

completeness of outcome data (including treatment of exclusions, attrition and incomplete data); selective outcome reporting; and any other potential sources of bias.[29]

Disagreement regarding assessment of risk of bias will be attempted to be resolved through discussion between the two reviewers. A third review author will be consulted in cases in which consensus cannot be reached. The level of risk of bias for each of the above-mentioned study characteristics will be presented separately for each study in a table accompanying the published review.

Data analysis

Summary measures

Internationally, there is considerable inter-country variability in the amount of alcohol that defines a standard drink,[30] in guidelines regarding safe levels of alcohol consumption and in the definition of 'at risk' drinking.[30, 31] There is also no standard, recognised definition of intoxication[16] and jurisdictional variability in the classification, measurement and recording of incidents of alcohol-related violence and injury.[32] Furthermore, there are a variety of commonly used survey tools,[33, 34] and observational and biological approaches to the assessment of alcohol consumption and intoxication.[35] As such, it is anticipated that there will be a range of different outcome measures reported across included studies, which may preclude meta-analytical synthesis of the data from these trials.

Nonetheless, outcome data will be included in meta-analyses if appropriate. For assessment of alcohol consumption, attempts will first be made to standardise outcomes reported in included trials to a continuous measure of grams of alcohol consumed, and intervention effect reported in meta-analyses as a mean difference with 95% confidence intervals. Alternatively,

if continuous measures are not able to be standardised to the common metric of grams of alcohol consumed, attempts will be made to pool trials and report intervention effect as a standardised mean difference with 95% confidence intervals. Where possible, risk ratios will be used to measures intervention effect for binary outcomes.

Given the limitations outlined above, it is likely that some outcome measures will not be able to combined in meta-analysis given a lack of standard definitions. Intervention effect for studies reporting such data will be described narratively.

Data synthesis and analysis

Where studies are sufficiently homogeneous and report the same outcome measure, Review Manager (RevMan) will be used to synthesise trial results using a fixed-effects model. If there is unexplained statistical heterogeneity, a random effects model will be utilised. For trials with multiple post intervention follow-up points, data from the most recent follow-up data collection (furthest follow-up point from recruitment) will be utilised. Similarly, intention to treat trial outcome data will be used in preference to data included in less conservative analyses. Attempts will be made to contact authors of trials with any missing data.

Where appropriate, sensitivity analysis will be performed with trials that are considered likely to introduce bias, including trials that have a high rate of participant attrition or other missing data, or that do not report an intention to-treat analysis. Where trial outcome data can not be combined, or significant heterogeneity exists, findings of included trials will be described narratively according to the review objectives.

Issues of clustering

In cluster randomised controlled trials where the effects of clustering have not been adjusted for, adjustments will be made to the standard deviations for the design effect, using either intra-class coefficients provided in study reports (or by contacting authors) or estimates from similar studies.

Assessment of study heterogeneity

Heterogeneity between studies will be assessed using both visual inspection of forest plots and the I^2 statistic. An I^2 value greater than 50% will be considered indicative of substantial heterogeneity and careful consideration will be given to the appropriateness of meta-analysis. In order to identify possible sources of heterogeneity, subgroup analyses will be conducted based on participants, design, interventions, outcomes and study quality (including risk of bias and level of participant drop-out).

Assessment of reporting bias

Funnel plots of eligible studies will be examined to assess any bias that may arise through selective reporting within studies.

Additional analyses

If appropriate, the following exploratory subgroup analyses will be conducted:

1. Interventions targeting different sports.
2. Interventions targeting different sporting participants (such as players or fans/spectators).
3. Interventions targeting professional and non-professional sports.
4. Interventions of varying intensities and timeframes.

Categorical comparisons for subgroup analyses will be developed following inspection of the study characteristics and outcomes reported in the included trials.

ETHICS AND DISSEMINATION

Ethics is not required given this protocol is for a systematic review. The findings of this study will be disseminated widely through mechanisms including peer-reviewed publications and conference presentations.

DISCUSSION

This systematic review will provide a detailed summary of the current state of evidence for the effectiveness of interventions in sports settings that are aimed at reducing alcohol consumption and related harms. Such a review will be of benefit to researchers and policy makers with an interest in reducing alcohol-related problems associated with the sports setting.

AUTHORS' CONTRIBUTIONS

Melanie Kingsland will lead the review. All authors have contributed to the conception of the research and will be involved in the preparation of the review, including providing comment on drafts.

FUNDING STATEMENT

No external sources of funding support.

COMPETING INTERESTS

The authors are currently undertaking a randomised controlled trial of an intervention to decrease excessive alcohol consumption at community sports clubs which may be included in this review. The authors have not received any benefit, in cash or in kind, any hospitality or any subsidy from the alcohol industry or any other source perceived to have an interest in the outcome of this review.

ACKNOWLEDGEMENTS

In developing this protocol, the authors would like to acknowledge the contribution of Debbie Booth from The University of Newcastle who provided guidance regarding the search strategy and to The University of Newcastle, the New South Wales Cancer Institute and Hunter New England Population Health for supporting author salaries.

