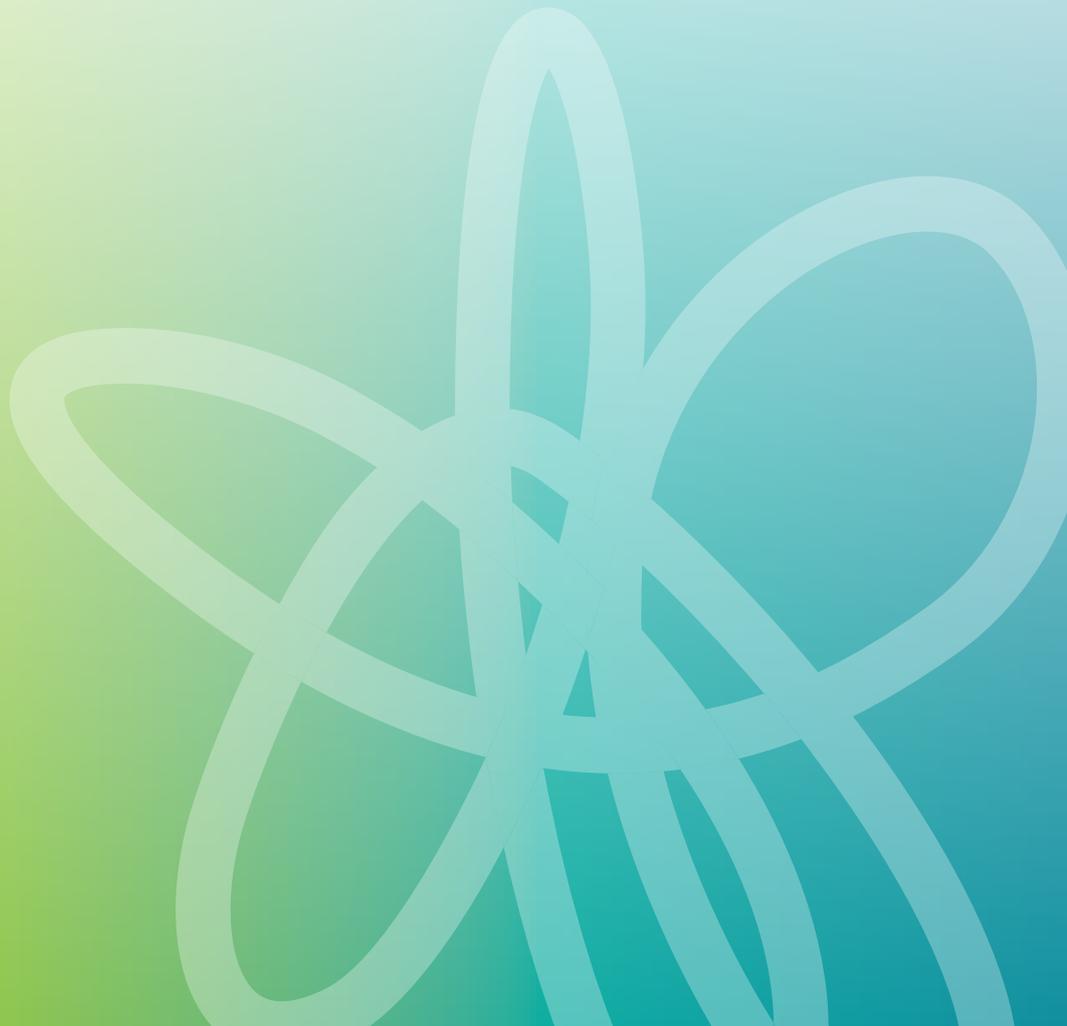




The Australian Prevention
Partnership Centre
Systems and solutions for better health

A rapid review of evidence

**Chronic disease prevention
interventions in children
and young adults**



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Chronic disease prevention interventions in children and young adults

An evidence review prepared for the Australian Government Department of Health on behalf of The Australian Prevention Partnership Centre

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Contents

1. Executive summary	5
i. Glossary	9
2. Background and aims of the review	10
3. Research questions	11
Purpose and audience for the review	11
4. Methods	12
Search strategy	12
Databases	12
Eligibility criteria	12
Screening and appraisal of evidence	12
5. Findings: nutrition	13
Home and family-centred strategies	13
Strategies among 0–5 year olds	13
Primary healthcare/health service strategies	13
Strategies to reduce consumption of sugar-sweetened beverages and energy-dense, nutrition-poor foods	13
6. Findings: physical inactivity	14
Home and family-centred strategies	14
Childcare-based strategies	14
School-based strategies	14
School-based policies	14
Active-travel strategies	14
After-school strategies	14
Multiple setting strategies	15
e-interventions	15
Sedentary behaviour reduction strategies	15
Strategies targeting girls	15
7. Findings: nutrition and physical inactivity	16
Home and family-centred strategies	16
Childcare-based strategies	16
Strategies targeting 0–4 year olds	16
School-based strategies	16
School-based policies	16
Strategies targeting children (5–12 years)	16
Strategies targeting girls	17
Strategies targeting young adults (18–24 years)	17
e-interventions	17
Strategies targeting overweight and obese children	17

8. Evidence summary table – nutrition	18
9. Evidence summary table – physical inactivity	20
10. Findings: smoking	22
Home and family-centred strategies.....	22
School-based strategies.....	22
Incentive-based strategies.....	22
Community-based strategies.....	22
Primary healthcare/health service-based strategies.....	22
e-interventions.....	22
Smoking cessation strategies.....	23
Policy-based strategies.....	23
Mass-media strategies.....	23
Strategies targeting young adults (18–24 years).....	23
11. Findings: alcohol	24
Home and family-centred strategies.....	24
School-based strategies.....	24
Primary healthcare/health service-based strategies.....	24
Multi-setting strategies.....	24
e-interventions.....	24
Policy strategies.....	24
12. Findings: smoking and alcohol	26
Home and family-centred strategies.....	26
School-based strategies.....	26
Multiple setting-based strategies.....	26
e-interventions.....	26
13. Evidence summary table – smoking	27
14. Evidence summary table – alcohol	30
15. Findings: multiple risk factors	32
School-based strategies.....	32
Motivational interviewing as a strategy.....	32
16. Limitations of this rapid review	33
17. References	34
18. Appendices	39
Appendix 1: Tabulation of studies by risk factor.....	39
Appendix 2: Search strategy in detail.....	73

1. Executive summary

Background

The purpose of this rapid review commissioned by the Australian Government Department of Health is to inform future population health policy directions. This review compiles the available evidence for prevention interventions at key age points and identifies evidence-based interventions shown to be successful in Australia or other comparable jurisdictions.

Aim

This review aims to identify what prevention interventions in children and young adults (aged 0–24 years) have been shown to be most effective in Australia and or comparable jurisdictions overseas in:

- Reducing common risk factors for chronic disease (poor nutrition, physical inactivity, unsafe use of alcohol and smoking)
- Preventing the development of chronic conditions, or reducing their impact, in adulthood.

In particular, the review examines:

- Critical age points for children and young adults for different risk factors or prevention interventions
- Prevention interventions that are differentially effective in particular settings or for particular population groups.

The review focuses on chronic conditions that constitute the greater proportion of chronic disease burden in Australia, including cardiovascular disease, diabetes, asthma, musculoskeletal disorders, chronic kidney disease, and mental and behavioural disorders.

Methods

The scope of this review was limited to a synthesis of evidence reviews (i.e. systematic reviews, meta-analyses, narrative reviews, scoping reviews, rapid reviews) published in the English language between 2005 and 2015. Evidence from Australia, and comparable international jurisdictions, such as New Zealand, Canada, the US and UK, were included. A comprehensive search strategy was implemented using seven electronic databases (i.e. Medline, Cochrane Database of Systematic Reviews, PubMed, Embase, JBI Connect, Global Health, Cinahl Plus and DoPHER). A Google Scholar search was also conducted to identify published reports in the grey literature, such as government websites, professional organisations and agencies and non-government agencies.

Full-text papers (n=4482) were retrieved and assessed in detail to determine if they met the eligibility criteria and quality standards based on an assessment of bias and the methods used to combine studies for meta-analysis. High-quality reviews (n=119) including meta-analyses, systematic reviews of randomised controlled trials or longitudinal studies, Cochrane reviews and reviews of population-level interventions/strategies form the basis of the key findings and conclusions of this rapid review.

Key findings

Overall there is a lack of intervention research targeting poor nutrition, physical inactivity, unsafe use of alcohol and smoking in children and young adults. This makes it difficult to confidently recommend individual strategies to reduce the impact of these risk factors on young people's current health and future risk of chronic health conditions.

However, this review found strong evidence that the greatest impact on reducing risk factors for chronic disease is likely to come from a multi-level, multi-strategy, multi-sector approach across the life course.

Age points for intervention

- The 10–14 year age range is a critical point for prevention interventions targeting nutrition and physical activity. This age range is when health behaviours can begin to change negatively.
- Adolescents are a key target group for smoking and alcohol prevention interventions. On average, young people first try alcohol and smoking around 14–15 years so this age is a point for intervention. However, it is important that interventions start earlier to encourage adolescents not to take up smoking or to stop smoking and to reduce risky alcohol consumption.
- Few interventions specifically targeted young adults aged 18–24 years. However, interventions shown to be effective in the general adult population are likely to be effective for this age group, but were beyond the scope of this review.

