



Non-alcohol outcomes: What are the most relevant in the context of alcohol brief intervention trials?
and
Measuring economic outcomes in alcohol screening and brief intervention studies

Aisha Holloway

The University of Edinburgh

Jeremy Bray

The University of North Carolina at Greensboro

Acknowledgements

- Aisha Holloway acknowledges:
 - Jeremy Bray
 - Dorothy Newbury-Birch

- Jeremy Bray acknowledges:
 - Carolina Barbosa
 - Alexander Cowell
 - Zachary Blizzard





Background

- Current health promotion interventions can be complex, multi-factorial interventions at individual, policy and physical environment levels
- May result in a wide variety of non-health outcomes, however, they are not captured by the narrow measures of health that are commonly used as outcome parameters in economic evaluations, such as life years gained, disease cases prevented or Quality Adjusted Life Years (QALYs)
- This may be due to the fact that the generic instruments used for the operationalization of QALYs, such as the EQ-5D and the SF-36, do not explicitly take into account outcomes that go beyond health



Context

- Incorporation of non-health outcomes (NHOs) in economic evaluations of interventions are receiving increased attention in UK and wider (Kelly et al 2009)
- National Institute for Health and Care Excellence (NICE) recommends incorporating NHOs in economic evaluations of interventions (Kelly et al 2010)
- Limited scientific evidence regarding nature of most relevant non-health outcomes (Benning et al 2015)



'Expert' perspectives

- Individual: educational output, social life, healthy/unhealthy behaviour, perceived life control, emotions, self-confidence, employability, family life, physical environment, justice and security, end of life aspects, other, use of medical treatment and perceptions
- Direct social level: healthy/unhealthy behaviour, educational achievements, social life, other, employability, well-being, physical environment and perceptions
- Societal level: labour participation and productivity, justice and security, unhealthy behaviour, use and availability of healthcare services, participation and connectedness, educational achievements, transport, economic, physical environment and other

