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REVIEW

A bibliometric review of drug and alcohol research focused on Indigenous peoples of Australia, New Zealand, Canada and the United States

ANTON CLIFFORD[1] & ANTHONY SHAKESHAFT[2]

[1]*School of Public Health, University of Queensland, Brisbane, Australia, and* [2]*National Drug and Alcohol Research Centre, University of New South Wales, Sydney, Australia*

Abstract

Issues. *Indigenous peoples of Australia, New Zealand, Canada and the United States experience a disproportionately high burden of harms from substance misuse. Research is therefore required to improve our understanding of substance use in Indigenous populations and provide evidence on strategies effective for reducing harmful use.* ***Approach.*** *A search of 13 electronic databases for peer-reviewed articles published between 1993 and 2014 focusing on substance use and Indigenous peoples of Australia, New Zealand, Canada and the United States. Relevant abstracts were classified as data or non-data based research. Data-based studies were further classified as measurement, descriptive or intervention and their trends examined by country and drug type. Intervention studies were classified by type and their evaluation designs classified using the Cochrane Effective Practice and Organisation of Care (EPOC) data collection checklist.* ***Key Findings.*** *There was a statistically significant increase from 1993 to 2014 in the percentage of total publications that were data-based ($P < 0.001$). Overall, data-based publications were mostly descriptive for all countries (84–93%) and drug types (74–95%). There were fewer measurement (0–4%) and intervention (0–14%) publications for all countries and the percentage of these did not change significantly over time. Forty-two percent of intervention studies employed an EPOC evaluation design.* ***Implications.*** *Strategies to increase the frequency and quality of measurement and intervention research in the Indigenous drug and alcohol field are required.* ***Conclusion.*** *The dominance of descriptive research in the Indigenous drug and alcohol field is less than optimal for generating evidence to inform Indigenous drug and alcohol policy and programs.* [Clifford A, Shakeshaft A. A bibliometric review of drug and alcohol research focused on Indigenous peoples of Australia, New Zealand, Canada and the United States. Drug Alcohol Rev 2017;00:000-000]

Key words: indigenous, alcohol, drugs, review.

Introduction

Indigenous peoples of Australia, New Zealand, Canada and the United States experience a disproportionately high burden of drug and alcohol-related mortality [1–5]. Drug- and alcohol-related morbidity is also disproportionately higher among Indigenous peoples from these countries, including for example, foetal alcohol spectrum disorder [6,7], alcoholic cirrhosis [8,9], alcohol-related injury [10,11], tobacco-related cancers [3,12] and mental disorders [3,11].

In addition to improving knowledge about the causes, levels and patterns of drug and alcohol use in Indigenous populations, research can also provide evidence about which intervention strategies are most cost-effective for reducing the deleterious health, social and psychological effects of drugs and alcohol on Indigenous peoples [13]. The extent to which research contributes to both describing harms and evaluating interventions aimed at reducing them will depend on research output in the Indigenous drug and alcohol field.

Examining the number and type of research publications in a specific area can provide a broad indication of research output [14]. The number of research publications that are data based, relative to those that are not, for example, can establish the amount of primary data

Anton Clifford PhD, Senior Research Fellow, Anthony Shakeshaft PhD, Professor and Deputy Director. Correspondence to Dr Anton Clifford, Senior Research Fellow, School of Public Health, University of Queensland, Herston Road, Qld 4006, Australia. E-mail: a.clifford@uq.edu.au

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available to contribute to the evidence. Moreover, the types of data-based studies (e.g. measurement, descriptive and intervention) published provide an indication of the type of evidence available. Examining the number of these types of publications in the Indigenous drug and alcohol research field would provide an indication as to the extent to which research has progressed from describing drug and alcohol issues in Indigenous populations, to establishing evidence of the effectiveness of intervention strategies designed to reduce drug and alcohol-related harms in Indigenous communities.

Study design is an indicator commonly used to assess the extent to which research evaluating the effectiveness of an intervention contributes to strengthening the evidence base [15]. Identifying the type of study designs used to evaluate drug and alcohol interventions targeting Indigenous peoples can provide an indication as to the strength of the Indigenous drug and alcohol evidence base [16]. It can also identify key gaps and areas for improvement. Such information may assist research and government funding agencies to identify priority study designs to strengthen the Indigenous drug and alcohol evidence base which, in turn, provides policy makers and health services with more reliable and valid evidence to inform drug and alcohol policies and programs targeting Indigenous peoples.

The overall aim of this review is to analyse the output of peer-reviewed drug and alcohol publications focused on Indigenous peoples of Australia, Canada, New Zealand and the United States for the period 1993–2014. Specifically, this review aims to: first, identify the number of drug and alcohol peer-reviewed publications focused on Indigenous peoples of Australia, New Zealand, Canada and the United States and the percentage of these that are data based; second, classify data-based studies as descriptive, measures or intervention research to determine the trend in these types of publications over time; and third, identify the foci, outcome measures and study design of intervention studies to determine the nature and quality of evidence available to inform Indigenous drug and alcohol policy and programs.

Methods

Search strategy

Figure 1 summarises the databases searched, the search terms used, the exclusion criteria and classification of studies.

The search strategy was consistent with methods detailed in the Cochrane Collaboration Handbook on Systematic Reviews of Health Promotion and Public Health Interventions [15]. A qualified archivist identified 13 relevant electronic databases to search: APAIS-ATSIS, ATSIHealth, Campbell Library, CINAHL, Cochrane Database of Systematic Reviews, DRUG, Embase, Global Health, Medline, NDARC Library, Project Cork, PsycINFO and PubMed. Electronic databases were searched individually with specific search strings as this search method is more effective at identifying relevant articles than a simultaneous search using generic search terms. An initial search of databases was conducted in October 2013 for the time period 1993–2013 (16 October). Given evidence of the small number of peer reviewed studies in the Indigenous health field [14], a 20 year time period was selected to obtain sufficient numbers of different types of studies to quantify changes in published Indigenous drug and alcohol research over time. The initial search identified 2421 references (after electronic removal of 1169 duplicate references). An updated search was conducted in July 2015 for the period 2013 to 2014, to extend the time period to December 2014. The 22 year period was selected to allow enough time for completion of the research and publication of the findings, balanced against limiting recall bias about studies completed too long ago. This updated search identified an additional 266 references (after electronic removal of duplicates). Combined, the initial and updated search identified 2687 citations/abstracts that were imported into Endnote.

Classification of studies

The abstracts of the 2687 identified references were examined and classified in a three-step process.