REFERENCES

1. Nutt DJ, King LA, Phillips LD. Drug harms in the UK: a multicriteria decision analysis. *Lancet* 2010;**376**:1558-1565.
2. World Health Organization. *World Health Organization Expert Committee on Problems Related to Alcohol Consumption*. Geneva:World Health Organization, 2007.
3. Gronkjaer M, Vinther-Larsen M, Curtis T, et al. Alcohol use in Denmark: A descriptive study on drinking contexts. *Addict Res Theory* 2010;**18**:359-370.
4. Hughes K, Anderson Z, Morleo M, et al. Alcohol, nightlife and violence: the relative contributions of drinking before and during nights out to negative health and criminal justice outcomes. *Addiction* 2008;**103**:60-65.
5. Norstrom T. Effects on criminal violence of different beverage types and private and public drinking. *Addiction* 1998;**93**:689-699.

6. Stockwell T, Lang E, Rydon P. High risk drinking settings: the association of serving and promotional practices with harmful drinking. *Addiction* 1993;**88**:1519-1526.

7. Frone MR. Prevalence and distribution of alcohol use and impairment in the workplace: A U.S. national survey. *J Stud Alcohol* 2006;**67**:147-156.

8. Black D, Lawson J, Fleishman S. Excessive alcohol use by non-elite sportsmen. *Drug Alcohol Rev* 1999;**18**:201-205.

9. Leichliter JS, Meilman PW, Presley CA, et al. Alcohol use and related consequences among students with varying levels of involvement in college. *J Am Coll Health* 1998;**46**:257.

10. Martens MP, Dams-O'Connor K, Beck NC. A systematic review of college student-athlete drinking: Prevalence rates, sport-related factors, and interventions. *J Subst Abuse Treat* 2006;**31**:305-316.

11. Nelson TF, Wechsler H. Alcohol and college athletes. *Med Sci Sports Exerc* 2001;**33**:43-47.

12. Nelson TF, Wechsler H. School spirits: Alcohol and collegiate sports fans. *Addict Behav* 2003;**28**:1-11.

13. O'Brien KS, Blackie JM, Hunter JA. Hazardous drinking in elite New Zealand sportspeople. *Alcohol Alcohol* 2005;**40**:239-241.

14. Wechsler H, Davenport AE. Binge drinking, tobacco, and illicit drug use and involvement in college athletics. *J Am Coll Health* 1997;**45**:195.

15. World Health Organisation. *Jakarta Declaration on Leading Health Promotion into the 21st Century*. Geneva:World Health Organisation, 1997.

16. Babor T, Caetano R, Casswell S, et al. *Alcohol: No Ordinary Commodity - Research and Public Policy.* Oxford: Oxford University Press, 2010.

17. Graham K. Preventive interventions for on-premise drinking: a promising but underresearched area of prevention. *Contemp Drug Probl* 2000;**27**:593.

18. National Drug Research Insititute. *Restrictions on the sale and supply of alcohol: evidence and outcomes*. Perth: National Drug Research Insitute, 2007.

19. Stokols D. Establishing and Maintaining Healthy Environments: Toward a Social Ecology of Health Promotion. *Am Psychol* 1992;**47**:6-22.

20. Stokols D. Translating social ecological theory into guidelines for community health promotion. *Am J Health Promot* 1996;**10**:282-298.

21. Green LW, Richard L, Potvin L. Ecological foundations of health promotion. *Am J Health Promot* 1996;**10**:270-281.

22. Priest N, Armstrong R, Doyle J, et al. Policy interventions implemented through sporting organisations for promotiong healthy behaviour change. *Cochrane Database Syst Rev* 2008;**3**:CD004809.

23. Mercer SL, DeVinney BJ, Fine LJ, et al. Study designs for effectiveness and translation research: identifying trade-offs. *Am J Prev Med* 2007;**33**:139-154.

24. *Developing and evaluating complex interventions: new guidance.* www.mrc.ac.uk/complexinterventionsguidance (accessed: September 2011).

25. Battaglia MP, Link MW, Frankel MR, et al. An evaluation of respondent selection methods for household mail surveys. *Public Opin Q* 2008;**72**:459-469.

26. Oldendick RW, Bishop GF, Sorenson SB, et al. A comparison of the Kish and last birthday methods of respondent selection in telephone surveys. *J Off Stat* 1988;**4**:307-318.

27. Nutbeam D, Bauman A. *Evaluation in a Nutshell: A Practical Guide to the Evaluation of Health Promotion Programs*. North Ryde: McGraw-Hill, 2006.

28. Sadish W, Cook T, Campbell D. *Experimental and quasi-experimental designs for generalized causal inference*. New York: Houghton Mifflin Company, 2002.

29. Higgins J, Green S, eds. *Cochrane Handbook for Systematic Reviews of Interventions*. Chichester: John Wiley & Sons, 2009.

30. *International Drinking Guidelines*. http://www.icap.org/PolicyIssues/DrinkingGuidelines/tabid/102/Default.aspx (accessed: November 2011).

31. Dawson DA. Alternative measures and models of hazardous consumption. *J Subst Abuse* 2000;**12**:79-91.

32. World Health Organization. *International Guide for Monitoring Alcohol Consumption and Related Harm*. Geneva: World Health Organization, 2000.

33. Heeb J-L, Gmel G. Measuring alcohol consumption: A comparison of graduated frequency, quantity frequency, and weekly recall diary methods in a general population survey. *Addict Behav* 2005;**30**:403-413.