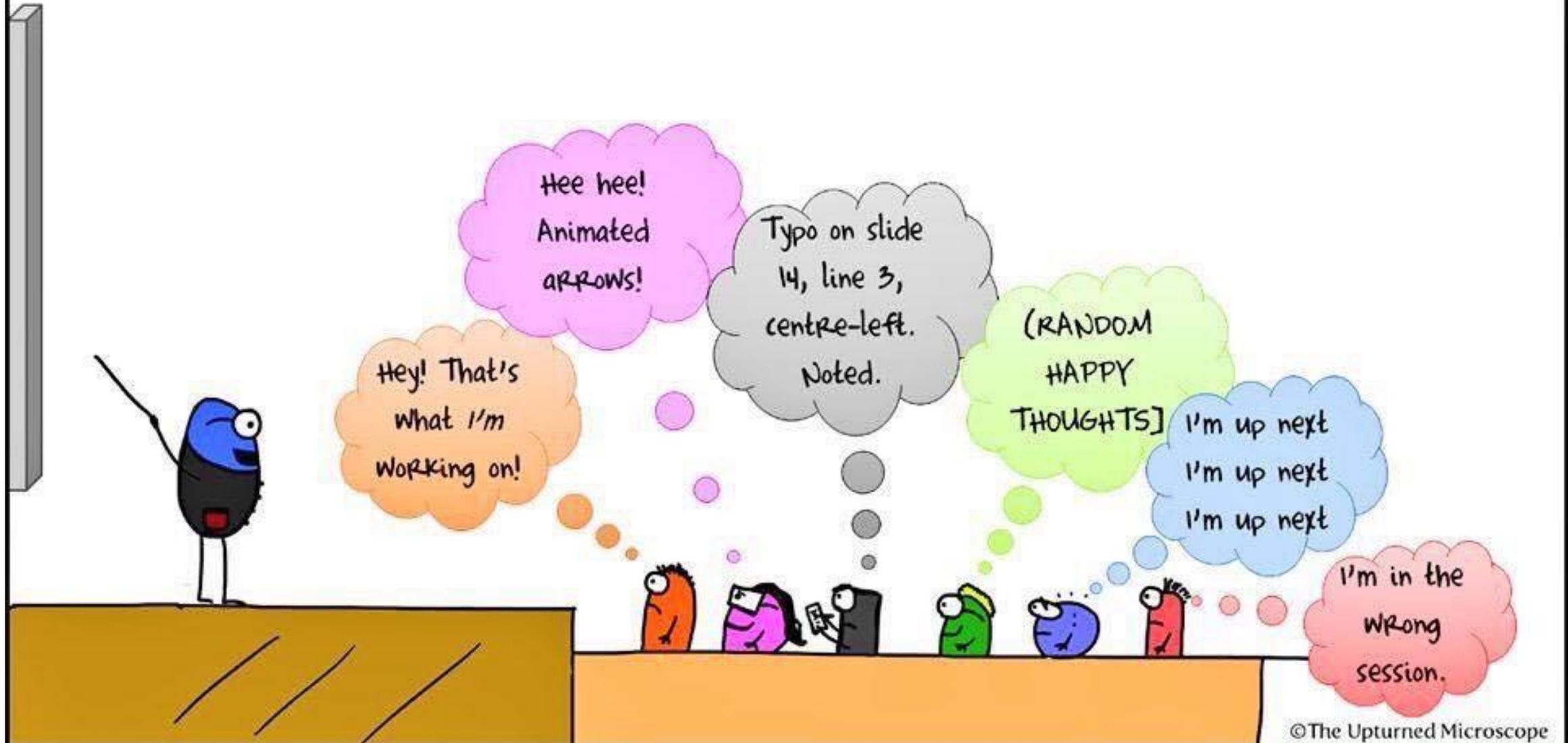


Challenges related to the measurement of intervention outcomes - ABIs

- Health benefits of Lifestyle Behaviour Change Interventions (LBCIs) can take a long time to accrue
- LBCIs may have consequences for those who are not directly targeted by the intervention or the community at large (spill over effects)
- Relative importance of the non-health outcomes used is affected by demographic background factors such as gender, age, education and income
- Many LBCIs are designed to achieve more health equity, but methods to account for equity outcomes in economic evaluation are not well developed

(Alayli-Goebbels et al, 2013)

What people think about during your conference talk



Materials and methods

- Informal review of literature on the social costs of alcohol use and use disorders to identify the key non-health, economic outcomes that should be measured in ABI studies
- Systematic review of ABI economic evaluations to identify the specific measures most commonly used to assess key non-health, economic outcomes in ABI studies
- Databases
 - Scopus
 - PsycINFO
 - Economics Literature (EconLIT)
 - Cumulative Index to Nursing and Allied Health Literature (CINAHL)
 - PubMed

Materials and methods

- Year of publication: 2000 to present
- English language
- Terms: alcohol AND (BI OR SBI OR MI OR ABI OR SBIRT OR BA OR SBA OR “brief intervention” OR “brief advice” OR “brief treatment”) AND (economic OR cost) AND (“alcohol-related disorders” OR “alcohol drinking” OR “temperance” OR “alcohol deterrents”)
- Develop taxonomy of measures based on social cost literature

Table 1. Estimated costs in millions (\$) of excessive drinking, by type of cost and population, U.S., 2006