Step 1: Identification of studies for exclusion. Papers were excluded if: (i) Indigenous peoples of Australia, New Zealand, Canada or the USA were not the main study population (n = 601); (ii) alcohol or drugs was not the focus of the study (n = 568); (iii) they were not a journal article (n = 337); or (iv) they were a duplicate (n = 135). Step 1 excluded 1641 publications, leaving 1046 remaining studies.

Step 2: Classification of studies. The remaining studies (n = 1046) were classified by research type using criteria derived and adapted from previous reviews [14]. Studies were initially classified into *Data-based* (n = 656), defined as original articles reporting new data or analysis of existing data, or *Non-data based* (n = 390), defined as research-reports of study protocols, commentaries, opinion articles, case studies or summaries of previous research (i.e. reviews).

Data-based studies were further categorised using a classification system employed in previous reviews [17–20]: *Measurement*, defined as studies concerned primarily with developing drug or alcohol measurement

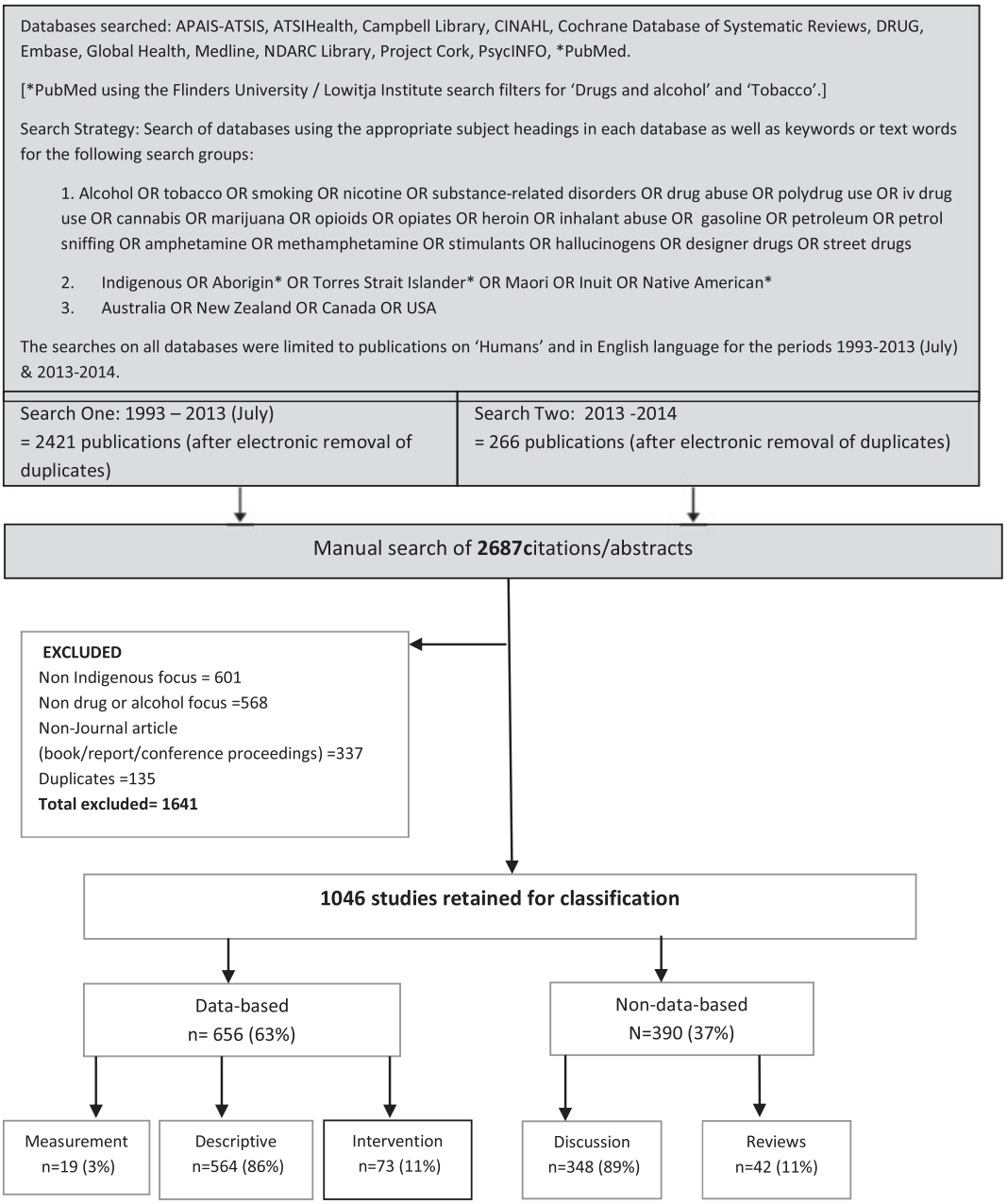

Figure 1. *Flowchart indicating search strategy and classification of studies.*

instruments and/or testing their psychometric properties (*n* = 19); *Descriptive*, defined as quantitative or qualitative research exploring the frequency, patterns, or predictors of smoking, alcohol, or other drug use, or related variables, such as knowledge, attitudes, harms, perceptions or experiences. (*n* = 564); and *Intervention*, defined as evaluations or trials of interventions (e.g. programs, services or policies) designed to reduce drug or alcohol use and/or related harm, evaluations or trials of intervention approaches that included alcohol or other drugs as an outcome predictor variable, or evaluations of approaches for improving the uptake of drug or alcohol interventions by healthcare practitioners (*n* = 73). If a publication focused on both descriptive and intervention issues, it was classified as intervention research. If it focused on both measurement and descriptive issues, it was classified as measurement research.

A randomly selected sample of 100 articles (~20%) classified in step two were re-classified by a blinded research assistant to cross-check classifications performed by the first author. Agreement between coders was good (*kappa* = 0.62). Discrepancies were discussed and resolved. Because of sufficient agreement between

coders cross-checking more than 20% of classifications was deemed unnecessary.

Step 3: Classification of intervention studies. The abstracts of the 73 intervention studies were further classified using a modified version of a taxonomy for classifying drug and alcohol interventions [21]. The original taxonomy was rated highly in a review of schemes for classifying drug policy interventions [22] and includes four categories: law enforcement, prevention, treatment and harm reduction [23]. In applying the taxonomy to classify drug and alcohol interventions identified in this review, two modifications were made: first, the category law enforcement was replaced with supply reduction and included the subcategories of law enforcement and regulation, to distinguish between supply reduction strategies that use law enforcement and those that do not; and second, a fifth category, dissemination, was included to determine the extent to which strategies designed to integrate evidence distilled from drug and alcohol research into practice are being evaluated in Indigenous communities [24]. The five categories defined included: (i) *Supply Reduction*, defined as either 'law enforcement'—laws targeting individuals or sub-groups of drinkers that normally require police enforcement to be effective, such as alcohol free zones/bans on public drinking; or 'regulation'—laws that do not normally require active law enforcement, such as trading hours and bans on some types of alcohol sales; (ii) *Prevention*, defined as strategies to prevent or delay the onset or development of substance misuse problems or harms in individuals at risk; (iii) *Treatment*, defined as strategies designed to treat individuals with or at risk of drug or alcohol dependence; (iv) *Harm reduction*, defined as strategies designed to reduce harms from substance misuse in individuals and the community; and (v) *Dissemination*, defined as interventions designed to improve delivery of drug and alcohol interventions to Indigenous peoples.