34. Room R. Measuring drinking patterns: the experience of the last half century. *J Subst Abuse* 2000;**12**:23-31.

35. Harford T. The measurement of alcohol-related accidents. *Addiction* 1993;**88**:907-912.

APPENDIX I: MEDLINE SEARCH STRATEGY

1. exp Sports/
2. sport*.mp.
3. cricket*.mp.
4. netball*.mp.
5. rugby.mp.
6. canoe*.mp.
7. softball.mp.
8. triathl*.mp.
9. water polo.mp.
10. water ski*.mp.
11. australian rules football.mp.
12. surfing.mp.
13. handball.mp.
14. yacht*.mp.
15. rowing.mp.
16. boating.mp.
17. sailing.mp.
18. lawn bowls.mp.
19. bowling.mp.
20. horse racing.mp.
21. harness racing.mp.
22. dog racing.mp.
23. motor sport*.mp.
24. auto sport*.mp.

25. motor racing.mp.

26. auto racing.mp.

27. motorcycl*.mp.

28. car racing.mp.

29. archery.mp.

30. equestrian.mp.

31. shooting.mp.

32. hunting.mp.

33. lacrosse.mp.

34. polo.mp.

35. table tennis.mp.

36. badminton.mp.

37. squash.mp.

38. cycling.mp.

39. Fitness Centers/

40. fitness centre*.mp.

41. gym*.mp.

42. (sport* and (game* or event* or club* or arena* or field* or ground*)).mp.

43. athlet*.mp.

44. player*.mp.

45. spectator*.mp.

46. fan*.mp.

47. (sport* and member*).mp.

48. exp Health Promotion/

49. exp Public Health/

50. Harm Reduction/

51. (harm adj3 minimi*).mp.

52. Health Policy/

53. Public Policy/

54. program*.mp.

55. intervention*.mp.

56. Preventive Medicine/

57. health education/ or consumer health information/ or patient education as topic/

58. environment*.mp.

59. (responsible and (alcohol* or beverage*) and service).mp.

60. server training.mp.

61. server intervention*.mp.

62. enforcement.mp.

63. community action*.mp.

64. community mobili*.mp.

65. (alcohol* and control*).mp.

66. strateg*.mp.

67. exp Alcohol Drinking/

68. alcohol*.mp.

69. (alcohol* and (drunk* or incident* or safety or offence* or abuse* or disorder* or harm* or violen* or injur* or intoxicat* or assault*)).mp.

70. drink driving.mp.

71. randomized controlled trial.pt.

72. controlled clinical trial.pt.

73. randomized.ab.

74. randomised.ab.

75. clinical trials as topic.sh.

76. randomly.ab.

77. trial.ti.

78. double blind.ab.

79. single blind.ab.

80. experiment*.mp.

81. (pretest or pre test).mp.

82. (posttest or post test).mp.

83. (pre post or prepost).mp.

84. Before after.mp.

85. (Quasi-randomised or quasi-randomized or quasi-randomized or quazi-randomised).mp.

86. stepped wedge.mp.

87. Preference trial.mp.

88. Comprehensive cohort.mp.

89. Natural experiment.mp.

90. (Quasi experiment or quazi experiments).mp.

91. (Randomised encouragement trial or randomized encouragement trial).mp.

92. (Staggered enrolment trial or staggered enrollment trial).mp.

93. (Nonrandomised or non randomised or nonrandomized or non randomized).mp.

94. Interrupted time series.mp.

95. (Time series and trial).mp.

96. Multiple baseline.mp.

97. Regression discontinuity.mp.

98. 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 or 38 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47

99. 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 or 63 or 64 or 65 or 66

100. 67 or 68 or 69 or 70

101. 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 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97

102. 98 and 99 and 100 and 101

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4-5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N/A
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5-7
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	7-8
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	8, Appendix I
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	8-9
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	9-10
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	10
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	10-11
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	11-12
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	12-13

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	13
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	13-14
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	N/A
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	N/A
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N/A
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	N/A
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	N/A
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	N/A
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	N/A
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: **www.prisma-statement.org**.

INTERVENTIONS IN SPORTS SETTINGS TO REDUCE ALCOHOL CONSUMPTION AND ALCOHOL RELATED HARM: A SYSTEMATIC REVIEW PROTOCOL

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2011-000645.R1
Article Type:	Protocol
Date Submitted by the Author:	03-Feb-2012
Complete List of Authors:	Kingsland, Melanie; The University of Newcastle, ; Hunter New England Population Health, Wiggers, John; The University of Newcastle, ; Hunter New England Population Health, Wolfenden, Luke; New South Wales Cancer Institute, ; The University of Newcastle,
Primary Subject Heading:	Public health
Secondary Subject Heading:	Public health, Sports & exercise medicine
Keywords:	PUBLIC HEALTH, SPORTS MEDICINE, PREVENTIVE MEDICINE

INTERVENTIONS IN SPORTS SETTINGS TO REDUCE ALCOHOL CONSUMPTION AND ALCOHOL RELATED HARM ~~ASSOCIATED WITH SPORTS SETTINGS~~: A SYSTEMATIC REVIEW PROTOCOL

Melanie Kingsland,[1,2] John H Wiggers,[1,2] Luke Wolfenden.[1,3]

[1]School of Medicine and Public Health, The University of Newcastle, Callaghan, New South Wales, 2308, Australia

[2]Hunter New England Population Health, Locked Bag 10, Wallsend, New South Wales, 2287, Australia

[3]NSW Cancer Institute, Australian Technology Park, Level 9, 8 Central Avenue, Eveleigh, New South Wales, 2015, Australia

Corresponding author:

Name: Melanie Kingsland

Postal address: Hunter New England Population Health, Locked Bag 10, Wallsend, New South Wales, 2287, Australia

E-mail: melanie.kingsland@hnehealth.nsw.gov.au

Telephone: +61 2 49246380 Fax: +61 2 49246215

Key words: alcohol drinking, sports, review, intervention studies

Word count: 2534

ABSTRACT

Introduction

Alcohol consumption is a primary cause of physical, psychological and social harm to both the user and to others. At both the professional and non-professional level, sports players and fans report consuming alcohol at greater levels than people not involved in sports. Limited systematic reviews have been conducted assessing interventions targeting alcohol consumption behaviour and related harms in the sporting context.