Cost Item	Group-specific cost estimates (\$, in millions)				
	Total cost	Binge drinking ^a	Underage drinking ^a	Drinking while ^a pregnant	Crime-related ^a
Health care	24,555.6	14,028.6	3,706.5	2612.4	—
Specialty care for abuse/dependence	10,668.5	7,303.2	2,056.9	Not estimated	—
Hospitalization	5,115.6	1,726.4	212.2	44.8	479.4
Fetal alcohol syndrome	2,538.0	1,071.0	461.9	2538.0	—
Health insurance administration	1,585.7	909.7	187.1	6.2	60.2
Drugs/services	1,212.4	851.6	156.2	6.5	115.0
Prevention and research	1,207.1	570.7	470.7	9.9	—
Ambulatory care	1,195.9	840.0	154.1	6.5	139.5
Nursing homes	1,002.9	742.1	2.3	0.5	—
Crime victims	—	—	—	—	295.6
Training	29.5	14.0	5.3	Not estimated	—
Lost productivity	161,286.1	119,743.3	16,579.6	2221.83	—
Impaired productivity—work	74,101.8	50,727.0	2,020.8	Not estimated	—
Mortality	65,062.2	50,501.0	6,777.2	165.6	28,672.7 ^b
Incarceration of perpetrators	6,328.9	6,328.9	3,587.0	Not estimated	6,328.9
Impaired productivity—home	5,355.6	3,666.2	211.0	Not estimated	—
Absenteeism	4,237.6	4,237.6	186.5	Not estimated	—
Crime victims	2,092.9	2,092.9	641.8	Not estimated	2,092.9
Fetal alcohol syndrome	2,053.7	866.7	373.8	2053.7	—
Impaired productivity—institution	2,053.3	1,323.0	363.2	2.5	11.9
Other effects	37,636.9	36,928.0	6,703.0	368.8	—
Criminal justice	20,972.7 ^c	20,476.9	4,700.5	Not estimated	20,972.7
Motor vehicle crashes	13,718.4	13,718.4	1,378.6	Not estimated	13,718.4
Fire losses	2,137.3	2,137.3	Not estimated	Not estimated	—
Crime victim property damage	439.8	439.8	169.9	Not estimated	439.8
Fetal alcohol syndrome—special education	368.8	155.6	67.1	368.8	—
Total	223,478.6	170,699.9	26,989.1	5203.0	73,327.0

^aThese categories are not mutually exclusive and may overlap.

^bHomicide = \$11,050.9 million; DUI-associated deaths = \$17,621.8 million

^c\$4408.1 million for police protection, \$3747.8 million for legal and adjudication, \$12,587.4 million for corrections, and \$229.4 million for private legal defense

DUI, driving under the influence

Table 1. Excessive Alcohol Consumption Costs (in Millions), by Category, U.S., 2010

Category of cost	Total costs (\$)	Government costs (\$)	Binge drinking (\$)	Underage drinking (\$)	Drinking while pregnant (\$)
Total	249,026.4	100,674.8	191,126.9	24,268.3	5,494.1
Health care	28,379.1	16,915.1	16,273.8	3,795.8	2,830.0
Specialty care for abuse/dependence	12,044.6	9,031.3	8,245.2	2,120.4	—
Hospitalization	5,948.5	2,828.1	2,007.5	198.9	48.6
Ambulatory care	1,524.5	524.0	1,070.8	144.4	7.0
Nursing home	1,166.8	691.6	863.4	2.1	0.5
Drugs/services	1,545.5	471.6	1,085.5	146.4	7.1
Fetal alcohol syndrome	2,750.0	1,248.5	1,160.5	449.5	2,750.0
Prevention and research	1,048.8	1,048.8	496.1	454.4	10.1
Training	34.8	11.5	16.4	6.3	—
Health insurance administration	2,315.6	1,059.7	1,328.5	273.3	6.7
Lost productivity	179,084.9	57,219.0	134,035.4	13,666.6	2,290.0
Impaired productivity at work	76,858.6	25,440.2	52,614.1	1,924.3	—
Impaired productivity at home	6,218.0	—	4,256.6	205.0	—
Absenteeism	4,619.9	1,529.2	4,619.9	201.5	—
Impaired productivity while in specialty care	1,983.4	656.5	1,358.6	349.1	—
Impaired productivity while in hospital	228.4	75.6	64.1	6.4	2.6
Mortality	75,204.5	24,892.7	58,373.4	6,044.2	170.7
Incarceration of perpetrators	9,150.5	3,028.8	9,150.5	3,855.3	—
Crime victims	2,704.8	895.3	2,704.8	734.7	—
Fetal alcohol syndrome	2,116.8	700.6	893.3	346.0	2,116.8
Other	41,562.5	26,540.7	40,817.7	6,806.0	374.1
Crime victim property damage	559.4	—	559.4	216.1	—
Criminal justice: corrections	15,865.9	15,865.9	15,865.9	1,842.0	—
Criminal justice: alcohol-related crimes	2,160.0	2,160.0	1,631.4	478.6	—
Criminal justice: violent and property crimes	5,998.8	5,998.8	5,998.8	2,117.6	—
Criminal justice: private legal	228.1	—	228.1	72.8	—
Motor vehicle crashes	13,461.9	—	13,461.9	1,490.2	—
Fire losses	2,914.3	2,142.0	2,914.3	527.5	—
Fetal alcohol syndrome (special education)	374.1	374.1	157.9	61.1	374.1