Broad characteristics of intervention studies in each of the five categories were summarised using criteria related to the drug targeted, intervention type and setting, study design and outcomes measured. Cochrane's Effective Practice and Organisation of Care (EPOC) data collection checklist was used to classify intervention studies by their evaluation design [16]: randomised controlled trial (RCT), controlled clinical trial, controlled before and after study and interrupted time series. The checklist was chosen because it includes criteria to facilitate inclusion of non-experimental evaluation designs (i.e. those without randomisation or a control group). Evaluation designs not meeting EPOC criteria were classified as Non-EPOC.

Statistical analysis

All analyses were performed using STATA Version 13. Tests for significant differences in the overall distribution of studies used the $\chi 2$ statistic, reporting degrees of freedom (df) and the probability value (P). Fischer's exact test was used if any value in any cell was <5 [25].

Results

Number of publications and percentage that were data based

Figure 2 shows the number of data and non-data based drug and alcohol publications focused on Indigenous

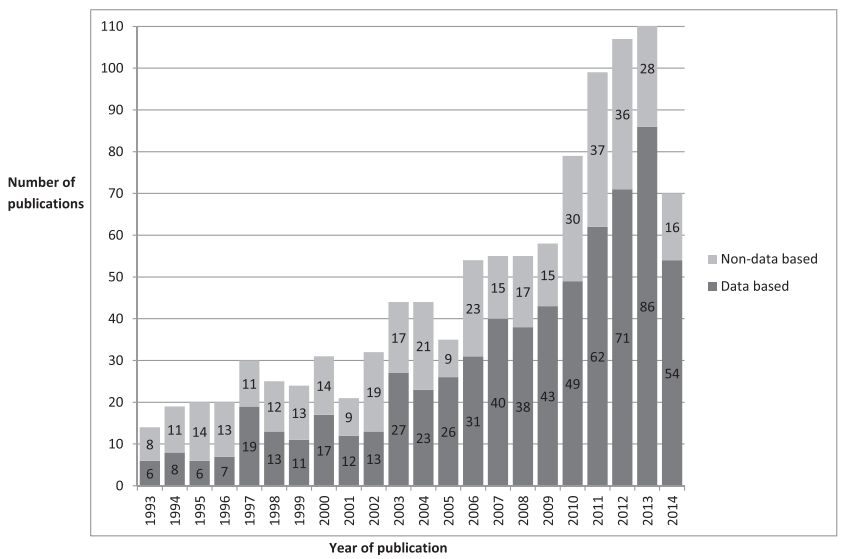

Figure 2. *Number of data and non-data based publications, 1993–2014.*

peoples of Australia, New Zealand, Canada and the United States for each year from 1993 to 2014. There was a statistically significant increase over time in the percentage of publications that were data-based ($X2 = 60.2892$ df = 21 $P < 0.0001$).

Type of data-based publications

The number of data-based publications classified as measurement and intervention for each year from 1993 to 2014 was typically small (<5). The years from 1993 to 2014 were therefore grouped into three time periods: 1993–2000; 2001–2007 and 2008–2014. Measurement and descriptive categories were collapsed, and χ^2 or Fischer exact tests of publication type (intervention/other) by time were undertaken.

Table 1 shows the number and percentage of data-based publications classified into measurement, descriptive and intervention subcategories for each country in each time period.

Overall, data-based publications were predominately descriptive (564 of the 656 publications), comprising 84% (n = 72) of publications in 1993–2000, 84% (n = 144) in 2001–2007, and 87% (n = 346) in 2008–2014. Intervention studies (73 of the 656 publications), comprised 16% (n = 14) of publications in 1993–2000, 11% in 2001–2007 (n = 19) and 10% in 2008–2014 (n = 40). Measurement studies (19 of the 656 publications) comprised 0% in 1993–2000, 5% (n = 9) in 2001–2007, and 3% (n = 10) in 2008–2014. The distribution of studies had not changed significantly across time periods ($X2 = 1.6593$ $df = 2$ $P = 0.436$). The distribution did not change significantly over time for any country ($P > 0.05$).

Table 2 shows the number and percentage of measurement, descriptive and intervention studies for alcohol, tobacco, illicit and poly-drug use in each time period.

Tobacco and alcohol were the focus of 40% (n = 263) and 27% (n = 176) of data-based studies, respectively. Poly drug use was the focus of 19% of studies (n = 127), with alcohol (n = 78), cannabis (n = 62) and tobacco (n = 50) the three most common drugs targeted. Fourteen percent of studies targeted an illicit drug, most commonly cannabis, and 2% targeted inhalants. The distribution of studies over time periods did not change significantly for alcohol (P = 0.07), tobacco (P = 0.27), illicit (P = 0.74) or poly drug use (P = 0.69) publications. The change in the distribution of solvent publications could not be determined because of their zero number of intervention studies.

Table 1. *Number and percentage of data-based studies classified as measurement, descriptive or intervention research by country*

	Totals	Measurement, *n* (%)	Descriptive, *n* (%)	Intervention, *n* (%)
United States				
1993–2000	40	0 (0%)	35 (87%)	5 (13%)
2001–2007	73	4 (5%)	64 (88%)	5 (7%)
2008–2014	163	2 (1%)	148 (91%)	13 (8%)
Totals	276	6 (2%)	246 (89%)	23 (8%)
Australia				
1993–2000	36	0 (0%)	29 (81%)	7 (19%)
2001–2007	55	5 (9%)	39 (71%)	11 (20%)
2008–2014	134	7 (6%)	109 (81%)	18 (13%)
Totals	225	12 (5%)	177 (79%)	36 (16%)
New Zealand				
1993–2000	4	0 (0%)	3 (75%)	1 (25%)
2001–2007	24	0 (0%)	21 (88%)	3 (12%)
2008–2014	41	1 (3%)	36 (87%)	4(10%)
Totals	69	1 (1%)	60 (87%)	8 (12%)
Canada				
1993–2000	6	0 (0%)	5 (83%)	1 (17%)
2001–2007	20	0 (0%)	20 (100%)	0 (0%)
2008–2014	59	0 (0%)	55 (93)	5 (7%)
Totals	86	0(0%)	80 (93%)	6 (7%)
Total				
1993–2014	656	19 (3%)	564 (86%)	73 (11%)