Methods and analysis

The review aims to determine if interventions implemented in the sport setting decrease alcohol consumption and related harms. Participants may include all persons regardless of age or other characteristics. Studies will be included which have implemented interventions within the sport setting and have either measured: alcohol consumption, excessive alcohol consumption or intoxication, or alcohol-related injury or violence. Randomised controlled trials, staggered enrolment trials, stepped-wedged trials, quasi-randomised trials, quasi-experimental trials and natural experiments will be included. Studies without a parallel comparison group ~~and studies that are not published or are not in press~~ will be excluded. Data will be sourced from a range of electronic databases and sources of grey-literature.

Two authors will independently screen all titles and abstracts of papers identified through the search strategy. Two authors will independently examine the full text of all remaining papers to determine eligibility. Two authors will independently extract data from eligible studies and independently assess risk of bias by assessing the adequacy of study characteristics.

Where studies are sufficiently homogeneous, trial results will be synthesised using a fixed-effects meta-analysis. Standardised mean differences will be used for continuous outcomes and risk ratios will be used for binary outcomes.

Dissemination

The findings of this study will be disseminated widely through mechanisms including peer-reviewed publications and conference presentations.

INTRODUCTION

Rationale

Alcohol consumption is a primary cause of physical, psychological and social harm to both the user and to others.[1, 2] Alcohol consumption that is linked to short term harm most frequently occurs in licensed venues (such as clubs and bars),[3-6] in workplaces[7] and in private homes[3-5] and occurs with greater prevalence amongst particular population groups, including people involved in sports. At both the professional (or elite) level and non-professional level, both sports players and fans have reported consuming alcohol at greater levels than people not involved in sports.[8-14] For instance, studies of college athletes in the United States have found significantly higher levels of binge drinking amongst male (61%) and female (50%) college athletes compared to male (43%) and females (36%) not involved in college athletics.[14] Similarly, research in New Zealand has documented rates of binge drinking amongst elite (56-59%) and non-elite sports people (51%) that are considerably higher than non-sportspeople (31%),[13] and non-elite sportspeople in Australia have reported higher rates of risky drinking (35%) compared to the general population (26%).[8] Rates of binge drinking amongst sports fans (males: 53%; females: 53%) have also been reported to be significantly higher than amongst non-fans (males: 41%; females: 37%).[12]

A settings-based approach to health promotion[15] has been widely used to target alcohol consumption behaviour in licensed premises.[16-18] Such approaches have a basis in ecological and social ecological theories of health promotion,[19-21] which recognise the importance of the physical, social and cultural environment in health risk behaviours such as alcohol consumption. Given the prevalence of at risk consumption among sports players and fans, interventions targeting alcohol consumption at sporting settings may represent an

effective strategy in mitigating the adverse effects of excessive alcohol consumption. Such interventions may include the sale of low-alcohol and non-alcohol beverages[22] and the prohibition of drinking games and promotions including cheap or discounted drinks[23] and alcohol-only awards or prizes.[24]

To our knowledge, to date, only one systematic review has been conducted assessing interventions targeting health behaviour change in the sporting context.[25] However, this review only examined policy interventions and focussed on alcohol consumption behaviour, rather than including broader alcohol-related harms such as violence.

Objectives

To determine if interventions implemented in the sport setting are effective relative to a comparison group in:

1. reducing alcohol consumption at the sporting venue and/or overall alcohol consumption; or
2. reducing excessive alcohol consumption or intoxication at the sporting venue and/or overall excessive alcohol consumption or intoxication; or
3. reducing alcohol-related violence or injury at the sporting venue and/or overall alcohol related violence or injury.

METHODS AND ANALYSIS

Eligibility criteria

Study characteristics

Participants

Participants may include people of all ages and may include, but are not limited to: players; fans/spectators; coaches/trainers; sporting club, venue or team management; and sporting club or venue staff or volunteers. There will be no exclusion criteria for participants.

Interventions

Interventions will be included that are implemented in a sporting setting and that ~~primarily~~ aim to modify at least one of the following: alcohol consumption behaviour~~;~~, alcohol-related intoxication~~;~~ or alcohol-related violence or injury. These could include health promotion, health education (e.g targeting the skills, knowledge, attitudes or beliefs or sports players, club members or spectators), regulatory (e.g enforcement of legislation regarding the sale or supply or alcohol) and environmental (e.g serving alcohol in plastic containers, or the provision of safe transport options of club patrons) initiatives. ~~-~~Interventions that aim to address ~~have~~ such ~~these~~ outcomes~~as a primary aim~~, but also aim to modify other health risk behaviours will also be included. Interventions with a treatment focus, such as those aiming to treat alcohol addiction, will be excluded. For the purposes of the review, sport settings will be defined as settings where an organised sporting event or activity occurs, whether it is a competition game or event, a training session or another type of club or team event at a professional (elite) or non-professional (amateur/community) level. Terms used to refer to such settings may include arenas, stadiums, grounds, complexes or ovals, as used by a particular sport or for general sports use.