Note: Cost to government and costs for binge, underage, and drinking while pregnant are all subsets of total costs. Binge drinking, underage drinking, and drinking while pregnant are not mutually exclusive and may overlap.





Methods in Alcohol Treatment Economic Evaluations

Table 3. Society level consequences included in reviewed studies

Domain		Study reference
Criminal activity	Anticipation of crime	NA
	Response to crime	(O'Farrell <i>et al.</i> , 1996; Fleming <i>et al.</i> , 2002; UKATT Research Team, 2005; Barrett <i>et al.</i> , 2006; Parrott <i>et al.</i> , 2006)
Road traffic accidents	Consequence of crime	(Fleming <i>et al.</i> , 2002)
	Drink driving offences	NA
	Property damage	NA
Workplace and productivity losses	Due to morbidity: Absenteeism	(Fleming <i>et al.</i> , 2002; Nalpas <i>et al.</i> , 2003; Barrett <i>et al.</i> , 2006; Lock <i>et al.</i> , 2006)
	Reduced efficiency	NA
	Reduced employment	NA
	Workplace accidents	NA
	Due to mortality: Premature death	NA
	Workplace fatalities	NA
	Due to criminal career	NA
	HRQoL of family and friends	NA
Health-related quality of life (HRQoL)	HRQoL of victims	(Fleming <i>et al.</i> , 2002)
	E.g. accident and emergency services, hospital out-patient, inpatient and day patient visits.	(Lindholm, 1998; Schadlich and Brecht, 1998; Palmer <i>et al.</i> , 2000; Fleming <i>et al.</i> , 2002; Rychlik <i>et al.</i> , 2003; Gentilello <i>et al.</i> , 2005; UKATT Research Team, 2005; Barrett <i>et al.</i> , 2006; Lock <i>et al.</i> , 2006; Parrott <i>et al.</i> , 2006)
General healthcare utilization	E.g. detoxification, inpatient, outpatient and residential treatment.	(Humphreys and Moos, 1996; O'Farrell <i>et al.</i> , 1996; UKATT Research Team, 2005; Barrett <i>et al.</i> , 2006; Bischof <i>et al.</i> , 2008)
Other specific alcohol treatment utilization	E.g. social workers interventions, occupational therapists.	(UKATT Research Team, 2005; Barrett <i>et al.</i> , 2006; Parrott <i>et al.</i> , 2006)

Not all reviewed studies included society-level consequences; *N*, number of studies; NA, not applicable.