Table 2. *Number and percentage of data-based studies classified as measurement, descriptive or intervention research by drug type*

	Totals	Measurement, *n* (%)	Descriptive, *n* (%)	Intervention, *n* (%)
Alcohol				
1993–2000	34	0 (0%)	25 (74%)	9 (26%)
2001–2007	47	2 (4%)	41(87%)	4 (9%)
2008–2014	95	2 (4%)	81 (82%)	12 (15%)
Totals	176	4 (2%)	147 (84%)	25 (14%)
Tobacco				
1993–2000	20	0 (0%)	17 (85%)	3 (15%)
2001–2007	63	2 (3%)	51(81%)	10(16%)
2008–2014	180	4 (2%)	160 (88%)	16 (9%)
Totals	263	6 (2%)	228 (87%)	29 (11%)
Illicits		-		
1993–2000	6	0 (0%)	5 (83%)	1 (17%)
2001–2007	30	3 (10%)	24 (80%)	3 (10%)
2008–2014	43	1 (2%)	39 (91%)	3 (7%)
Totals	79	4 (4%)	68 (88%)	7 (8%)
Inhalants				
1993–2000	4	0 (0%)	4 (100%)	0 (0%)
2001–2007	4	0 (0%)	4 (100%)	0 (0%)
2008–2014	3	0 (0%)	3 (100%)	0 (0%)
Totals	11	0 (0%)	11 (100%)	0 (0%)
Poly-drug use				
1993–2000	22	0 (0%)	21 (95%)	1 (5%)
2001–2007	28	2 (4%)	24 (89%)	2 (7%)
2008–2014	77	3 (5%)	65 (83%)	9 (14%)
Totals	127	5 (4%)	110 (87%)	12 (9%)
Total				
1993–2014	656	19 (3%)	564 (86%)	73 (11%)

Broad characteristics of intervention studies

Table 3 summarises the characteristics of intervention studies. Of the 73 intervention studies, 25 were classified as Prevention, 22 Treatment, 11 Supply Reduction, 7 Harm Reduction and 8 Dissemination.

Prevention interventions primarily evaluated education ($n = 10$ studies) and mass media ($n = 6$ studies) strategies targeting tobacco or alcohol. Drug use was a primary outcome measure for 20 out of 25 prevention interventions.

Thirteen out of 22 treatment interventions evaluated pharmacotherapies, alone or in combination with a behavioural intervention (i.e. counselling). Tobacco ($n = 10$ studies) was the drug most commonly targeted by treatment interventions. Drug use was a primary outcome measure for 20 out of 22 treatment interventions, followed by drug-related harms ($n = 7$ studies).

Ten out of 11 supply reduction interventions evaluated community level alcohol restrictions. Alcohol-related harms were a primary outcome measure for almost two-thirds of these types of interventions ($n = 7$ studies), followed by alcohol use ($n = 4$ studies).

Four out of seven harm reduction interventions evaluated multiple strategies targeting alcohol, three of which identified alcohol use as the primary outcome measure. Dissemination interventions evaluated strategies to improve the uptake of alcohol and/or tobacco interventions in primary health care or community settings.

Study designs employed by intervention studies

Table 4 summarises the number and percentage of intervention studies employing EPOC and non-EPOC evaluation designs.

Of the 73 intervention studies, 41% ($n = 30$) employed an EPOC (13 controlled before and after; 10 randomised controlled trials and 7 interrupted time series) and 59% ($n = 43$) a non-EPOC (30 single before and after; 10 post-test; and 1 each of case study, cross-sectional and longitudinal cohort) evaluation design. The percentage

Table 3. *Key characteristics of published evaluations of drug and alcohol interventions targeting Indigenous peoples*

Intervention type, year	Country	Drug/s	Intervention strategy	Setting/s	EPOC study design	Outcomes measured			
						Behaviour	Harms	Knowledge, attitudes and/or perceptions	Process
Prevention									
1995	Australia	Petrol	Petrol replacement, work skills	Community	CBA	√	√	—	—
1996	US	Tobacco	Education	Community	CBA	√	—	√	—
1997	Australia	Alcohol	Education	Prison	Non-EPOC	√	√	—	—
1998	Australia	Tobacco	Community health promotion	Community	Non-EPOC	√	—	√	—
2005	Australia	Tobacco	Mass media	Community	Non-EPOC	√	—	—	—
2005	NZ	Tobacco	Mass media	Community	Non-EPOC	—	—	—	√
2006	Australia	Tobacco	Education	PHC	Non-EPOC	√	—	√	—
2006	Australia	Tobacco	Community health promotion	Community	CBA	√	—	√	—
2007	US	Substance use	Education	Schools	Non-EPOC	√	—	√	—
2008	NZ	Tobacco	Mass media	Community	Non-EPOC	√	—	√	—
2008	Australia	Cannabis, petrol, alcohol	Community development	Remote communities	ITS	√	√	—	√
2009	US	Substance use	Education	Schools	Non-EPOC	—	—	√	—
2009	US	Inhalants, alcohol, tobacco	Education	Schools	RCT	√	—	—	—
2009	Australia	Alcohol	Community sport	Community	Non-EPOC	√	√	—	—
2010	Australia	Tobacco	Mass media	Rural and urban communities	Non-EPOC	—	—	√	—
2010	Australia	Tobacco	Education health promotion	Remote communities	Non-EPOC	√	—	—	√
2012	US	Alcohol	Mass media	Rural/remote communities	Non-EPOC	√	—	√	—
2012	US	Substance use	Education	Schools	CBA	√	√	—	—
2012	US	Tobacco	Education	Schools	CBA	—	—	√	—
2013	US	Alcohol	Mass media	Community	Non-EPOC	√	—	√	—

Table 3 (continued)