Comparisons

Comparisons will be included that are no intervention controls, attention controls or waitlist controls, or that are alternative interventions.

Primary oOutcomes

Studies with the following primary outcome measures will be included:

- alcohol consumption, such as number of drinks consumed or alcohol consumed at excessive/risky levels, as assessed via survey or direct observation;
- alcohol-related intoxication, such as proportion of people intoxicated or average level of intoxication, measured by surveys, observations or biochemical measures; and
- alcohol-related violence or injury, such as number of incidents of alcohol-related assault or number of alcohol-related injuries, measured by surveys, observations, or records kept by police, medical facilities or sporting facilities, which may include incidents that are either self-reported or witnessed.

Study design

Studies with the following study designs will be included:

- randomised controlled trials, including cluster randomised controlled trials;
- staggered enrolment trials[26] or stepped-wedged trials;[27]
- quasi-randomised trials, where group allocation is not purely random, but may be determined by a factor such as birth date;[28, 29]
- quasi-experimental trials with comparison/control groups, including non-randomised pre-post (before-after) trials with one or more intervention and control groups,[30] time-series/interrupted time-series trials (including multiple baseline trials) with independent control groups,[26, 30] preference trials[27] and regression discontinuity trials;[26]
- natural experiment studies that have a comparison group.[31]

Any trials without parallel comparison or control groups will be excluded.

Length of follow-up

There will be no eligibility criteria based on length of follow-up.

Publication characteristics

There will be no eligibility criteria based on year of study publication or language ~~other than that the study must be published in a year that is included in the electronic databases that are searched. Only studies that are published or in press will be included.~~.

Information sources

Electronic databases

The following electronic databases will be searched: the Cochrane Central Registry of Controlled Trials (CENTRAL, The Cochrane Library); MEDLINE; EMBASE; PsychINFO; SPORTDiscus; Dissertations and Theses; ERIC; and PsycEXTRA.

Other sources

Studies will also be obtained from the following sources:

- Reference lists of included studies.
- Hand searching of three relevant journals in the field (volumes from the past 5 years).
- Freely available internet databases including: Alcohol and Alcohol Problems Science Database (Available at: http://etoh.niaaa.nih.gov/); BiblioMap (Available at: http://eppi.ioe.ac.uk/webdatabases/Intro.aspx?ID=7); Lifestyle Information Network (Available at: http://lin.ca/recreation-database); SportScan Article Database

(Available at: http://www.ausport.gov.au/information/nsic/catalogue/sportscan_article_database).

- Internet searches engines, such as Google Scholar.
- Corresponding authors of all included trials.

Search strategy

The search strategy for MEDLINE is in Appendix I. This strategy will be applied to the other electronic databases where relevant, with any modifications reported in the review manuscript. Authors will be contacted via email to obtain any studies that are identified through searching other sources.

Study selection

Two review authors will independently screen all titles and abstracts of papers identified as a result of the search documented above. Endnote (version X4.02) will be used for the screening process, with review authors employing a standardised, pre-piloted screening tool to assess study eligibility. The abstracts of papers that are in a language other than English will be translated using Google Translate and, if considered eligible or eligibility is unclear, professional translation of the full paper will be undertaken. Based on an assessment of paper title and abstract, papers will be excluded which do not meet the eligibility criteria of the review. Two review authors will independently examine the full text of all remaining papers to determine study eligibility. Reasons for study ineligibility will be recorded for all full-text articles and this information will be documented in a table accompanying the published review. For papers where there is insufficient information to determine eligibility, the study authors will be contacted for clarification. If following this process there is still insufficient information to determine trial eligibility, the trial will be excluded from the review, with the

reasons for exclusion documented in the published review. Disagreement regarding study eligibility will be attempted to be resolved through discussion between the two reviewers responsible for trial screening. The decision of a third reviewer will determine study eligibility in instances where consensus cannot be reached. Review authors will not be blind to the name or institution of study authors or to journal titles.

Data extraction

Two review authors will independently extract data from eligible studies. A pre-piloted form designed specifically for this review will be used to extract data from eligible studies for assessment of study quality and evidence synthesis. Disagreement regarding data extraction will be attempted to be resolved through discussion between the two reviewers. A third review author will review any papers on which consensus cannot be reached. One review author will transcribe data from data extraction forms into the systematic review software Review Manager (RevMan) and the second review author will check this process. In instances where data ~~is~~ are unclear or is not available from the published manuscript, attempt will be made to contact study authors. Review authors will not be blind to the name or institution of study authors or to journal titles.

Data items

Extracted information will include: authors; study funding and/or other sources of conflicts of interest; study setting (including country, type of sport and level of professionalism); study population and participants demographics (including age, gender and role, such as player or spectator/fan); study design; intervention and control conditions (including number of conditions, content, duration and intensity); trial outcomes and results (including study consent rates and attrition, sample size, number of participants per experimental condition

and per cluster if relevant, inter-class coefficients if relevant and results of the primary outcomes described above); and information for assessment of study bias (see below).

Attempts will be made to contact the corresponding authors of included trials in instances where data ~~is~~ are unavailable in the published manuscript. Any assumptions or simplifications made in the data extraction or management process due to unavailable information will be documented in the final manuscript.