Table 4. Summary of individual-level consequences variables

Domains	Domain variables	Study reference
Alcohol consumption ^{a,b}	Drinks/drinking day (DDD)	(Humphreys and Moos, 1996; Pettinati <i>et al.</i> , 1999; Alwyn <i>et al.</i> , 2004; Lock <i>et al.</i> , 2006; Parrott <i>et al.</i> , 2006)
	Total quantity (grams)/X time	(Alwyn <i>et al.</i> , 2004; Doran <i>et al.</i> , 2004; Parrott <i>et al.</i> , 2006; Bischof <i>et al.</i> , 2008)
	Drinks/X time	(Fleming <i>et al.</i> , 2002; Shakeshaft <i>et al.</i> , 2002; Sobell <i>et al.</i> , 2002; Kunz <i>et al.</i> , 2004; Babor <i>et al.</i> , 2006; Barrett <i>et al.</i> , 2006)
	Drinking days/X time	(Pettinati <i>et al.</i> , 1999; Sobell <i>et al.</i> , 2002)
	Drinking intensity	(Long <i>et al.</i> , 1998; Sobell <i>et al.</i> , 2002)
	Binge drinking episodes/ heavy drinking	(Humphreys and Moos, 1996; Fleming <i>et al.</i> , 2002; Shakeshaft <i>et al.</i> , 2002; Sobell <i>et al.</i> , 2002; Kunz <i>et al.</i> , 2004; Fals-Stewart <i>et al.</i> , 2005; Babor <i>et al.</i> , 2006; Bischof <i>et al.</i> , 2008; Zarkin <i>et al.</i> , 2008)
	Time to first drink	(Alwyn <i>et al.</i> , 2004)
	% Days abstinent (PDA)	(O'Farrell <i>et al.</i> , 1996; Long <i>et al.</i> , 1998; Parrott <i>et al.</i> , 2006; Zarkin <i>et al.</i> , 2008)
	Alcohol status: abstinence versus relapse	(Schadlich and Brecht, 1998; Palmer <i>et al.</i> , 2000; Nalpas <i>et al.</i> , 2003; Rychlik <i>et al.</i> , 2003)
	Biochemical markers	(Long <i>et al.</i> , 1998)
Alcohol-related problems ^{a,b}	General alcohol-related problems	(Humphreys and Moos, 1996; Long <i>et al.</i> , 1998; Shakeshaft <i>et al.</i> , 2002; Alwyn <i>et al.</i> , 2004; Kunz <i>et al.</i> , 2004; Gentilello <i>et al.</i> , 2005; Lock <i>et al.</i> , 2006; Zarkin <i>et al.</i> , 2008)
	Alcohol dependence	(Humphreys and Moos, 1996; Long <i>et al.</i> , 1998; Alwyn <i>et al.</i> , 2004; Kunz <i>et al.</i> , 2004; Lock <i>et al.</i> , 2006; Parrott <i>et al.</i> , 2006)
	Relationship satisfaction/marital functioning	(O'Farrell <i>et al.</i> , 1996; Fals-Stewart <i>et al.</i> , 2005)
	Social satisfaction and/or self-esteem	(Alwyn <i>et al.</i> , 2004)
Life expectancy ^{a,b}	Life years/mortality	(Lindholm, 1998; Palmer <i>et al.</i> , 2000; Wutzke <i>et al.</i> , 2001; Fleming <i>et al.</i> , 2002)
HRQoL ^a	Utility approach (QALYs)	(Mortimer and Segal, 2005; UKATT Research Team, 2005; Parrott <i>et al.</i> , 2006)
	Utility approach (DALYs)	(Corry <i>et al.</i> , 2004)
	Monetary approach	NA
	Health profile approach	(Babor <i>et al.</i> , 2006; Lock <i>et al.</i> , 2006; Parrott <i>et al.</i> , 2006)
Patients' expenditure	Out of pocket healthcare cost	(Lock <i>et al.</i> , 2006)
	Travel and time costs due to other health care use	(Lock <i>et al.</i> , 2006)
	Higher health insurance premium	NA
	Criminal justice-related costs	NA

HRQoL, health-related quality of life; QALYs, quality-adjusted life years; DALYs, disability-adjusted life years; NA, not applicable.