What works (strong evidence)

- School-based interventions that address physical inactivity. Classroom-based physical activity interventions positively influence blood cholesterol, cardiorespiratory fitness and skinfold thickness among children and adolescents
- School-based interventions preventing children and adolescents from starting to smoke and helping them to quit
- Interventions conducted in multiple settings (e.g. schools, family and community) that target multiple health risk factors (e.g. nutrition education, physical activity promotion and discourage sedentary behaviours)
- Nutrition interventions delivered across multiple settings (i.e. home and school)
- Home- and family-based interventions for alcohol
- Higher prices and alcohol taxes to reduce excessive alcohol consumption.

What might work but the evidence is less robust (weak to moderate evidence)

- Parental and family interventions for all four risk factors
- School-based nutrition interventions
- Interventions to reduce the amount of sedentary time
- School-based interventions (e.g. playground markings and increase in play equipment) to increase physical activity during recess breaks
- Computer and web-based interventions to increase physical activity
- Smoking interventions conducted in multiple settings (e.g. schools, family and community)
- Incentive-based interventions to prevent or reduce smoking behaviour
- Smoking prevention mass media interventions
- On-line self-help interventions to reduce alcohol consumption
- School-based alcohol interventions to delay alcohol use and curb risky drinking behaviour
- Alcohol interventions conducted in multiple settings (e.g. schools and family).

What might or might not work but evidence is lacking (insufficient evidence)

- Nutrition interventions to increase fruit and vegetable intake
- One-on-one dietary advice in healthcare settings
- Nutrition interventions using e-interventions (e.g. smart phones, computer-based interventions)
- After-school physical activity interventions
- School-based policies related to physical activity
- Alcohol-related policy-based interventions (e.g. banning alcohol advertising, raising minimum drinking age, zero tolerance laws, reducing alcohol access)
- Brief alcohol interventions.

Impact on major chronic diseases in Australia

There is limited evidence about the impact of interventions targeting the four risk factors of poor nutrition, physical inactivity, unsafe use of alcohol and smoking in childhood and the later impact on chronic disease in adulthood.

This review focused on the short-term impact of interventions on chronic health conditions due to the nature of the intervention research that is available and because evidence of the long-term impact of youth-based interventions on later chronic health conditions is largely lacking.

Analysis of data from Australian longitudinal studies, such as the Longitudinal Study of Australian Children and The Raine Study, which follow a cohort of young people (typically from birth through to adulthood), will help to determine the impact of interventions in children and youth on future chronic health conditions.

Key recommendations

- Youth-based interventions targeting multiple modifiable risk factors for chronic disease have greater impact if they are based in multiple settings and use multiple strategies that target a range of health behaviours.
- Interventions that change the social, political and physical environment have greater reach at the population level and can positively influence the health behaviours of more people for longer.
- Longer-term follow-up of youth-based interventions will help to assess the sustainability of intervention effects and their long-term impact on chronic health conditions.
- Longitudinal studies are needed to determine the effect of youth-based interventions over the longer term. Leveraging existing cohort studies (birth to adulthood) may be a viable way to measure the effect of youth-based interventions on later chronic disease outcomes.
- Further intervention research is needed for some population groups, such as young adults aged 18–24 years, to determine if this is a critical age point for intervention, and for prevention programs focused on nutrition, physical inactivity, smoking and alcohol use.
- Other interventions, such as local government community-based programs, may be effective, but have not been included in this review because they have not been formally evaluated and/or reported in a review paper.

Table 1: Summary of interventions targeting youth risk factors of nutrition, physical inactivity, smoking and alcohol

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
NUTRITION				
Setting and strategy: Multiple (school, family, community)	#	+++	+++	IE
Setting: Home and family	++	++	++	IE
Setting: School		++	++	
Strategy: Reduce sugar-sweetened beverages and energy-dense, nutrient-poor foods (policy)	o	o	o	o
Strategy: Increase fruit and vegetable intake	o	IE	IE	IE
Setting: Childcare	IE			
Strategy: School policy		*	*	
Setting: University				IE
Setting: Primary healthcare/health services	#	IE	IE	IE
Strategy: e-interventions	#	IE	IE	IE
PHYSICAL INACTIVITY				
Strategy: Active travel	++	+++	+++	IE
Setting: School – classroom		+++	+++	
Setting and Strategy: Multiple (school, family, community)	#	+++	IE	IE
Setting: School – during breaks	++	++	++	
Setting: Home and family	++	++	++	IE
Strategy: Reduce sedentary time	++	++	++	IE
Strategy: School policy		++	++	IE
Strategy: e-interventions	IE	+	+	IE
Setting: School – multicomponent		o	o	
Strategy: Targeting girls		o	o	IE
Setting: Childcare	*			
Strategy: After-school activities		IE	IE	
SMOKING				
Setting: School		+++	+++	
Setting and strategy: Multiple (school, family, community)		++	++	++
Setting: Home and family		++	++	IE
Strategy: Incentives		++	++	IE
Strategy: Mass media		++	++	++
Strategy: Policy (price)		o	o	o
Setting: Community		o	o	o
Strategy: e-interventions		IE	o	o
Setting: Primary healthcare/health services		IE	o	IE
Strategy: Smoking cessation		#	*	*
ALCOHOL				
Strategy: Policy (price)		#	IE	+++
Setting: School		++	++	
Strategy: e-interventions		#	++	++
Setting and strategy: Multiple		#	++	++
Setting: Home and family		IE	++	IE
Strategy: Policy (advertising)		#	o	o
Setting: Primary healthcare/health-services		#	o	IE

LEGEND: +++ = strong evidence; ++ = moderate evidence; + = weak evidence; O = promising intervention; IE = insufficient evidence (poor quality, lack of intervention studies); * = evidence of little effect of intervention; # = no reviews found to determine evidence; shaded = not applicable.

Glossary

BMI	Body mass index
Strong evidence	Indicates high confidence that the evidence reflects the true effect and further research is unlikely to change our confidence in the estimate of the effect
Moderate evidence	Indicates moderate confidence and further research may change our confidence and the estimate
Weak evidence	Indicates low confidence and further research is likely to change our confidence and the estimate
Insufficient evidence	Indicates that either a body of evidence is unavailable or there was a paucity of studies of reliable quality for the setting/strategy in question
Promising interventions	Interventions without strong research evidence (mainly due to lack of studies) but where there is emerging evidence
Evidence of little effect	Interventions with evidence that the intervention was not effective
MVPA	Moderate-to-vigorous physical activity
PA	Physical activity
Home and family-centred strategies	Include the provision of parental skills including parental support, nurturing behaviours, establishing clear boundaries or rules, parental monitoring, social and peer resistance skills, the development of behavioural norms and positive peer affiliations
School-based strategies	Include awareness education, social and peer resistance skills, normative feedback, or development of behavioural norms and positive peer affiliations. Prevention programs can be either specific curricula delivered as school lessons, or classroom behaviour management programs. Can include school curriculum (can involve health and/or specific classes or the curriculum generally), teacher training, educational materials, changes to the format of the school day, and changes to the environment
Community-based strategies	May consist of efforts to persuade local media to run educational messaging to promote positive health messages
Multi-setting strategies	Programs that deliver interventions in multiple settings, for example in both school and family settings, typically combining school curricula with a parenting intervention
Brief interventions (BI)	Targeted, time-limited, low-threshold services that aim to change behaviour. In general, BIs are delivered in person, in healthcare settings and provide information or advice, increase motivation, and teach behaviour change skills
Motivational interviewing (MI)	Focus on enhancing participants' motivations to self-evaluate and self-regulate their behaviour, and often involve goal-setting or contracting and decisional balance exercises
SSB	Sugar-sweetened beverages
EDNP foods	Energy-dense, nutrition-poor foods

2. Background and aims of the review

In 2014, a working group established under the Community Care and Population Health Principle Committee (CCPHPC) of the Australian Health Ministers' Advisory Council assessed the relevance and currency of the existing National Chronic Disease Strategy 2005. This working group found that the Strategy should be revised, and recommended a high-level framework-based approach that would better cater for a broad range of chronic conditions. The prevention interventions may be policy, structural and behavioural.

A jurisdictional working group was established under the CCPHPC to work with the Australian Government Department of Health to revise the strategy. A draft National Strategic Framework on Chronic Conditions (the Framework) has recently been the focus of a national targeted consultation process undertaken by the Australian Government Department of Health. Feedback from the consultations is now informing revisions to the draft Framework. The consultations identified that focusing prevention interventions at certain age points in the life course may reduce the risk of developing chronic conditions in later years.

Feedback from the consultations referred to evidence that sound prevention health interventions in-utero and in children aged 0–5 years have a positive impact into adulthood. Similarly, this feedback also noted evidence that prevention interventions during the transitional years of youth (12–24 years) reduce risk behaviours, in turn reducing chronic conditions and comorbidities in adulthood.

3. Research questions

The review addresses the following questions:

What prevention interventions in children and young adults (0–24 years) have been shown to be most effective, in Australia and or comparable jurisdictions overseas, in improving the common risk factors for chronic disease (poor nutrition, physical inactivity, unsafe use of alcohol, smoking) and/or preventing the development of chronic conditions, or reducing their impact, in adulthood, with particular consideration of:

- Whether there are critical points across children and young adults for different risk factors or prevention interventions
- Whether there are prevention interventions that are differentially effective in particular settings or for particular population groups
- Conditions that constitute the greater proportion of chronic disease burden in Australia including cardiovascular disease, diabetes, asthma, musculoskeletal disorders, chronic kidney disease and mental and behavioural disorders.