Assessment of risk of bias

Two review authors will independently assess risk of bias in eligible studies by assessing the adequacy of the following study characteristics, as outlined in the Cochrane Handbook for Systematic Reviews of Interventions: sequence generation; concealment of treatment allocation from participants and research personnel at time of study enrolment; blinding of research personnel (including data collection and analysis personnel) throughout the trial; completeness of outcome data (including treatment of exclusions, attrition and incomplete data); selective outcome reporting; and any other potential sources of bias.[32]

For any non-randomised trials included in the review, the authors will assess any selection bias that may have lead to confounding of the outcome of interest and the appropriateness of any statistical methods used to adjust for such confounding. Additional biases specific to individual study designs will be assessed on a case-by-case basis and in consultation with relevant methodological experts and noted in a supplementary risk of bias table.[32]

Disagreement regarding assessment of risk of bias will be attempted to be resolved through discussion between the two reviewers. A third review author will be consulted in cases in

which consensus cannot be reached. The level of risk of bias for each of the above-mentioned study characteristics will be presented separately for each study in a table accompanying the published review.

Data analysis

Summary measures

Internationally, there is considerable inter-country variability in the amount of alcohol that defines a standard drink,[33] in guidelines regarding safe levels of alcohol consumption and in the definition of 'at risk' drinking.[33, 34] There is also no standard, recognised definition of intoxication[16] and jurisdictional variability in the classification, measurement and recording of incidents of alcohol-related violence and injury.[35] Furthermore, there are a variety of commonly used survey tools,[36, 37] and observational and biological approaches to the assessment of alcohol consumption and intoxication.[38] As such, it is anticipated that there will be a range of different outcome measures reported across included studies, which may preclude meta-analytical synthesis of the data from these trials.

Nonetheless, outcome data will be included in meta-analyses if appropriate. For assessment of alcohol consumption, attempts will first be made to standardise outcomes reported in included trials to a continuous measure of grams of alcohol consumed, and intervention effect reported in meta-analyses as a mean difference with 95% confidence intervals. Alternatively, if continuous measures are not able to be standardised to the common metric of grams of alcohol consumed, attempts will be made to pool trials and report intervention effect as a standardised mean difference with 95% confidence intervals. Where possible, risk ratios will be used to measures intervention effect for binary outcomes.

Given the limitations outlined above, it is likely that some outcome measures will not be able to combined in meta-analysis given a lack of standard definitions. Intervention effect for studies reporting such data will be described narratively.

Data synthesis and analysis

Where studies are sufficiently homogeneous and report the same outcome measure, Review Manager (RevMan) will be used to synthesise trial results using a fixed-effects model. Meta-analyses will be performed in strata based on study design. If there is unexplained statistical heterogeneity, a random effects model will be utilised. For trials with multiple post intervention follow-up points, data from the most recent follow-up data collection (furthest follow-up point from recruitment) will be utilised. Similarly, intention to treat trial outcome data will be used in preference to data included in less conservative analyses. Attempts will be made to contact authors of trials with any missing data.

Where appropriate, sensitivity analysis will be performed with trials that are judged to represent an overall high risk of bias based on the risk of bias assessment tool~~are considered likely to introduce bias, including trials that have a high rate of participant attrition or other missing data, or that do not report an intention to treat analysis~~. Where trial outcome data can not be combined, or significant heterogeneity exists, findings of included trials will be described narratively according to the review objectives.

Issues of clustering

In cluster randomised controlled trials where the effects of clustering have not been adjusted for, adjustments will be made to the standard deviations for the design effect, using either

intra-class coefficients provided in study reports (or by contacting authors) or estimates from similar studies.

Assessment of study heterogeneity

Heterogeneity between studies will be assessed using both visual inspection of forest plots and the I^2 statistic. An I^2 value greater than 50% will be considered indicative of substantial heterogeneity and careful consideration will be given to the appropriateness of meta-analysis. In order to identify possible sources of heterogeneity, subgroup analyses will be conducted based on participants, design, interventions, outcomes and study quality (including risk of bias and level of participant drop-out).

Assessment of reporting bias

Funnel plots of eligible studies will be examined to assess any bias that may arise through selective reporting within studies.

Additional analyses

If appropriate, the following exploratory subgroup analyses will be conducted:

1. Interventions targeting different sports.

2. Interventions targeting the different ~~sporting participants~~ groups of people attending sporting settings (such as players ~~or~~ and fans/spectators).

~~3. Interventions targeting professional and non-professional sports.~~

~~4. Interventions of varying intensities and timeframes.~~

Categorical comparisons for subgroup analyses will be developed following inspection of the study characteristics and outcomes reported in the included trials.

ETHICS AND DISSEMINATION

Ethics is not required given this protocol is for a systematic review. The findings of this study will be disseminated widely through mechanisms including peer-reviewed publications and conference presentations.

DISCUSSION

This systematic review will provide a detailed summary of the current state of evidence for the effectiveness of interventions in sports settings that are aimed at reducing alcohol consumption and related harms. Such a review will be of benefit to researchers and policy makers with an interest in reducing alcohol-related problems associated with the sports setting.

AUTHORS' CONTRIBUTIONS

Melanie Kingsland will lead the review. All authors have contributed to the conception of the research and will be involved in the preparation of the review, including providing comment on drafts.