^aCategories within the health consequences domain.

^bVariables within the clinical consequences category.

Preliminary Taxonomy of Measures

A- Society Level Consequences		
1- Criminal activity	Response to crime	Prosecution service
		Courts
		Defence
		Prison and probation services
2- Road traffic accidents	Drink driving offences	
	Property damage	
3- Workplace and productivity losses	Due to morbidity	Absenteeism
		Reduced efficiency/ productivity
		Reduced employment
		Workplace accidents
	Due to mortality	Premature death
		Workplace fatalities
4- Health-Related Quality of Life (HRQoL)	HRQoL of family and friends of the alcohol misuser	
	HRQoL of victims of crime and drink-driving accidents	
	HRQoL of the general population: fear of crime	
5- General health care	Health care utilization: Alcohol misuse is related to a range of health effects which may result in an excess use of healthcare resources compared to the rest of the population.	

Preliminary Taxonomy of Measures

B- Individual Level Consequences		
1- Health consequences[†]	Clinical consequences	Alcohol consumption*
		Alcohol-related problems*
		Life expectancy*
	HRQoL	Utility approach**
		Monetary approach***
		Health profile approach*
2- Patients' expenditure	Out of pocket health care cost	
	Expenditure on alcohol	
	Travel and time costs	
	Higher health insurance premium	
	Criminal justice related costs	
3- Educational outcomes (younger population)	School attendance	
	School matriculation	
*Used in cost effectiveness analysis or in cost benefit analysis if a monetary valuation is applied; **Used in cost utility analysis or in cost benefit analysis if a monetary valuation is applied; ***Used in cost benefit analysis; [†] Only one outcome is usually used		

Preliminary results

- Initial pull found 112 unduplicated studies
 - Preliminary review of titles found 56 intervention studies
 - The remainder were reviews or commentaries

Next steps

- Formally classify articles into reviews/commentaries, social cost studies, and economic evaluations of specific ABIs
- Use social cost articles to refine draft measures taxonomy
- Refine search terms for second search to include broader, non-health outcomes
- Identify additional articles from reference lists of review articles
- Review economic evaluation articles and classify measures used



References

- Alayli-Goebbels AF et al (2013) A review of economic evaluations of behavior change interventions: setting an agenda for research methods and practice. *J Public Health (Oxf)*. 36:336–44.
- Barbosa, C., Godfrey, C., & Parrott, S. (2010). Methodological assessment of economic evaluations of alcohol treatment: what is missing?. *Alcohol and alcoholism*, 45(1), 53-63.
- Benning TM et al (2015) Exploring Outcomes to Consider in Economic Evaluations of Health Promotion Programs: What Broader Non-Health Outcomes Matter Most? *BMC Health Services Research*, 15:266. DOI 10.1186/s12913-015-0908-y
- Bouchery, E. E., Harwood, H. J., Sacks, J. J., Simon, C. J., & Brewer, R. D. (2011). Economic costs of excessive alcohol consumption in the US, 2006. *American journal of preventive medicine*, 41(5), 516-524.
- Kelly MP et al (2009) A conceptual framework for public health: NICE's emerging approach. *Public Health*. 123(1):e14–20.
- Kelly MP et al (2010) Evidence based public health: A review of the experience of the National Institute of Health and Clinical Excellence (NICE) of developing public health guidance in England. *Social Science & Medicine*. 71(6), Sept, 1056-1062
- Sacks, J. J., Gonzales, K. R., Bouchery, E. E., Tomedi, L. E., & Brewer, R. D. (2015). 2010 national and state costs of excessive alcohol consumption. *American journal of preventive medicine*, 49(5), e73-e79.
- van Mastrigt GAPG et al (2015) A qualitative study on the views of experts regarding the incorporation of non-health outcomes into the economic evaluations of public health interventions *BMC Public Health*, 15:954. DOI 10.1186/s12889-015-2247-7