Purpose and audience for the review

The purpose of this rapid review commissioned by the Australian Government Department of Health is to inform future population health policy directions. This review compiles the available evidence for prevention interventions at key age points and identifies evidence-based interventions shown to be successful in Australia or other comparable jurisdictions.

4. Methods

Search strategy

The scope of this review was limited to a synthesis of evidence reviews (i.e. systematic reviews, meta-analyses, narrative reviews, scoping reviews, rapid reviews) published in the English language between 2005 and 2015. Evidence from Australia, and comparable international jurisdictions, such as New Zealand, Canada, the US and UK, were included. A comprehensive search strategy was implemented using seven electronic databases (Medline, Cochrane Database of Systematic Reviews, PubMed, Embase, JBI Connect, Global Health, Cinahl Plus and DoPHER). A Google Scholar search was also conducted to identify published reports in the grey literature (e.g. government websites, professional organisations and agencies, non-government agencies). Further detail on the search strategy can be found in Appendix 2.

Databases

Search terms used were consistent with the US National Library, Medical Subject Headings (MeSH®) Thesaurus (with modifications as required for specific databases) (Appendix 2). For grey literature, searches were undertaken using selected key words using the advanced search functions of Google Scholar. This was limited to the first 200 results, in keeping with recent guidance.¹

Eligibility criteria

1. Study type: Literature reviews/reviews of evidence (i.e. systematic reviews, meta-analyses, narrative reviews, scoping reviews, rapid reviews, reviews of randomised trials or of longitudinal studies)
2. Publication date and language: Published in English between 2005 and 2015
3. Population of interest: Children and young adults aged 0–24 years
4. Country of publication: Australia and or comparable jurisdictions overseas (US, UK, Canada, NZ)
5. Full-text article available
6. Peer reviewed
7. Intervention focus: One or more of the risk factors identified in the research question: alcohol misuse, poor nutrition, physical inactivity and smoking. Interventions could include any policy, structural and behavioural strategies.

Screening and appraisal of evidence

Full-text papers (n=4482) were retrieved and assessed in detail to determine if they met the eligibility criteria outlined above. The reviews were then assessed for quality, including an assessment of bias and the methods used to combine studies, and level of effectiveness was rated based on the findings reported in the paper. High-quality reviews included meta-analyses, systematic reviews of randomised controlled trials or longitudinal studies, Cochrane reviews and reviews of population-level interventions/strategies and form the basis for the key findings and conclusions of this rapid review. Low-quality reviews were subsequently excluded. Overall, 119 reviews were determined eligible for inclusion and are summarised in Appendix 1. The search strategy, PICO framework and PRISMA flow diagram are provided in detail in Appendix 2.

5. Findings: nutrition

Home and family-centred strategies

There is weak to moderate evidence that strategies targeting parents, including parent nutrition education sessions, participation in family behaviour counselling and parent training, are effective in changing what children and adolescents eat.² There is weak evidence that family-focused interventions that educate parents and/or children about nutrition increase daily fruit and vegetable consumption among overweight and obese children aged 4–12 years.³ There is insufficient evidence that educating parents to accurately estimate portion sizes results in young children (3–5 years) being given an appropriate portion size.⁴

Strategies among 0–5 year olds

Due to a lack of studies, there is insufficient evidence about the effectiveness of interventions or programs, including home visiting programs or preschool-based interventions, to increase the amount of fruit and vegetables that young children eat.⁵

Primary healthcare/health-service strategies

Primary healthcare and health services provide a setting for opportunistic individual nutrition education and advice. However, there is insufficient evidence of the impact of using this one-to-one dietary advice on sugar consumption or fruit and vegetable intake across different age groups of children, although only dental clinics have been reviewed.⁶

Strategies to reduce consumption of sugar-sweetened beverages and energy-dense, nutrition-poor foods

While there is insufficient evidence of the impact of policy strategies on eating behaviour, there are strong links between food and beverage marketing and children's dietary behaviour. There is international support to introduce policy changes to reduce the amount of marketing and advertising of sugar-sweetened beverages and energy-dense, nutrition-poor foods among children and to implement taxes on these foods.^{7,8}

6. Findings: physical inactivity

Home and family-centred strategies

There is insufficient evidence of the effectiveness of interventions to engage family members in physical activity programs with their children (0–18 years),⁹ but strategies with some promise included face-to-face interactions or telephone contact to provide parent training, family counselling or prevention messages.

Childcare-based strategies

The evidence shows little effect from interventions to increase physical activity in childcare settings through playground marking, increasing game equipment and play space, and childcare staff training among children aged 2–5 years.^{10–12}

School-based strategies

Schools are an ideal setting for population-based physical activity interventions because of the time that children spend at school.¹³ The most effective school-based interventions use a range of strategies and involve other settings,^{14 15} including classroom-based, curriculum and environmental elements (such as active transport and the provision of physical activity equipment)¹⁵ rather than isolated education or curriculum changes.¹⁴

There is strong evidence that classroom-based physical activity interventions increase physical activity participation, improve blood cholesterol,^{13 16} improve cardiorespiratory fitness,¹³ decrease skinfold thickness,¹⁶ and increase overall fitness^{14 16} among children and adolescents (6–18 years).^{13 17} There is weak to moderate evidence that interventions that are designed to increase physical activity during school breaks (e.g. playground markings, provision of game equipment and allocation of play space) are effective among primary and secondary school children.^{10 11 18 19} In addition, there is moderate evidence that family involvement in school-based interventions is effective for increasing children and adolescents physical activity.¹⁴

There is insufficient evidence that voluntary physical activities in schools (e.g. role modelling, encouragement to be active) are more effective at reducing BMI than compulsory activities, such as those integrated into the curriculum.²⁰

School-based policies

School-based policies have increased levels of activity in physical education classes and active travel to school. However, due to a lack of studies, there is insufficient evidence of the effectiveness of school-based policy interventions on health outcomes for children (5–12 years) and adolescents (13–18 years).²¹

Active-travel strategies

There is strong evidence that active travel (walking, cycling, use of public transport) can lead to increased physical activity among children aged 5–17 years.²² While active school commuters (5–17 years) are more physically active,²² there is insufficient evidence of the impact of active travel behaviour on other health outcomes²³ including BMI^{22 24 25} and cardiovascular health.²⁴ Neighbourhoods with built environments designed to promote walking may impact negatively on moderate-vigorous activity among younger children because of heightened parental safety concerns. More walkable neighbourhoods have a small to moderate positive impact on adolescent physical activity.²⁶

After-school strategies

After-school hours are critical for the physical activity levels of young people, but there is insufficient evidence related to increasing physical activity behaviour among children (5–18 years) during this time.²⁷ Settings that are seen as more effective were mainly located in schools, while activities taking place in combinations of school, home or the community were not as effective.²⁷

Multiple setting strategies

While there is emerging evidence that a comprehensive approach that targets individual attitudes and skills as well as the social and environmental context may lead to increases in physical activity,²⁸ due to a lack of studies there is insufficient evidence that strategies in multiple settings are effective in increasing physical activity in children and adolescents.²⁸

e-interventions

Facebook-delivered lifestyle counselling interventions have little effect on the BMI of overweight and obese adolescents (12–18 years).²⁹ There is weak evidence of the effectiveness of using computer and web-based interventions to increase physical activity among children aged 8–18 years, although these changes were not sustained.³⁰

Sedentary behaviour reduction strategies

Several strategies, including interventions to reduce screen time, may decrease sedentary behaviour and improve physical activity among children and adolescents. However, there is weak to moderate evidence of the effectiveness of these strategies including behaviour modification techniques (e.g. goal setting, self-monitoring, problem solving) to reduce screen time among children aged 1–12 years,³¹ or the use of computer exercise games (e.g. PlayStation, Wii) as an alternative to sedentary games among children aged 6–15 years.^{32 33}

There is weak to moderate evidence that interventions that reduce sedentary behaviours reduce BMI in children aged 0–18 years.^{34 35} The inclusion of physical activity and nutrition promotion strategies does not add to the effectiveness of these interventions.³⁴ This suggests that comprehensive sedentary behaviour interventions that target a reduction in multiple sedentary activities may be as effective as multi-component programs.