Intervention type, year	Country	Drug/s	Intervention strategy	Setting/s	EPOC study design	Outcomes measured			
						Behaviour	Harms	Knowledge, attitudes and/or perceptions	Process
2013	US	Alcohol	Mail out of brochures and workbook to high risk group	Community (home)	Non-EPOC	√	—	—	—
2014	Australia	Tobacco	Multi-component community intervention	Community and health settings	CBA	√	—	—	√
2014	NZ	Tobacco	Community health promotion	Community groups	Non-EPOC	√	—	√	—
2014	Canada	Substance use	Education	Schools	CBA	√	—	√	—
2014	Australia	Tobacco	Social marketing	Community	Non-EPOC	√	—	—	—
Supply reduction									
1994	Australia	Alcohol	Regulation	Remote community	Non-EPOC	—	—	—	√
1995	Canada	Alcohol	Regulation	Remote communities	Non-EPOC	√	—	√	—
1998	Australia	Alcohol	Regulation	Remote community	ITS	√	√	—	—
2000	Australia	Alcohol	Regulation	Remote community	ITS	√	√	√	—
2000	US	Alcohol	Regulation, law enforcement	Remote/rural communities	CBA	—	√	—	—
2006	US	Alcohol	Regulation, law enforcement	Remote communities	ITS	—	√	—	—
2008	Australia	Alcohol	Regulation	Remote communities	ITS	—	√	—	—
2009	NZ	Tobacco	Regulation	Workplaces	Non-EPOC	√	—	√	—
2010	Australia	Alcohol	Regulation	Remote community	Non-EPOC	√	√	—	—
2013	Australia	Tobacco	Regulation	Remote communities	Non-EPOC	√	—	√	—
2014	US	Alcohol	Regulation, law enforcement	Rural community	ITS	—	√	—	—
Harm reduction									
1994	Australia	Alcohol	Sobering up shelter	Remote communities	ITS	√	√	—	—
1996	US	Alcohol	Empowerment and support	After care treatment centres	Non-EPOC	√	—	√	√
2000	NZ	Alcohol	Community action	Community	Non-EPOC	—	√	—	—

Table 3 (continued)

Intervention type, year	Country	Drug/s	Intervention strategy	Setting/s	EPOC study design	Outcomes measured			
						Behaviour	Harms	Knowledge, attitudes and/or perceptions	Process
2000	US	Alcohol, tobacco, cannabis	Skills and community-based intervention	Community	RCT	√	—	—	—
2005	Australia	Alcohol	Education, rehabilitation, taxation	Community	Non-EPOC	√	√	—	—
2005	US	Tobacco	Quit program	Schools	CBA	√	—	—	—
2006	Australia	Alcohol	Sobering up shelter	Community	Non-EPOC	—	—	—	√
Treatment									
1995	US	Tobacco	Counselling Pharmacotherapy	Primary care	Non-EPOC	√	—	—	—
2003	Australia	Tobacco	BI, pharmacotherapy	PHC	Non-EPOC	√	—	—	—
2004	Australia	Tobacco	Counselling Pharmacotherapy	Community settings	Non-EPOC	√	—	√	√
2004	NZ	Illicit drugs	Pharmacotherapy	Outpatient treatment	Non-EPOC	√	√	—	—
2005	NZ	Tobacco	Pharmacotherapy	Primary care	RCT	√	—	—	—
2006	US	Substance use	Residential treatment	Residential rehabilitation	CBA	√	√	—	√
2007	Australia	Heroin	Pharmacotherapy	Indigenous PHC	Non-EPOC	√	—	—	√
2007	US	Tobacco	Quit program	Primary care	Non-EPOC	√	—	—	—
2008	US	Alcohol	Pharmacotherapy	Rural rehab setting	RCT	√	√	—	—
2009	Australia	Alcohol, cannabis	Brief Intervention	PHC	RCT	√	—	—	—
2010	Australia	Alcohol, petrol	treatment	Treatment settings	Non-EPOC	—	√	—	—
2010	Canada	Heroin	Pharmacotherapy	Drug treatment centres	RCT	—	—	—	√
2010	US	Tobacco	Counselling and pharmacotherapy	PHC	RCT	√	—	—	√
2010	Australia	Alcohol	Residential treatment	Residential rehabilitation	CBA	√	√	—	—
2011	Australia	Solvent	Residential treatment	Residential treatment sites	CBA	√	√	—	—
2011	US	Tobacco	Counselling and pharmacotherapy	Rural and remote community settings	Non-EPOC	√	—	√	—
2012	Australia	Tobacco	Counselling, support, pharmacotherapy	Indigenous PHC	RCT	√	—	—	—

Table 3 (continued)

Intervention type, year	Country	Drug/s	Intervention strategy	Setting/s	EPOC study design	Outcomes measured			
						Behaviour	Harms	Knowledge, attitudes and/or perceptions	Process
2013	NZ	Alcohol	Web based BI	Community	RCT	√	√	—	—
2012	Canada	Opioids	Pharmacotherapy	Community	Non-EPOC	√	—	—	√
2013	Australia	Alcohol	Counselling, support and pharmacotherapy	Indigenous PHC	Non-EPOC	√	—	—	—
2013	Canada	Alcohol, tobacco cocaine, cannabis, opioids	Counselling treatment	Community settings	Non-EPOC	√	√	√	—
2014	Australia	tobacco	Counselling	Indigenous PHC	RCT	√			
Dissemination									
2002	Australia	Alcohol	Education	Indigenous PHC	Non-EPOC	—	—	√	—
2002	Australia	Tobacco	Training in tobacco BI	Health care settings	Non-EPOC	—	—	√	—
2004	Australia	Alcohol	Dissemination of alcohol guidelines	Primary care	Non-EPOC	√		√	
2011	Australia	Tobacco	Training and provision of resources	PHC	CBA	√	—	√	—
2012	Australia	Alcohol	Training and outreach support	Indigenous PHC	Non-EPOC	√	—	—	√
2013	Canada	Tobacco	Distance education and support	Community	Non-EPOC	—	—	√	—
2013	US	Tobacco	Training	Community	Non-EPOC	—	—	√	
2014	US	Alcohol, Tobacco	Electronic clinical reminders	Indigenous PHC	Non-EPOC	√	—	—	√

BI, brief intervention; CBA, controlled before and after study; EPOC, Cochrane Effective Practice and Organisation of Care; ITS, interrupted time series; NZ, New Zealand; PHC, primary health care; RCT, randomised controlled trial; US, United States.

Table 4. *Number (%) of intervention studies and respective EPOC evaluation designs in each time period*

Time period	EPOC			Non-EPOC	Total
	RCT	CBA	ITS		
1993–2000	1 (8%)	3 (29%)	3 (29%)	7 (50%)	14
2001–2007	1 (5%)	3 (16%)	1 (5%)	14 (74%)	19
2008–2014	8 (20%)	7 (17%)	4 (10%)	21 (53%)	40
Total	10 (13%)	13 (18%)	7 (10%)	43 (59%)	73

CBA, controlled before and after study; EPOC, Cochrane Effective Practice and Organisation of Care; ITS, interrupted time series; RCT, randomised controlled trial.

of interventions evaluated using an EPOC design was highest from 1993 to 2000 (50%) and lowest from 2001 to 2007 (26%). The percentage of interventions evaluated using an EPOC design did not change significantly over time ($X^2 = 2.7211$ $df = 2$ $P = 0.257$).