FUNDING STATEMENT

No external sources of funding support.

COMPETING INTERESTS

The authors are currently undertaking a randomised controlled trial of an intervention to decrease excessive alcohol consumption at community sports clubs which may be included in this review. The authors have not received any benefit, in cash or in kind, any hospitality or

any subsidy from the alcohol industry or any other source perceived to have an interest in the outcome of this review.

ACKNOWLEDGEMENTS

In developing this protocol, the authors would like to acknowledge the contribution of Debbie Booth from The University of Newcastle who provided guidance regarding the search strategy and to The University of Newcastle, the New South Wales Cancer Institute and Hunter New England Population Health for supporting author salaries.

REFERENCES

1. Nutt DJ, King LA, Phillips LD. Drug harms in the UK: a multicriteria decision analysis. *Lancet* 2010;**376**:1558-1565.
2. World Health Organization. *World Health Organization Expert Committee on Problems Related to Alcohol Consumption*. Geneva:World Health Organization, 2007.
3. Gronkjaer M, Vinther-Larsen M, Curtis T, et al. Alcohol use in Denmark: A descriptive study on drinking contexts. *Addict Res Theory* 2010;**18**:359-370.
4. Hughes K, Anderson Z, Morleo M, et al. Alcohol, nightlife and violence: the relative contributions of drinking before and during nights out to negative health and criminal justice outcomes. *Addiction* 2008;**103**:60-65.
5. Norstrom T. Effects on criminal violence of different beverage types and private and public drinking. *Addiction* 1998;**93**:689-699.
6. Stockwell T, Lang E, Rydon P. High risk drinking settings: the association of serving and promotional practices with harmful drinking. *Addiction* 1993;**88**:1519-1526.

7. Frone MR. Prevalence and distribution of alcohol use and impairment in the workplace: A U.S. national survey. *J Stud Alcohol* 2006;**67**:147-156.

8. Black D, Lawson J, Fleishman S. Excessive alcohol use by non-elite sportsmen. *Drug Alcohol Rev* 1999;**18**:201-205.

9. Leichliter JS, Meilman PW, Presley CA, et al. Alcohol use and related consequences among students with varying levels of involvement in college. *J Am Coll Health* 1998;**46**:257.

10. Martens MP, Dams-O'Connor K, Beck NC. A systematic review of college student-athlete drinking: Prevalence rates, sport-related factors, and interventions. *J Subst Abuse Treat* 2006;**31**:305-316.

11. Nelson TF, Wechsler H. Alcohol and college athletes. *Med Sci Sports Exerc* 2001;**33**:43-47.

12. Nelson TF, Wechsler H. School spirits: Alcohol and collegiate sports fans. *Addict Behav* 2003;**28**:1-11.

13. O'Brien KS, Blackie JM, Hunter JA. Hazardous drinking in elite New Zealand sportspeople. *Alcohol Alcohol* 2005;**40**:239-241.

14. Wechsler H, Davenport AE. Binge drinking, tobacco, and illicit drug use and involvement in college athletics. *J Am Coll Health* 1997;**45**:195.

15. World Health Organisation. *Jakarta Declaration on Leading Health Promotion into the 21st Century*. Geneva:World Health Organisation, 1997.

16. Babor T, Caetano R, Casswell S, et al. *Alcohol: No Ordinary Commodity - Research and Public Policy.* Oxford: Oxford University Press, 2010.

17. Graham K. Preventive interventions for on-premise drinking: a promising but underresearched area of prevention. *Contemp Drug Probl* 2000;**27**:593.

18. National Drug Research Insititute. *Restrictions on the sale and supply of alcohol: evidence and outcomes*. Perth: National Drug Research Insitute, 2007.

19. Stokols D. Establishing and Maintaining Healthy Environments: Toward a Social Ecology of Health Promotion. *Am Psychol* 1992;**47**:6-22.

20. Stokols D. Translating social ecological theory into guidelines for community health promotion. *Am J Health Promot* 1996;**10**:282-298.

21. Green LW, Richard L, Potvin L. Ecological foundations of health promotion. *Am J Health Promot* 1996;**10**:270-281.

22. Mentha R, Wakerman J. An evaluation of the Australian Football League Central Australian Responsible Alcohol Strategy 2005-07. *Health Promot J Austr* 2009;**20**(3):208-213.

23. Grossbard J, Geisner IM, Neighbors C, et al. Are drinking games sports? College athlete participation in drinking games and alcohol-related problems. *J Stud Alcohol* 2007;**68**(1):97-105.

24. Dietze PM, Fitzgerland JL, Jenkinson RA. Drinking by professional Australian Football League (AFL) players: prevalence and correlates of risk. *Med J Aust* 2008;**189**(9):479-483.

25. Priest N, Armstrong R, Doyle J, et al. Policy interventions implemented through sporting organisations for promotiong healthy behaviour change. *Cochrane Database Syst Rev* 2008;**3**:CD004809.

26. Mercer SL, DeVinney BJ, Fine LJ, et al. Study designs for effectiveness and translation research: identifying trade-offs. *Am J Prev Med* 2007;**33**:139-154.

27. *Developing and evaluating complex interventions: new guidance.* www.mrc.ac.uk/complexinterventionsguidance (accessed: September 2011).

28. Battaglia MP, Link MW, Frankel MR, et al. An evaluation of respondent selection methods for household mail surveys. *Public Opin Q* 2008;**72**:459-469.