Strategies targeting girls

It is important to implement strategies targeting girls as they are less physically active than boys, and they have a more pronounced decline in physical activity during adolescence.^{36 37} There is moderate to strong evidence of the effectiveness of school-based interventions that focus on increasing physical activity among pre-adolescent and adolescent girls.³⁶⁻³⁸ Interventions that are more effective cater specifically for girls³⁶⁻³⁸ or younger adolescent girls, that target diet and physical activity among younger girls (5–11 years)³⁸ and target physical activity and sedentary behaviour among adolescent girls (12–18 years).³⁷ Multi-component, theory-based and school-based interventions are more effective.³⁷ The use of peers and social support strategies are important when young girls are moving into adolescence.³⁶

7. Findings: nutrition and physical inactivity

Home and family-centred strategies

There is weak to moderate evidence of the effectiveness of home and family-centred strategies to improve nutrition and physical activity in children. However, parental support and participation is more effective among younger than older children,³⁹ and parental involvement is effective when involved in interventions designed to reduce BMI among children and adolescents.⁴⁰ There is weak evidence of the effectiveness of family interventions that target reduced sedentary time.⁴¹

There is weak evidence related to family-based interventions in the treatment of obesity among children and adolescents.⁴² However, effective strategies are family-based, lifestyle interventions that combine dietary, physical activity and behavioural strategies.⁴²

Childcare-based strategies

Childcare facilities provide opportunities to influence children's dietary intake, physical activity and sedentary behaviours.⁴³ However, due to a lack of studies, there is insufficient evidence of the effectiveness of childcare as a setting for interventions designed to prevent or reduce weight among young children aged under five years.^{43 44}

Strategies targeting 0–4 year olds

Overall, the evidence base remains relatively sparse, particularly when compared to interventions that focus on school-aged children. The studies reviewed provide a mixed picture of the ability of intervention programs to change obesity-related behaviours in young children. However, importantly they support the premise that parents and caregivers are receptive to intervention programs and in some cases can be supported to make positive changes to dietary, physical activity, and sedentary behaviours of their young children. Interventions that may lead to sustainable behaviour change in pre-school age children include those targeting the home and family environment, such as increasing parent and other carers' knowledge as well as developing skills and competencies around children's nutrition and physical activity.⁴⁵

School-based strategies

There is strong evidence that school-based interventions are effective for certain age groups and risk factors.⁴⁶ For children aged 4–19 years, school-based interventions combining nutrition education, physical activity promotion and discouraging sedentary behaviour are more effective in reducing BMI than those that focus on each strategy in isolation.⁴⁶⁻⁵⁰ However, there is insufficient evidence of the effectiveness of nutrition education and physical activity interventions to prevent obesity⁴⁸ and to affect body weight and blood pressure in children aged 6–17 years.⁵¹

For adolescents aged 11–17 years, there is moderate evidence that school-based interventions that promote environmental changes as well as focusing on social influence and enhancing skills were more effective,^{46 47 52} with parental and community involvement more influential in changing behaviour.^{46 47}

School-based policies

There is evidence of little effect from school-based diet and physical activity policy interventions on the weight status of children 4–11 years when implemented alone.⁵³ However, these policies are more effective when part of a comprehensive intervention that includes a focus on multiple factors (diet, physical activity, sedentary behaviour) and multiple levels of influence (home, school, community).⁵³

Strategies targeting children (5–12 years)

There is strong evidence that interventions that target multiple health behaviours among children 6–12 years have a positive impact on BMI.⁵⁴ These interventions include strategies focused on healthy diet, physical activity and healthy body image in the school curriculum, increased physical activity sessions, improved nutritional quality of food supply in schools, as well as parent support and home activities encouraging children to be more active, eat nutritious food and reduce screen time.⁵⁴

Strategies targeting girls

While there is weak evidence of the effectiveness of physical activity and nutrition interventions designed to prevent overweight and obesity in pre-adolescent girls (7–11 years), promising strategies include those that are culturally appropriate, include a range of social settings, recognise differences in age and gender, and focus on reducing sedentary behaviour.⁵⁵

Strategies targeting young adults (18–24 years)

Due to a lack of studies, there is insufficient evidence of the effectiveness of physical activity and nutrition interventions for weight management among young adults aged 18–35 years in a university setting or young women in general (18–35 years).^{56 57}

e-interventions

Technologies, including smart phone technology and computer-based interventions (such as internet and active video games), can reach a wide audience. However, there is insufficient evidence of the effectiveness of e-strategies in nutrition and physical activity interventions due to a lack of studies.⁵⁸⁻⁶⁰

Strategies targeting overweight and obese children

There is weak to moderate evidence that effective interventions for weight reduction among overweight and obese children (5–16 years) are those that combine physical activity and diet rather than diet alone.⁶¹ There is weak evidence that, among obese or overweight children aged up to 18 years, a combination of dietary and exercise interventions is effective in reducing metabolic risk, particularly blood lipids and diabetes markers.⁶²

8. Evidence summary table – nutrition

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
Setting: Home and family	Weak-moderate evidence Parental involvement is effective in changing children’s dietary behaviour			Insufficient evidence*
	Insufficient evidence (home visiting programs increase fruit and vegetable consumption) (increasing parent/carer knowledge, skills and competencies around children’s nutrition)			
	Weak evidence Family-focused interventions Insufficient evidence (parental education for appropriate portion size for their child)			
Setting: Childcare	Insufficient evidence (preschool-based interventions increase fruit and vegetable consumption) (childcare based beverage-related policies reduce consumption of sugar sweetened beverages)	Not applicable	Not applicable	Not applicable
Setting: School	Not applicable	Moderate evidence • Promote environmental change, social influence and skill enhancement		Not applicable
Strategy: School policy	Not applicable	Evidence of little effect of intervention • School-based policy targeting multiple health risk factors and multiple settings to reduce obesity. Comprehensive interventions focus on multiple behaviours, multiple settings		Not applicable
Setting: University	Not applicable	Not applicable		Insufficient evidence* (nutrition interventions for weight management)
Setting: Primary health care/health services	Insufficient evidence (one-on-one advice within dental clinics reduces sugar consumption or increase fruit and vegetable intake)			Insufficient evidence*

8. Evidence summary table – nutrition continued

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
Strategy: Reduce sugar-sweetened beverages and high fat, salt sugar foods	Promising intervention Policy actions and measures to reduce the volume, exposure and impact of advertising of sugar-sweetened beverages and high fat, salt and sugar foods – strong public support and international precedence to reduce marketing and increase taxes			Insufficient evidence*
Strategy: Increase fruit and vegetable intakes	Insufficient evidence <i>see home and family and childcare</i>	Insufficient evidence		Insufficient evidence*
Strategy: e-interventions				Insufficient evidence*
Setting and Strategy: Multiple	No evidence	Strong evidence Strategies encouraging children to eat nutritious food focus on: <ul style="list-style-type: none"> • Healthy diet • Healthy body image in the school curriculum • Improved nutritional quality of food supply in schools • Parent support and home activities Weak evidence <ul style="list-style-type: none"> • Interventions targeting girls (range of social settings, culturally appropriate, recognises differences in age and gender) 		Insufficient evidence*

**No reviews specific to young adults were identified, however it is likely that intervention strategies and settings shown to be effective for increasing healthy nutrition in adults in general are applicable to young adults.*

9. Evidence summary table – physical inactivity

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
Setting: Home and family	<p>Insufficient evidence (Potential strategies to encourage parent-child PA include parent training, family counselling or PA messages via face-to-face or telephone contact)</p> <p>Weak-moderate evidence</p> <ul style="list-style-type: none"> • Strategies targeting nutrition and PA behaviours (parental support and participation more effective in younger children) • Parental involvement effective in family-based weight reduction interventions targeting children and adolescents 			Insufficient evidence*
Setting: Childcare	<p>Evidence of little effect of interventions (policy, staff training, increased play space size, structured PA programs)</p>	Not applicable	Not applicable	Not applicable
Setting: School	Not applicable	<p>Strong evidence Positive effect on PA as well as other health risk factors (cholesterol, fitness, BMI)</p> <ul style="list-style-type: none"> • Classroom-based PA interventions • Interventions that use a range of strategies– classroom based, curriculum and environmental • School-based obesity interventions that target multiple health risk factors <p>Moderate evidence</p> <ul style="list-style-type: none"> • Family involvement improves effect of school-based PA interventions • Increased physical activity during school breaks via environmental strategies (provision of PA equipment, play space) • Promote environmental change, social influence and skill enhancement <p>Moderate-strong evidence</p> <ul style="list-style-type: none"> • School-based PA interventions that specifically target girls (social support strategies important in transition to adolescence) 		<p>Insufficient evidence (PA and nutrition interventions for weight management in university setting)</p>
Strategy: School policy	Not applicable	<p>Weak-moderate evidence</p> <ul style="list-style-type: none"> • Policies to increase PA via formal physical education classes and safer routes to school to promote active school travel <p>Evidence of little effect of intervention when implemented alone</p> <ul style="list-style-type: none"> • Need to be comprehensive school-based policy targeting multiple health risk factors and multiple settings to reduce obesity 		Not applicable

9. Evidence summary table – physical inactivity continued

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
Strategy: After-school activities	Not applicable	Insufficient evidence (School setting more effective than home or community)		Not applicable
Strategy: Active travel	Moderate evidence <ul style="list-style-type: none"> Neighbourhood environments designed to promote walking negatively impact PA due to parental safety concerns 	Strong evidence <ul style="list-style-type: none"> Active travel (walk, cycle, public transport) interventions Active school transport interventions Neighbourhood environments designed to promote walking Insufficient evidence for effect on other health risk factors		Insufficient evidence*
Strategy: Reduce sedentary time	Weak-moderate evidence <ul style="list-style-type: none"> Behaviour modification techniques: goal setting, self-monitoring Electronic PA based games as alternatives to sedentary games (6–15 years only) Inclusion of PA component in sedentary behaviour interventions 			Insufficient evidence*
Strategy: e-interventions	Not applicable		Evidence of little effect of interventions Facebook-delivered lifestyle counselling (with PA component) reduces BMI of overweight/obese adolescents	Insufficient evidence*
		Weak evidence Using computer and web-based interventions to increase PA		
Setting and strategy: multiple Multiple strategies		Insufficient evidence*		Insufficient evidence*
Multiple settings		Insufficient evidence (Use of multiple settings to increase PA)		
Multiple strategies and multiple settings	Insufficient evidence (Use of multiple strategies across multiple settings)	Strong evidence Obesity interventions targeting multiple health risk factors	Insufficient evidence (Use of multiple strategies across multiple settings)	

*No reviews specific to young adults were identified however it is likely that intervention strategies and settings shown to be effective for increasing physical activity in adults in general are applicable to young adults.