Discussion

This review examined broad patterns of Indigenous drug and alcohol research output over the past 20 years. Encouragingly, the proportion of publications that were data based increased steadily over the time period. Less encouraging, 86% of all data-based publications were descriptive studies, with only 11% assessing the effectiveness of interventions. This predominance of descriptive studies was consistent for all time periods, countries and types of drugs. This finding is consistent with that of previous reviews examining research output in the drug and alcohol [20,26,27] and Indigenous health [14,28] fields. This indicates that, as with drug and alcohol and Indigenous health research generally, the development of intervention research in the Indigenous drug and alcohol field is progressing slowly, limiting the amount and quality of evidence available to inform policies and programs implemented to reduce drug and alcohol harms in Indigenous communities. Compounding this is the small number of dissemination studies, which, consistent with previous research [24,29,30], suggests that the implementation of evidence distilled from drug and alcohol research in Indigenous communities is not being rigorously evaluated and the results consistently published in the peer review literature.

Measurement articles constituted 0–9% of research publications for all time periods, countries and drug types. This is less than optimal, considering that valid and reliable measurement tools are required for rigorous descriptive and intervention research. Tobacco and alcohol publications had a lower percentage of measurement studies than illicit and poly-drug use publications. Given that tobacco and alcohol accounted for 40% and 27% of data-based publications, respectively, it might have been expected that a larger percentage of research outputs in these fields would have been allocated to developing and testing measurement tools. If the validity and reliability of tobacco and alcohol measures are not rigorously established for Indigenous peoples, the accuracy of prevalence data examining patterns of use, outcome data assessing the effect of interventions designed to reduce use and screening instruments to detect individuals with at risk use are likely to be questionable. For example, in their critique of a national survey of Indigenous alcohol use in Australia, Chikritzhs and Brady found that less than optimal measures contributed to an underestimation of Indigenous alcohol use [31]. They concluded that an understanding of Indigenous cultures and drinking patterns are required to obtain reliable and accurate measures of Indigenous alcohol use. Encouragingly, there is some evidence from the relatively small number of drug and alcohol measurement studies conducted in Indigenous communities of researchers working with Indigenous communities to develop reliable and accurate measures of Indigenous drug and alcohol use that are culturally appropriate and acceptable to Indigenous peoples [32–36].

Intervention studies

The variations in the number and types of interventions evaluated may reflect differences in prevalence and harms, and levels of funding and political support for alcohol, tobacco and illicit drugs. The dominance of alcohol and tobacco intervention evaluations is consistent with Indigenous peoples experiencing a higher burden of harm from alcohol and tobacco than other drugs [3,5]. Similarly, the higher percentage of treatment interventions for smoking is consistent with tobacco smoking being a leading behavioural risk factor of death and disease in Indigenous populations [37]. Although the percentage of research that is intervention is highest for tobacco, it is concerning that the percentage of tobacco intervention research has remained low from 1993–2000 (15%) to 2008–2014 (9%). This low

proportion of tobacco intervention research is a particular problem for Indigenous peoples because they are over-represented in low-socioeconomic status sub-populations [37] and rates of smoking remain high among these populations [38].

With regard to alcohol, the dominance of supply reduction interventions in Australia possibly reflects the disproportionately high burden of alcohol harms in remote Indigenous Australian communities [9], and widespread political support for community-level alcohol restrictions to reduce risky alcohol consumption and related harms [39]. It might also reflect the relative ease of implementing these strategies, compared with the time, commitment and high levels of engagement required to successfully implement more participatory alcohol intervention approaches in Indigenous communities [40]. A recent review of Indigenous community studies published between 1990 and 2015 has shown that despite much rhetoric about the importance of community development interventions designed, implemented and evaluated in partnership with Indigenous communities, only 31 such evaluations were published in this 25 year period, and they were of low methodological quality [41]. In clinical settings, it might similarly have been expected that a greater number of studies reporting the cost-effectiveness of alcohol interventions for Indigenous peoples would have been published, considering the high strength of the evidence base for alcohol brief interventions delivered in non-Indigenous clinical settings [42] and their relatively low rates of delivery to Indigenous Australians in primary health care [43].

Only 41% (n = 30) out of 73 intervention studies employed an EPOC evaluation design. The dominance of non-EPOC designs is consistent with findings of previous reviews of Indigenous health research, which found that few study designs used to evaluate drug and alcohol interventions specifically targeting Indigenous peoples employ randomisation and a control group [44–47]. The RCT is the most rigorous study design, but its implementation is not always feasible [48], particularly in Indigenous communities [49]; only one third of EPOC evaluation designs employed an RCT. Practical and methodologically rigorous study design alternatives for increasing the output of robust intervention studies in the Indigenous drug and alcohol field should therefore be considered. Encouragingly, there is recent evidence of researchers in the Indigenous drug and alcohol field implementing methodologically rigorous alternatives to RCTs, such as the Multiple Baseline design (MBD) [50–53]. Methodologically, this design staggers the implementation of interventions across multiple sites with each site acting as a comparative control for other sites for the period before it receives the intervention [54]. Practically, the MBD is more cost and time-efficient than RCTs and more feasible for evaluating public health, policy and community-level interventions [55]. Despite its methodological rigour and practical benefits, no intervention study in this review employed the MBD and few employed similar alternatives. The process of implementing methodologically rigorous alternatives, and RCTs, as described by researchers currently utilising them to evaluate Indigenous drug and/or alcohol interventions, strongly suggests that partnerships between researchers, Indigenous communities and healthcare providers are required, to enable researchers' methodological skills and expertise to be combined with community members' local knowledge and experience, and healthcare providers' expertise in designing and implementing services and programs [50–53].

Limitations of methodology

Grey literature publications were not included as they have not been subject to peer review. As well-designed studies are likely to be published in peer-reviewed journals [56], it seems unlikely that rigorous studies would have been under-represented. There may be disagreement over the classification system used to categorise types of research output. The classification system has, however, been used in previous reviews of Indigenous health research [14], enabling comparison of outputs of Indigenous drug and alcohol research with Indigenous health research more broadly. It also provides a useful indicator for those working in the Indigenous drug and alcohol field of the potential for outputs being produced to inform policy and practice. Publications may have been misclassified, although good agreement (*kappa* = 0.62) between blinded coders suggests not. Study design was the main indicator used to assess the quality of intervention studies. Indicators related to implementation of a study design (e.g. selection bias, confounding, attrition) were not examined. Study designs may have been implemented in a way that compounded weaknesses and compromised strengths inherent in their design. Differences in inherent methodological strengths and weaknesses across study designs (e.g. random vs. non-random and single vs. two group designs) however, make them an adequate indicator of the methodological quality of an intervention evaluation [16].