29. Oldendick RW, Bishop GF, Sorenson SB, et al. A comparison of the Kish and last birthday methods of respondent selection in telephone surveys. *J Off Stat* 1988;**4**:307-318.

30. Nutbeam D, Bauman A. *Evaluation in a Nutshell: A Practical Guide to the Evaluation of Health Promotion Programs*. North Ryde: McGraw-Hill, 2006.

31. Sadish W, Cook T, Campbell D. *Experimental and quasi-experimental designs for generalized causal inference*. New York: Houghton Mifflin Company, 2002.

32. Higgins J, Green S, eds. *Cochrane Handbook for Systematic Reviews of Interventions*. Chichester: John Wiley & Sons, 2009.

33. *International Drinking Guidelines*. http://www.icap.org/PolicyIssues/DrinkingGuidelines/tabid/102/Default.aspx (accessed: November 2011).

34. Dawson DA. Alternative measures and models of hazardous consumption. *J Subst Abuse* 2000;**12**:79-91.

35. World Health Organization. *International Guide for Monitoring Alcohol Consumption and Related Harm*. Geneva: World Health Organization, 2000.

36. Heeb J-L, Gmel G. Measuring alcohol consumption: A comparison of graduated frequency, quantity frequency, and weekly recall diary methods in a general population survey. *Addict Behav* 2005;**30**:403-413.

37. Room R. Measuring drinking patterns: the experience of the last half century. *J Subst Abuse* 2000;**12**:23-31.

38. Harford T. The measurement of alcohol-related accidents. *Addiction* 1993;**88**:907-912.

APPENDIX I: MEDLINE SEARCH STRATEGY

1. exp Sports/
2. sport*.mp.
3. cricket*.mp.
4. netball*.mp.
5. rugby.mp.
6. canoe*.mp.
7. softball.mp.
8. triathl*.mp.
9. water polo.mp.
10. water ski*.mp.
11. australian rules football.mp.
12. surfing.mp.
13. handball.mp.
14. yacht*.mp.
15. rowing.mp.
16. boating.mp.
17. sailing.mp.
18. lawn bowls.mp.
19. bowling.mp.
20. horse racing.mp.
21. harness racing.mp.
22. dog racing.mp.
23. motor sport*.mp.
24. auto sport*.mp.

25. motor racing.mp.

26. auto racing.mp.

27. motorcycl*.mp.

28. car racing.mp.

29. archery.mp.

30. equestrian.mp.

31. shooting.mp.

32. hunting.mp.

33. lacrosse.mp.

34. polo.mp.

35. table tennis.mp.

36. badminton.mp.

37. squash.mp.

38. cycling.mp.

39. Fitness Centers/

40. fitness centre*.mp.

41. gym*.mp.

42. (sport* and (game* or event* or club* or arena* or field* or ground*)).mp.

43. athlet*.mp.

44. player*.mp.

45. spectator*.mp.

46. fan*.mp.

47. (sport* and member*).mp.

48. exp Health Promotion/

49. exp Public Health/

50. Harm Reduction/

51. (harm adj3 minimi*).mp.

52. Health Policy/

53. Public Policy/

54. program*.mp.

55. intervention*.mp.

56. Preventive Medicine/

57. health education/ or consumer health information/ or patient education as topic/

58. environment*.mp.

59. (responsible and (alcohol* or beverage*) and service).mp.

60. server training.mp.

61. server intervention*.mp.

62. enforcement.mp.

63. community action*.mp.

64. community mobili*.mp.

65. (alcohol* and control*).mp.

66. strateg*.mp.

67. exp Alcohol Drinking/

68. alcohol*.mp.

69. (alcohol* and (drunk* or incident* or safety or offence* or abuse* or disorder* or harm* or violen* or injur* or intoxicat* or assault*)).mp.

70. drink driving.mp.

71. randomized controlled trial.pt.

72. controlled clinical trial.pt.

73. randomized.ab.

74. randomised.ab.

75. clinical trials as topic.sh.

76. randomly.ab.

77. trial.ti.

78. double blind.ab.

79. single blind.ab.

80. experiment*.mp.

81. (pretest or pre test).mp.

82. (posttest or post test).mp.

83. (pre post or prepost).mp.

84. Before after.mp.

85. (Quasi-randomised or quasi-randomized or quasi-randomized or quazi-randomised).mp.

86. stepped wedge.mp.

87. Preference trial.mp.

88. Comprehensive cohort.mp.

89. Natural experiment.mp.

90. (Quasi experiment or quazi experiments).mp.

91. (Randomised encouragement trial or randomized encouragement trial).mp.

92. (Staggered enrolment trial or staggered enrollment trial).mp.

93. (Nonrandomised or non randomised or nonrandomized or non randomized).mp.

94. Interrupted time series.mp.

95. (Time series and trial).mp.

96. Multiple baseline.mp.

97. Regression discontinuity.mp.

98. 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 or 38 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47

99. 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 or 63 or 64 or 65 or 66

100. 67 or 68 or 69 or 70

101. 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 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97

102. 98 and 99 and 100 and 101

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4-5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N/A
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	5-7
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	7-8
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	8, Appendix I
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	8-9
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	9-10
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	10
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	10-11
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	11-12
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	12-13

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	13
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	13-14
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	N/A
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	N/A
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N/A
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	N/A
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	N/A
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	N/A
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	N/A
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	N/A

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: **www.prisma-statement.org**.