10. Findings: smoking

Home and family-centred strategies

The family and home environment is an important setting in preventing children starting to smoke so they avoid a lifetime of addiction, poor health, and the associated social and economic consequences.⁶³ There is moderate evidence of the effectiveness of family-based interventions on reducing smoking initiation or experimentation by children (5–12 years) and adolescents (13–18 years).⁶³ These interventions involve the encouragement of authoritative parenting (i.e. showing strong interest in and care of child, often with rule setting). There is also moderate evidence that adding a family-based component to school interventions is effective.⁶³

School-based strategies

There is strong evidence that school-based smoking prevention interventions are effective in reducing smoking behaviour, initiation and intention to smoke in the short term (up to three years post-intervention) among children and adolescents.^{64–66} Key aspects of interventions include active learning, awareness of influences to smoke, skill building, deconstructing media messages, implementation with other community-wide initiatives, continued until age 18 years, and adapted to the needs and cultures of different groups.^{64–66} There is evidence of little effect for girl-specific school-based smoking prevention interventions among adolescent girls.⁶⁷

Incentive-based strategies

Incentive programs offer a reward (e.g. contests, competitions, incentive schemes, lotteries, raffles, and payments not starting to smoke) to prevent children and adolescents (5–18 years) from smoking. There is insufficient evidence that these interventions are effective.^{68–69}

Community-based strategies

There is weak to moderate evidence that multi-component community interventions influence smoking behaviour and affect the uptake of smoking in young people aged under 25 years.⁷⁰ The use of coordinated, widespread, multi-component programs to influence young people's behaviour is an important aspect of community-based interventions and often involve community members in these programs. Key aspects include educating tobacco retailers about age restrictions, delivery of smoking-related disease prevention programs, and mass media, school and family-based programs.⁷⁰

Primary healthcare/health service-based strategies

There is insufficient evidence that behaviour-based smoking prevention interventions conducted in healthcare settings, (including counselling and education, are effective among children (5–12 years) and adolescents (13–18 years) due to a lack of studies.^{71–72} However, targeted cessation interventions that comprise behaviour-based and complimentary approaches (such as acupuncture and hypnosis) were promising among adolescents (13–18 years).⁷² There is insufficient evidence that behavioural⁷¹ or pharmacological^{71–73–74} interventions are effective in reducing smoking rates among current adolescent smokers and also insufficient evidence that motivational interviewing is effective in helping adolescents to stop smoking.⁷⁵

e-interventions

There is insufficient evidence that Internet-based interventions are effective in assisting smoking cessation for six months or longer among adolescents, young adults and adults of all ages due to a lack of studies.^{76–78} However, interventions that are interactive and tailored to individuals are seen as promising among adults of all ages.⁷⁶

Smoking cessation strategies

There is insufficient evidence that smoking cessation programs aimed at young people aged under 20 years are effective.⁷⁹ Interventions that use a combination of approaches, such as taking into account the young person's preparation for quitting, supporting behavioural change and enhancing motivation, were seen as promising.⁷⁹ The use of motivational interviewing for smoking cessation among adolescents and adults is moderately effective.⁷⁵ However, there was evidence of little effect for the use of medications (such as nicotine replacement and bupropion) among young people aged < 20 years,^{71 73 74 79} with some adverse events reported.⁷⁹

Policy-based strategies

There is insufficient evidence of the effectiveness of interventions to reduce access to tobacco among minors by deterring shopkeepers from making illegal sales.^{80 81} While these interventions may lead to large decreases in the number of outlets selling tobacco to young people, this is often not sustained for any length of time, and both enforcement and community policies are needed to improve compliance among retailers. There is insufficient evidence that restricting access has an impact on smoking behaviour among youth in the early stages of starting to smoke.⁸¹ Policy-based interventions with a greater impact on low SES young people (11–25 years) are cigarette price and tax increases.⁸²

While there are no trials of the impact of tobacco advertising and promotional activities on people taking up smoking, studies have followed non-smokers and their exposure to advertising, such as the number of tobacco advertisements in magazines.⁸³ These studies suggest that tobacco advertising and promotion increase the likelihood that adolescents (aged ≤18 years) will become smokers.⁸³

Mass-media strategies

There is weak to moderate evidence of the effectiveness of smoking-prevention mass media campaigns for young people aged up to 25 years.⁸⁴ Common features of more successful campaigns include: delivery using multiple media channels (newspapers, television, radio, posters); use of combined school and media components (through school posters and school-based curriculum); and repeated exposure to campaign messages over a minimum period of three years delivered consecutively to the same student group.⁸⁴

Strategies targeting young adults (18–24 years)

There is evidence of little effect of smoking cessation interventions targeting young adults.^{77 85} However, promising interventions among this group were those that were brief and include a social support component using telephone counselling, such as Quitline, Internet resources and e-mail.^{78 85}

11. Findings: alcohol

Home and family-centred strategies

There is moderate evidence that family-based interventions are effective in preventing alcohol misuse through delaying age of initiation of alcohol use and curbing risky drinking among young people aged under 18 years.⁸⁶⁻⁸⁸ These interventions include developing parenting skills and nurturing behaviours, establishing clear boundaries or rules, and developing social and peer resistance skills.⁸⁶⁻⁸⁷ There is insufficient evidence of the impact of family interventions on future alcohol use among children aged less than 10 years.⁸⁹

School-based strategies

There is weak to moderate evidence of the effectiveness of school-based programs aimed at preventing alcohol misuse in school-aged children.⁸⁹⁻⁹⁰ These programs showed positive effects in reducing drunkenness and binge drinking among this group.⁹⁰ Aspects of these programs include alcohol awareness education, social and peer resistance skills, and the development of positive behavioural norms around alcohol use. There is no difference in the effectiveness of intervention programs that are alcohol-specific or part of other health-related programs (such as drug education programs, healthy school or community initiatives).⁹⁰ There is insufficient evidence of the effectiveness of using brief alcohol interventions in schools among adolescents.⁹¹⁻⁹² The use of alcohol media programs to address alcohol-related attitudes and intentions among children and adolescents is an emerging area and there is insufficient research to determine effectiveness.⁹³

Primary healthcare/health service-based strategies

There is insufficient evidence of the effectiveness of using brief interventions to reduce alcohol use and to prevent progression to more severe levels of use among adolescents or young people when inpatients⁹⁴ or attending emergency departments.⁹⁵⁻⁹⁷ There is insufficient evidence of the effectiveness of using motivational interventions among adolescents⁹⁸⁻¹⁰⁰ and children.¹⁰¹ However, electronic screening and interventions in health settings show promise in reducing alcohol consumption and related harm.⁹⁹

Multi-setting strategies

Multi-setting interventions are delivered in a number of settings, such as in both school and family settings, and often combine school curricula with parenting interventions. There is moderate evidence that multi-setting interventions for alcohol misuse prevention in children (aged up to 19 years)^{89, 102-103} are effective. However, there is insufficient evidence that these interventions are more effective than those conducted in a single setting.¹⁰²

e-interventions

There is insufficient evidence of the effectiveness of online self-help interventions in reducing alcohol consumption among tertiary students and adults in the long term due to a lack of quality studies.¹⁰⁴⁻¹⁰⁷

Policy strategies

There is strong evidence that higher alcohol prices and alcohol taxes lead to reductions in excessive alcohol consumption and subsequent harms among adults.¹⁰⁸ However, there is insufficient evidence that changes in alcohol price affect population subgroups including minors where disposable income and the demand elasticity may influence drinking behaviour,¹⁰⁸⁻¹⁰⁹ or among binge drinkers aged 18–26 years.¹¹⁰

There is insufficient evidence of the effect of banning alcohol advertising, including television, Internet, billboards, or in magazines, on alcohol consumption among adolescents and adults.¹¹¹ However, there is an association between alcohol advertising and promotion and increased likelihood that adolescents (13–18 years) will start to drink alcohol and to drink more if they already consume alcohol.¹¹² This exposure includes: mass media alcohol advertising, including portrayal of alcohol, alcohol promotion and media

exposure containing alcohol advertisements; alcohol advertising through television, radio, newspapers, outdoor advertising, posters; and alcohol promotion including give-aways and items bearing alcohol industry logos.

There is insufficient evidence that raising the minimum drinking age and zero-tolerance laws are effective in reducing alcohol consumption among adolescents and young adults.⁸⁹

There is insufficient evidence that interventions to reduce access to alcohol among minors are effective.⁸⁹ These include decreasing sales to minors, increasing identity checks, and reducing community tolerance of underage purchasing and consumption of alcohol.