Conclusion

While there has been an increase in the number and percentage of data-based publications in the Indigenous drug and alcohol field, the pattern of research output suggests a dominance of descriptive research and a paucity of intervention and measurement research, at least over the past two decades. Compounding the lack of intervention research has been the small number of interventions

evaluated using methodologically rigorous study designs. If mechanisms to increase the frequency and quality of intervention research in the Indigenous drug and alcohol field are not implemented, evidence for informing Indigenous drug and alcohol policy and programs is likely to be inconclusive or absent. Research institutions and funding organisations should therefore consider the findings of this review when allocating research resources in the Indigenous drug and alcohol field. The overall findings of this review suggest that greater priority should be given to allocating research resources to studies with the greatest potential to reduce Indigenous drug and alcohol-related harms through the application of evidence-based practice.

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References

[1] Bramley D, Broad J, Harris R, Reid P, Jackson R, for the Alcohol Burden of Disease and Disability Group. Differences in patterns of alcohol consumption bewteen Maori and non-Maori in Aoteraroa (New Zealand). N Z Med J 2003;116:U645.

[2] Vos T, Barker B, Begg S, Stanley L, Lopez AD. Burden of disease and injury in Aboriginal and Torres Strait Islander peoples: the Indigenous health gap. Int J Epidemiol 2009;38:470–477.

[3] Galgali G, Beaglehole R, Scragg R, Tobias M. Potential for prevention of premature death and disease in New Zealand. N Z Med J 1998;111:7–10.

[4] Tjepkema M, Wilkins R, Senecal S, Guimond E, Penney C. Mortality of urban Aboriginal adults in Canada, 1991–2001. Prev Chronic Dis 2011;8:A06.

[5] Shield KD, Gmel G, Kehoe-Chan T, Dawson DA, Grant BF, Rehm J. Mortality and potential years of life lost attributable to alcohol consumption by race and sex in the United States in 2005. PLoS One 2013;8:e51923.

[6] Elliott EJ, Payne J, Morris A, Haan E, Bower C. Fetal alcohol syndrome: a prospective national surveillance study. Arch Dis Child 2008;93:732–737.

[7] Beckett CD. Fetal alcohol spectrum disorders: a Native American journey to prevention. Fam Community Health 2011;34:242–245.

[8] Calabria B, Doran CM, Vos T, Shakeshaft AP, Hall W. Epidemiology of alcohol-related burden of disease among Indigenous Australians. Aust N Z J Public Health 2010;34:S47–S51.

[9] Landen M, Roeber J, Naimi T, Nielsen L, Sewell M. Alcohol-attributable mortality among American Indians and Alaska natives in the United States, 1999–2009. Am J Public Health;2014:S343–S349.

[10] Wood DS. Alcohol controls and violence in Nunavut: a comparison of wet and dry communities. Int J Circumpolar Health 2011;70:19–28.

[11] Steering Committee for the Review of Government Service Provision. Overcoming indigenous disadvantage: key indicators. Canberra: Productivity Commission, 2003.

[12] McKenzie F, Ellison-Loschmann L, Jeffreys M, Firestone R, Pearce N, Romieu I. Cigarette smoking and risk of breast cancer in a New Zealand Multi-Ethnic Case–Control Study. PLoS One 2013;8:e63132.

[13] Gray D, Wilkes E. Reducing alcohol and other drug related harm. Resource sheet no. 3. Produced for the Closing the Gap Clearinghouse. Canberra: Australian Institute of Health and Welfare. Melbourne: Australian Institute of Family Studies, 2010.

[14] Sanson-Fisher RWCE, Perkins JJ, Blunden SV, Davis BB. Indigenous health research: a critical review of outputs over time. Med J Aust 2006;184:502–505.

[15] Jackson N. Handbook: systematic reviews of health promotion and public health interventions. Victoria: Victorian Health Promotion Foundation, 2007.

[16] Cochrane Effective Practice and Organisation of Care Review Group. Data collection checklist. Available online: http://epoc.cochrane.org/sites/epoc.cochrane.org/files/uploads/datacollectionchecklist.pdf (accessed on 23 January 2015).

[17] Calabria B, Shakeshaft A, Havard A. A systematic and methodological review of interventions for young people experiencing alcohol-related harm. Addiction 2011;106:1406–1418.

[18] Clinton-McHarg T, Carey M, Sanson-Fisher R, Shakeshaft A, Rainbird K. Measuring the psychosocial health of adolescent and young adult (AYA) cancer survivors: a critical review. Health Qual Life Outcomes 2010;8:25.

[19] Havard A, Shakeshaft A, Sanson-Fisher R. Systematic review and meta-analyses of strategies targeting alcohol problems in emergency departments: interventions reduce harm, not consumption. Addiction 2008;103:368–376.

[20] Calabria B, Clifford A, Shakeshaft AP, Doran CM. A systematic review of family-based interventions targeting alcohol misuse and their potential to reduce alcohol-related harm in indigenous communities. J Stud Alcohol Drugs 2012;73:477–488.

[21] Ministerial Council on Drug Strategy. The National Drug Strategy; Australia's integrated framework 2004–2009. Canberra: Department of Health & Ageing, 2004.

[22] MacPherson D. A Framework For Action. A four pillar approach to drug problems in Vancouver (Revised). Vancouver: Pro-textual Communiations, 2001.

[23] Ritter A, McDonald D. Drug policy interventions: a comprehensive list and a review of classification schemes. Melbourne: Turning Point Alcohol and Drug Centre, 2005 Monograph No. 02: DPMP Monograph Series, 2005.

[24] Clifford A, Pulver L, Richmond R, Shakeshaft A, Ivers R. Disseminating best-evidence health-care to indigenous health-care settings and programs in Australia: identifying the gaps. Health Promot Int 2009;24:404–427.

[25] Pagano M, Gauvreau K. Principles of biostatistics. Wadsworth Incorproated: Belmont, California, 1993.

[26] Courtney RJ, Naicker S, Shakeshaft A, Clare P, Martire K, Mattick RP. Smoking cessation among low-soicoeconoic status amd disadvantaged population groups: a systematic review of research output. Int J Environ Res Public Health 2015;12:6303–6422.