12. Findings: smoking and alcohol

Home and family-centred strategies

There is insufficient evidence that parenting programs reduce substance misuse (including alcohol and tobacco) among children under 18 years.¹¹³ However, interventions that are more effective include an emphasis on the development of social skills and sense of personal responsibility among young people, as well as addressing issues related to substance use, and include active parental involvement.¹¹³

School-based strategies

There is insufficient evidence of the effectiveness of universal, school-based drug prevention education interventions.¹¹⁴

Multi-setting strategies

The use of multi-setting (including schools, family, community) risk prevention programs are moderately effective across a range of health risk behaviours (including smoking and alcohol) in adolescents aged between 10 and 19 years.¹¹⁵

e-interventions

There is moderate evidence that text messaging interventions for tobacco and alcohol cessation are effective among adolescents and young adults aged between 12 and 29 years.¹¹⁶ There is insufficient evidence that telephone and/or Internet-based support is effective in reducing smoking or alcohol use among young adults aged up to 18 years¹¹⁷ or that the use of social media is effective in promoting positive health messages among adolescents and young adults.¹¹⁸

13. Evidence summary table – smoking

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
Setting: Home and family	Not applicable	<p>Moderate evidence Positive effect on preventing smoking initiation or experimentation.</p> <ul style="list-style-type: none"> • Encouragement of authoritative parenting (i.e. showing strong interest in and care of child, often with rule setting). • Add a family-based component to school interventions. <p><i>Also see multiple strategies</i></p> <p>Insufficient evidence (parenting programs to reduce substance misuse (alcohol and tobacco))</p> <ul style="list-style-type: none"> • Emphasise development of social skills and sense of responsibility in young people • Education of issues related to substance use • Active parental involvement 		Insufficient evidence *
Setting: School	Not applicable	<p>Strong evidence Positive effect on reducing smoking prevalence, initiation, and intention to smoke in the short term. Effects not maintained into adulthood in the absence of ongoing interventions.</p> <ul style="list-style-type: none"> • Active learning and skill building • Awareness of smoking influences • Deconstructing media messages • Target specific high-risk demographic groups • Used professional health educators and/or trained community members • Build in methods of updating material • Sustained long-term interventions (up to 18 years) • School-based curriculum/components (e.g. school posters) • Combined with mass media and other community-level interventions <p>Evidence of little effect of intervention (girl-specific school-based smoking prevention interventions among adolescent girls (<18 years))</p> <p>Insufficient evidence (universal, school-based drug prevention education interventions)</p> <p>Insufficient evidence (lack of studies to assess effectiveness of school tobacco policies in either primary or secondary)</p>		Not applicable

13. Evidence summary table – smoking continued

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
Setting: Primary healthcare/ health-service	Not applicable	Insufficient evidence (counselling and education in health care settings reduce smoking uptake)	Insufficient evidence (counselling and education in reducing smoking uptake) Insufficient evidence (behavioural or pharmacological strategies reduce smoking in current smokers) Promising interventions: <ul style="list-style-type: none"> • Behaviour-based and complimentary approaches (e.g. acupuncture and hypnosis) • Motivational interviewing 	Insufficient evidence *
Strategy: Smoking cessation	Not applicable		Evidence of little effect of intervention Nicotine replacement therapy among adolescents aged <18 years. Moderate evidence use of motivational interviewing	Evidence of little effect of intervention Promising interventions: <ul style="list-style-type: none"> • Brief • social support component (telephone counselling), internet resources, email
Setting: Community	Not applicable	Insufficient evidence (for young people <20 years) Promising interventions: <ul style="list-style-type: none"> • Behaviour-based and complimentary approaches (e.g. acupuncture and hypnosis) • Motivational interviewing • Brief interventions that include a social support component using telephone counselling (e.g. Quitline), Internet resources and e-mail 		
Strategy: Incentives	Not applicable	Weak to moderate evidence for influencing smoking behaviour and impact on smoking uptake in young people <25 years. <ul style="list-style-type: none"> • Often involve community members in these programs. • Educating tobacco retailers about age restrictions • Delivery of smoking-related disease prevention programs • Combination of mass media, school and family-based programs <i>See also mass media.</i>		Insufficient evidence *

13. Evidence summary table – smoking continued

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
Strategy: e-intervention	Not applicable	Insufficient evidence (offering rewards to prevent smoking, e.g. prizes).	Insufficient evidence (assisting smoking cessation ≥ six months) (use of social media to promote positive health messages) Promising interventions: <ul style="list-style-type: none"> • Interactive • Tailored to individuals 	
Strategy: Policy	Not applicable	No evidence	Insufficient evidence (restricting access to minors)	Insufficient evidence *
			Limited evidence (school tobacco policies)	
Greater impact of price and tax increases on low SES young people (11-25 years)				
Strategy: Mass media	Not applicable	Insufficient evidence		Weak to moderate evidence <ul style="list-style-type: none"> • Distributed through multiple channels (e.g. newspapers, radio, television) • Combined with school-based curriculum/components • Use of repetitive media messages over a minimum of three years
Setting and strategy: Multiple	Not applicable	Weak to moderate evidence Prevention of smoking uptake. A combination of: <ul style="list-style-type: none"> • Educating tobacco retailers about age restrictions • Delivery of smoking-related disease prevention programs • Combination of mass media, school and family-based programs Moderate evidence <ul style="list-style-type: none"> • Effectiveness of multi-setting (including schools, family, community) risk prevention programs across a range of health risk behaviours (including smoking and alcohol) in adolescents aged between 10 and 19 years. 		

*No reviews specific to young adults were identified, however it is likely that intervention strategies and settings shown to be effective in reducing smoking behaviour in adults in general are applicable to young adults.

14. Evidence summary table – alcohol

Settings and strategies	Population			
	Preschool: 0–4 years	Children: 5–12 years	Adolescents: 13–17 years	Young adults: 18–24 years
Setting: Home and family	Not applicable	Insufficient evidence (family interventions on future alcohol use among children <10 years)	Moderate evidence Delay age of alcohol initiation and curb risky drinking behaviour. <ul style="list-style-type: none"> • Develop parenting skills and nurturing behaviour. • Establish clear boundaries and rules. • Develop social and peer resistance skills. <i>Also see multiple strategies</i>	Insufficient evidence *
		Insufficient evidence (parenting programs to reduce substance misuse (alcohol and tobacco)). <ul style="list-style-type: none"> • Emphasise development of social skills and sense of responsibility in young people • Education of issues related to substance use • Active parental involvement 		
Setting: School	Not applicable	Weak to moderate evidence More effective in reducing drunkenness and binge drinking than starting to drink <ul style="list-style-type: none"> • Alcohol awareness education • Social and peer resistance skills • Develop positive behavioural norms regarding alcohol No difference in effectiveness if alcohol-specific or part of other health-related programs (drug education, healthy school or community initiatives). Insufficient evidence (brief alcohol interventions to reduce alcohol use among adolescents) Insufficient evidence (universal, school-based drug prevention education interventions) Emerging area (Media literacy programs – alcohol-related cognitions, attitudes and behavioural intentions)		Not applicable
Setting: Primary healthcare/ health service	Not applicable	No evidence	Insufficient evidence (motivational interventions to reduce alcohol use) Promising interventions: Electronic screening and interventions	Insufficient evidence *
			Insufficient evidence (brief interventions reduce alcohol use or prevent progression to more severe levels of use among inpatients or when attending emergency departments)	

14. Evidence summary table – alcohol continued

Settings and strategies	Population			
	Pre-school: 0–4 years	Children: 5–12 years	Adolescents: 13–18 years	Young adults: 18–24 years
Strategy: e-intervention	Not applicable	No evidence		<p>Insufficient evidence (on-line self-help interventions to reduce long-term alcohol consumption)</p> <p>Insufficient evidence (telephone and/or Internet-based support to reduce alcohol consumption)</p>
			<p>Moderate evidence of the use of text messaging interventions for alcohol cessation</p> <p>Insufficient evidence (use of social media to promote positive health messages)</p>	
Strategy: Policy	Not applicable	No evidence	<p>Insufficient evidence (changes in alcohol price affect drinking behaviour)</p> <p>Insufficient evidence (interventions to reduce access to alcohol are effective. Includes:</p> <ul style="list-style-type: none"> • Decreasing sales • Increase in identity checks • Reducing community tolerance of underage purchasing and consuming alcohol) 	<p>Strong evidence • Higher prices and alcohol taxes reduce excessive alcohol consumption</p> <p>Insufficient evidence (higher prices and alcohol taxes reduce alcohol consumption among binge drinkers)</p>
			<p>Insufficient evidence (exposure to alcohol advertising and promotion increases likelihood of adolescents starting to drink alcohol and increase consumption among adolescents and young adults. Exposure includes portrayal of alcohol, alcohol promotion and media exposure containing advertisements)</p> <p>Insufficient evidence (banning alcohol advertising (Internet, television, billboards, magazines) reduces alcohol consumption)</p> <p>Insufficient evidence (raising minimum drinking age and zero tolerance laws reduce alcohol consumption)</p>	
			<p>Moderate evidence for alcohol misuse prevention programs using multi-settings (including school- and family-based)</p> <p>Insufficient evidence (that multiple settings are more effective than single setting interventions)</p>	
Setting and strategy: Multiple	Not applicable	No evidence	<p>Moderate evidence • Multi-setting (including schools, family, community) risk prevention programs across a range of health risk behaviours (including smoking and alcohol) in adolescents aged between 10 and 19 years</p>	

*No reviews specific to young adults were identified, however it is likely that intervention strategies and settings shown to be effective in reducing risky alcohol consumption in adults in general are applicable to young adults.

15. Findings: multiple risk factors

School-based strategies

There is moderate evidence that holistic school-based interventions, such as the Health Promoting Schools framework, are effective in improving a number of health outcomes in students aged 4–18 years, including BMI, physical activity, physical fitness, fruit and vegetable intake, tobacco use and being bullied.^{119 120} However, effects are not consistent across all ages and genders, with less positive effects found for physical activity and nutrition interventions among older students.¹¹⁹ Key elements in successful school-based programs are: changes to social and physical environments to be more supportive of healthy behaviours; and incorporating other important behaviour settings outside of school (i.e. family/home and community).¹²⁰

Motivational interviewing as a strategy

There is insufficient evidence that motivational interviewing is an effective intervention strategy to change health behaviours (including substance use, diet, weight management, diabetes, and physical activity) among adolescents aged 13–18 years.^{121 122}

16. Limitations of this rapid review

This rapid review was conducted in a short timeframe. While every effort was made to approximate a full systematic review and a thorough search was undertaken consistent with the agreed scope of work, it is possible that some relevant studies were missed.