[27] Sanson-Fisher RW, Campbell EM, Htun AT, Bailey LJ, Millar CJ. We are what we do: research outputs of public health. Am J Prev Med 2008;35:380–385.

[28] Azzopardi PS, Kennedy EC, Patton GC, *et al.* The quality of health research for young Indigenous Australians: systematic review. Med J Aust 2013;199:57–63.

[29] Brady MA. Difference and indifference: Australian policy and practice in Indigenous substance abuse. Canberra: Australian National University, 2000.

[30] Shakeshaft A, Clifford A, Shakeshaft M. Reducing alcohol related harm experienced by Indigenous Australians: identifying opportunities for Indigenous primary health care services. Aust N Z J Public Health 2010;34:S41–S45.

[31] Chikritzhs T, Brady M. Fact of Fiction? A critique of the National Aboriginal and Torres Strait Islander Social Survey 2002. Drug Alcohol Rev 2006;25:277–287.

[32] Calabria B, Clifford A, Shakeshaft A, *et al.* Identifying Aboriginal-specific AUDIT-C and AUDIT-3 cut off scores for at risk, high risk and likely dependent drinkers using measures of agreement with the 10-item AUDIT. Addict Sci Clin Pract 2014:9–17.

[33] Cummins LH, Chan KK, Burns KM, Blume AW, Larimer M, Marlatt GA. Validity of the CRAFFT in American–Indian and Alaska-native adolescents: screening for drug and alcohol risk. J Stud Alcohol 2003;64:727–732.

[34] Ober C, Dingle K, Clavarino A, Najman JM, Alati R, Heffernan EB. Validating a screening tool for mental health and substance use risk in an Indigenous prison population. Drug Alcohol Rev 2013;32:611–617.

[35] Okamoto SK, Helm S, Giroux D, Edwards C, Kulis S. The development and initial validation of the Hawaiian Youth Drug Offers Survey (HYDOS). Ethn Health 2010;15:73–92.

[36] Schlesinger CM, Ober C, McCarthy MM, Watson JD, Seinen A. The development and validation of the Indigenous Risk Impact Screen (IRIS): a 13-item screening instrument for alcohol and drug and mental health risk. Drug Alcohol Rev 2007;26:109–117.

[37] King MSA, Gracey M. Indigenous health part 2: underlying causes of the health gap. Lancet 2009;374:76–85.

[38] Hosseinpoor AR, Parker LA, d'Espaignet ET, Chatterji S. Social determinants of smoking in low-and middle-income countries: results for the World Health Survey. PLoS One 2011;6:e2033.

[39] d'Abbs P. Problematizing alcohol through the eyes of the other: alcohol policy and Aboriginal drinking in the Northern Territory, Australia. Contemp Drug Probl 2012;39:371–396.
[40] d'Abbs PH. Alcohol restrictions in Indigenous communities: necessary but not sufficient. Med J Aust 2011;194:507.
[41] Snijder MSA, Wagemakers A, Stephens A, Calabria B. A systematic review of studies evaluating Australian Indigenous community development projects: the extent of community participation, their methodological quality and their outcomes. BMC Public Health 2015;15:1154.
[42] Kaner EFS, Dickenson HO, Beyer FR, *et al.* Effectiveness of brief alcohol interventions in primary care populations. Cochrane Database Syst Rev 2007 .CD004148
[43] Clifford A, Shakeshaft A, Deans C. Training and tailored outreach support to improve alcohol screening and brief intervention in Aboriginal Community Controlled Health Services. Drug Alcohol Rev 2013;32:72–79.
[44] Rowan M, Poole N, Shea B, *et al.* Cultural interventions to treat addictions in Indigenous populations: findings from a scoping study. Subst Abuse Treat Prev Policy 2014;9:34.
[45] Lee K, Jagtenberg M, Ellis C, Conigrave K. Pressing need for more evidence to guide efforts to address substance use among young Indigenous Australians. Health Promot J Aust 2013;24:87–97.
[46] Clifford A, Pulver LJ, Richmond R, Shakeshaft A, Ivers R. Smoking, nutrition, alcohol and physical activity interventions targeting Indigenous Australians: rigorous evaluations and new directions needed. Aust N Z J Public Health 2011;35:S38–S46.
[47] Ashifa J, Kelly L, St Pierre-Hansen N. Healing the community to heal the individual. Literature review of aboriginal community-based alcohol and substance abuse programs. Can Fam Physician 2008;54 .1000.e1–7
[48] Bonell CPHJ, Cousens S, Ross D, Hayes R, Petticrew M, Kirkwood BR. Alternatives to randomisation in the evaluation of public health interventions: design challenges and solutions. J Epidemiol Community Health 2011;65:582–587.
[49] Glover M, Kira A, Johnston V, *et al.* A systematic review of barriers and facilitators to participation in randomized controlled trials by Indigenous people from New Zealand, Australia, Canada and the United States. Glob Health Promot 2015;22:21–31.
[50] Clough AR, Fitts MS, Robertson JA, *et al.* Study Protocol-Alcohol Management Plans (AMPS) in Queensland: their impacts on injury, violence, health and social indicators and their cost-effectiveness. BMC Public Health 2014;14.
[51] National Drug and Alcohol Research Centre (NDARC). The effectiveness of a multi-component intervention for young people with multiple and complex needs. Available online: https://ndarc.med.unsw.edu.au/project/the-effectiveness-of-a-multi-component-intervention-for-young-people-with-multiple-and-complex-needs (accessed 5 October 2015).
[52] National Drug and Alcohol Research Centre (NDARC). Reducing alcohol-related injury and violence in rural Aboriginal communities. Available online: https://ndarc.med.unsw.edu.au/project/reducing-alcohol-related-injury-and-violence-rural-aboriginal-communities (accessed 5 October 2015).
[53] National Cancer Institute. Division of Cancer Control and Population Sciences—Intervention Research to Improve Native American Health. http://cancercontrol.cancer.gov/nativeamericanintervention/funded.html (accessed on 26 November 2015).
[54] Hawkins NG, Sanson-Fisher R, Shakeshaft S, D'Este C, Green LW. The multiple baseline design for evaluating population-based research. Am J Prev Med 2007;33:162–168.
[55] Gilligan C, Sanson-Fisher R, Shakeshaft A. Appropriate research designs for evaluating community-level alcohol interventions: what next? Alcohol Alcohol 2010;45:481–487.
[56] Dwan K, Gamble C, Williamson PR, Kirkham JJ, the Reporting Bias Group. Systematic review of the empirical evidence of study publication bias and outcome reporting bias — an updated review. PLoS One 2013;8:e66844. DOI: 10.1371/journal.pone.0066844.