Many studies included in systematic reviews assessed in this report were conducted in North America and these findings may not always be generalisable to an Australian setting. It is important to ensure that local programs are rigorously evaluated as a high priority.

It was often difficult to conclude that an intervention or prevention program was effective due to a lack of content information to identify effective strategies. In addition, the characteristics of effective programs, including the program setting, key personnel or target age, may be important moderators of program effects and thus may not be replicable in other settings or countries or among different population groups. For example, a prevention program that has been effective in a setting or country where there is a low prevalence of alcohol misuse by adolescents may not be effective in a country where adolescent drinking is more socially acceptable or there are social and cultural pressures to drink alcohol.

In some cases, the study subjects for whom the programs and interventions 'worked' were self-selecting and/or the interventions were evaluated under ideal circumstances. It is important to remember that interventions proven to be effective in the context of research trials may encounter many barriers in a subsequent 'real world' implementation process.

The strength of evidence needs to be distinguished from the impact and reach of interventions. 'Strong evidence' in this report denotes high confidence that our assessment reflects the true effect and that further research is very unlikely to change our confidence in the estimate of the effect. In many cases, the effect of prevention programs is modest and there is need for future programs to do better. New programs should build on the work of previous programs (and not 'reinvent the wheel') and ensure that the dose/intensity and duration of interventions are addressed and appropriate evaluation research designs are used.

Furthermore, many chronic conditions do not occur until later in life. Thus cohort studies following a group of children from birth through to adulthood can provide valuable information to determine the onset of modifiable risk factors for chronic disease as well as where and when best to start prevention/intervention programs. Longitudinal studies of this nature also enable the effect of a particular prevention or intervention program to be evaluated over the longer term.

Priorities for research: It is recommended that further intervention research addressing youth risk factors for later chronic disease is conducted across multiple settings; uses multiple intervention strategies targeting individuals and their environments; and is supported by a long-term investment in research that identifies effective youth interventions for the prevention of chronic disease.

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18. Appendices

Appendix 1: Tabulation of studies by risk factor

Risk factor: nutrition

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Chambers 2015	To investigate (1) the effectiveness of statutory and self-regulatory actions to reduce the volume, exposure or wider impact of advertising for foods high in fat, sugar and salt (HFSS) to children; and (2) the role of educational measures	0–18 years	Policy – marketing	Nutrition	Policy/environment change, advertising	While no single intervention can be expected to have a large impact on a child's risk of overweight, at least in the short term, reducing the volume of, and children's exposure to, advertising of HFSS foods is a policy that can be justified as a precautionary measure, and one which serves to help change the social norms around dietary behaviour and appropriate nutrition for children. In the future, researchers should aim to generate evidence on the longer-term impacts of interventions and their wider potential to change health behaviour in order to ensure that policymakers can be more confident in the decisions that they take.	Up to Mar 2013
Bourke 2014	To review the literature to assess whether dietary interventions can increase the fruit and vegetable consumption of overweight and obese children	4–12 years overweight/obese	School, family	Nutrition	Family-focused interventions – parental support, nutrition education, physical activity	This review highlights that narrow interventions focusing on single aspects of behaviour are unlikely to achieve long-term change in tackling obesity. Successful public health interventions tackling childhood obesity will need to take a holistic approach and target behaviour change in multiple aspects of children's lifestyles and their surroundings, including nutritional education, parental support and physical activity.	Up to Aug 2013
Bollars 2013	To describe the changing nature of marketing methods and recent policy approaches to controlling the marketing of food and beverages to children, and summarise of recent evidence linking advertising and marketing to children's dietary behaviour	Children, adolescents	Policy – marketing	Nutrition	EDNP marketing	The rise in the number of TV channels and expanding new media has reduced average costs and increased opportunities significantly. In the food and drink sector, the leading categories of food being advertised are soft drinks, sweetened breakfast cereals, biscuits, confectionery, snack foods, ready meals and fast food/quick service outlets. The majority of the food and beverage products featured are high in fat, sugar or salt.	Updated 2009–2012
Small 2013	To determine (1) findings regarding the effect of varying portion sizes with young children and (2) the evidence regarding the effects of educating adults to estimate portion sizes	3–5 years	Home, parents	Nutrition	Portion education and portion education/training	Although many studies have focused on a variety of portion-related interventions, the influence of portion education with parents of young children has not been well researched. More research is needed to understand the effect of parent-focused, portion-education interventions that encourage appropriate energy intake and healthy weight attainment in young children.	1990–2011

Risk factor: nutrition – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Harris 2012	To assess the effectiveness of one-to-one dietary interventions for all ages carried out in a dental care setting in changing dietary behaviour. The effectiveness of these interventions in the subsequent changing of oral and general health is also assessed	All ages including children	Health care – dental	Nutrition	One-to-one dietary interventions	There is some evidence that one-to-one dietary interventions in the dental setting can change behaviour, although the evidence is greater for interventions aiming to change fruit/vegetable and alcohol consumption than for those aiming to change dietary sugar consumption. There is a need for more studies, particularly in the dental practice setting, as well as greater methodological rigour in the design, statistical analysis and reporting of such studies.	Up to Jan 2012
Haynos 2012	To conduct a review of randomly controlled studies of universal prevention of childhood obesity	Children <12; adolescents 12–18 years	Multiple – home, community, school, child care	Nutrition	Universal prevention strategy	Review suggested that outcomes are generally modest across all age groups and there were few replications of any program; thus, at this time no universal prevention program for childhood obesity meets criteria for a well-established intervention of the American Psychological Association.	Up to Apr 2012
Wolfenden 2012	To assess the effectiveness, cost-effectiveness and associated adverse events of interventions designed to increase the consumption of fruit and/or vegetables among children	0–5 years	Home, preschool	Nutrition	Home visiting programs; repeated food exposure in the home; preschool-based intervention in increasing child fruit and vegetable intake	Despite the importance of encouraging fruit and vegetable consumption among children aged five years and under, this review identified few randomised controlled trials investigating interventions to achieve this.	Up to Nov 2012
Hingle 2010	A systematic review of interventions designed to change child and adolescent dietary behaviour was conducted to determine whether parent involvement enhanced intervention effectiveness, and what type of involvement was most effective	2–18 years	Family	Nutrition	Parental involvement in intervention strategies	Indirect methods to engage parents were most commonly used, although direct approaches were more likely to result in positive outcomes. Limited conclusions may be drawn regarding the best method to involve parents in changing child diet to promote health. However, direct methods show promise and warrant further research.	1980–Dec 2008
Patel 2010	Describe the beverages offered in childcare facilities and schools and summarise school and childcare-based interventions and policies to encourage healthy beverage intake	Pre-school and primary aged	Policies – childcare, primary school	Nutrition	Policies governing beverage sales in schools	The major sources of beverages available in schools and childcare include beverages provided through federal programs, competitive beverages (e.g. beverages for purchase through vending machines), water from drinking fountains, and beverages brought into facilities. Policies governing the types of beverages available in schools and childcare settings have increased, but still vary in scope and jurisdiction. Although there are no childcare-based interventions that exclusively target beverage intake, there are examples of school-based interventions to encourage healthy beverage consumption.	Up to Dec 2010

Risk factor: nutrition – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Collins 2007¹	To identify and present the best available evidence on the optimal dietetic treatment and management of children and adolescents who are overweight or obese	<18 years overweight/obese	School, home, community	Nutrition	Diet therapy, sedentary behaviour modifications, behavioural therapy	There is an urgent need for high-quality studies investigating the optimal dietary approach to management of paediatric overweight and obesity. These studies require adequate follow up to ascertain if weight loss can be sustained in the long term. Details of the dietary prescription, adherence to the dietary intervention and diet-specific outcomes need to be reported to inform best practice.	1975–2003
Howerton 2007²	To evaluate the effectiveness of school-based nutrition interventions on child fruit and vegetable (FV) consumption	Elementary school aged	School	Nutrition	School-based nutrition intervention	School-based nutrition interventions produced a moderate increase in FV intake among children. These results may have implications for chronic disease prevention efforts, including cardiovascular disease and cancer.	1990–2002
Collins 2006²	To assess the effectiveness of dietetic treatment for obese children and to report details of dietary interventions	<18 years	Community, home	Nutrition	Dietary intervention and lifestyle modifications	It is not possible to evaluate the effectiveness of dietary treatment for childhood obesity because of the lack of high-quality studies and the heterogeneity of designs, treatment combinations, outcome measures, and follow-up. There is an urgent need to improve the quality of studies in this area because childhood obesity poses major health risks for populations, yet there is limited evidence on which to base treatment strategies.	1975–2003
Sahay 2006²	A review of the nutrition intervention literature was conducted for Cancer Care Ontario to develop a provincial nutrition and healthy body weight strategy	All ages	School, healthcare, family, communities	Nutrition	Family involvement, participatory planning and implementation models	This review identified five components common to those interventions that reported a significant positive effect on dietary change in a controlled trial. Most effective interventions are theoretically based, involve the family as a source of support, use participatory models for planning and implementing interventions, give clear messages, and provide adequate training and support to intervenors.	1994–Jan 2000

¹ Information outdated therefore not included in summary

Risk factor: physical inactivity

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
McGoey 2015	This review used the Reach, Efficacy/ Effectiveness, Adoption, Implementation and Maintenance framework to determine the extent to which intervention studies promoting physical activity in youth report on factors that inform generalisability across settings and populations	12-17 years	Multiple	Physical activity	Multiple; health programs, policies, curriculum, teacher-delivered, school-based	In order for health promoters, schools and policy makers to successfully promote regular PA in youth, interventions need to be designed so that they are easy to implement, are cost-effective, and are likely to be maintained. The data provide evidence that interventions should be at least one year in duration, include follow-up measures at six months, and employ teacher-delivered, school-based strategies combining social environmental approaches with instructional-based lessons.	2003–Jan 2013
McGrath 2015	A systematic review and meta-analysis of studies linking aspects of the built environment with youth moderate-vigorous activity, including walking	8–17 years and adults	Community, environment	Physical activity	Active travel	Neighbourhoods with built-environment features designed to promote play and walking had unexpected negative effects on younger children's moderate-vigorous activity, whereas there were small-to-moderate positive effects on adolescents' activity.	2000–2013
Norris 2015	A review to investigate the methods used in such interventions and their effects on physical activity and educational outcomes.	Child and adolescent 3–14 years	School	Physical activity	Classroom lessons including PA and educational elements	All studies found improved physical activity following physically active lessons: either in the whole intervention group or in specific demographics. Educational outcomes either significantly improved or were no different compared to inactive teaching. Studies ranged from low to high risk of bias.	Up to Mar 2014
Pearson 2015	A meta-analysis of the quantification of physical activity intervention effectiveness for adolescent girls	Girls 12–18 years	School	Physical activity	Behaviour change; theory based, targeted physical activity and sedentary behaviour	Interventions to increase physical activity in adolescent girls show small but significant effects, suggesting that behaviour change may be challenging. Moderator analyses showed larger effects for interventions that were theory based, performed in schools, were girls only, with younger girls, used multi-component strategies, and involved targeting both physical activity and sedentary behaviour.	Up to May 2013
Ruotsalainen 2015	To examine the effects of physical activity and exercise interventions on body mass index, subsequent physical activity and psychological symptoms for overweight and obese adolescents	Overweight/ obese 12–18 years	Community, primary care	Physical activity	e-intervention – Facebook-delivered lifestyle counselling	Interventions were not effective at increasing PA in overweight and obese adolescents	1950–2013

Risk factor: physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Sims 2015	To examine measured effects of physical activity at least six months post-intervention	5–18 years	School community	Physical activity	Multiple strategies; extra physical education classes, PA delivery outside curriculum time, counselling, goal-setting sessions, incentive based programs, community approaches.	This review reinforced previous evidence that PA interventions have little measured effect on TPA or MVPA levels in children, either immediately post-intervention or at six-month follow-up. The possibility remains that the included studies, plus PA interventions in general, were ineffective due to insufficiencies in intensity, duration, delivery quality, theoretical grounding and implementation or measurement sensitivity.	1991–Nov 2014
Ward 2015	To identify if childcare educators' practices predict or are associated with pre-schoolers' physical activity and eating behaviours in childcare centres and to assess the effectiveness of interventions that control educators' practices or behaviours to improve pre-schoolers' physical activity and eating behaviours	4–6 years	Childcare	Physical activity	Control of educator practices	Educators may play a positive role in promoting healthy behaviours in children, but this is mainly based on a small number of intervention type studies of low or moderate quality. The influence of specific components of educators' practices on children's healthy eating and physical activity behaviours remains inconclusive.	Up to Jan 2015
Biddle 2014	A meta-analysis to quantify the effect of physical activity interventions for pre-adolescent girls by including intervention studies that provided results for girls separately	Girls 5–11 years	School	Physical activity	Educational, PA programs, multi-component strategies Behavioural change (i.e. organised sports, decreased sedentary, motorised transport)	Interventions to increase physical activity in pre-adolescent girls show small but significant effects, suggesting that behaviour change may be challenging, but results suggest some strategies that could be successful. The average treatment effect for pre-adolescent girls involved in physical activity interventions was significant but small. Moderator analyses showed larger effects for interventions that catered for girls only and used educational and multi component strategies. Interventions to increase physical activity in pre-adolescent girls show small but significant effects, suggesting that behaviour change may be challenging, but results suggest some strategies that could be successful.	Up to Aug 2013
Broekhuizen 2014	An overview of evidence on the value of both school and preschool playgrounds on children's health in terms of physical activity, cognitive and social outcomes	2–18 years	School/ preschool	Physical activity	Recess PA, playground equipment adaption, cognitive and social outcomes	The experimental studies generated moderate evidence for an effect of the provision of play equipment, inconclusive evidence for an effect of the use of playground markings, allocating play space and for multi-component interventions, and no evidence for an effect of decreasing playground density, the promotion of physical activity by staff and increasing recess duration on children's health.	2000–Sep 2012

Risk factor: physical inactivity continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Escalante 2014	A systematic review to examine interventions aimed at increasing children's physical activity levels during recess	Preschool 2–5 years primary school 5–12 years	School	Physical activity	Increase in PA at recess (using playground markings, game equipment, physical structures, or a combination)	The cumulative evidence was (a) that interventions based on playground markings, game equipment, or a combination of the two, do not seem to increase the physical activity of preschoolers and schoolchildren during recess and (b) that interventions based on playground markings plus physical structures do increase the physical activity of schoolchildren during recess in the short to medium term.	Up to Jul 2012
Kellou 2014	To identify the characteristics of interventions likely to successfully prevent overweight in youngsters by promoting physical activity (PA), with special focus on dimensions of the socio-ecological model of behaviour and health, and unresolved issues	6–12 years	Home, school, community	Physical activity	Individual, interpersonal, institutional environment, community determinants	Our review indicated that programs targeting PA determinants at the different levels of the socio-ecological model, including the social and organisational/built environments, had the greatest potential for preventing obesity in youngsters. Targeting various facets of PA, including everyday PA, might represent another key element for program efficacy on weight status.	1990–Dec 2012
Laine 2014	Systematic review of evidence on the cost-effectiveness of population-level interventions to promote physical activity	General population	Multiple settings/strategies.	Physical activity	Preventive interventions aimed at promoting and maintaining physical activity in wide population groups	The most efficient interventions to increase physical activity were community rail trails (\$.006/MET-h), pedometers (\$.014/MET-h), and school health education programs (\$.056/MET-h).	Up to Aug 2013
Liao 2014	To assess the overall effect size of sedentary behaviour interventions on BMI reduction and to compare whether interventions that have multiple components have higher mean effect size than interventions with single components	0–18 years	Multiple	Physical activity	Sedentary behaviour alone or with physical activity, nutrition	Interventions that target reducing sedentary behaviours among children are effective in reducing BMI. A comprehensive sedentary behaviour intervention that targets reducing multiple sedentary activities may be as effective as multicomponent programs in BMI reduction and could be a promising way to prevent obesity in children.	Up to Jul 2012
Mehtala 2014	A review of the evidence on PA interventions in childcare by applying a socio-ecological approach	2–6 years	Childcare	Physical activity	Increased playground space, structured PA activities, teacher training, more space per child	Children's PA remained low and did not approach the 180 min/day criteria. It may be that more intensive multilevel and multi-component interventions based on a comprehensive model are needed.	Up to May 2013

Risk factor: physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Soares 2014	To present evidence of intervention programs for efficacy of physical activity for adolescents	Adolescents 13–18 years	All settings	Physical activity	Interventions of interest were those that presented a change in the physical activity behaviour as outcome	Due to heterogeneity in contents and methodologies, as well as the lack of jobs that accompany adolescents after the intervention period, conclusions cannot be drawn about the actual effects of the intervention programs of physical activity on the behaviour of young people.	Up to 2013
Vasconcellos 2014	Systematic review of the effect of PA on aerobic capacity, muscle strength, body composition, hemodynamic variables, biochemical markers, and endothelial function in obese/overweight adolescents	12–17 years	School, home, community	Physical activity	Multiple – dietary, lifestyle, physical activity (three sessions a week, one hour, mixed intensity)	PA is associated with significant and beneficial changes in fat percentage, waist circumference, systolic blood pressure, insulin, low-density lipoprotein cholesterol, and total cholesterol, as well as with small non-significant changes in diastolic blood pressure, glucose, and high-density lipoprotein cholesterol.	Up to 2014
Brown 2013	To systematically review the efficacy of physical activity interventions targeting children on potential mediators and, where possible, to calculate the size of the intervention effect on the potential mediator	5–12 years	School, home, after-school care, community	Physical activity	Curriculum delivery, physical education classes, activity class breaks, environmental changes, active transport campaigns, active homework	Positive effects on cognitive/psychological potential mediators were reported in 15 out of 31 studies. Positive effects on social environmental potential mediators were reported in three out of seven studies, and no effects on the physical environment were reported. Although no studies were identified that performed a mediating analysis, 33 positive intervention effects were found on targeted potential mediators.	1985–Apr 2012
Cleland 2013	To determine the effectiveness of interventions to increase physical activity among women experiencing disadvantage, and the intervention factors associated with effectiveness	18–64 years disadvantaged women	Multiple	Physical activity	Multiple (individually, socially, environmentally or policy targeted)	Programs with a group delivery mode significantly increase physical activity among women experiencing disadvantage, and group delivery should be considered an essential element of physical activity promotion programs targeting this population group.	Up to Mar 2011
Dobbins 2013	To summarise evidence of the effectiveness of school-based interventions in promoting physical activity and fitness in children and adolescents	6–18 years	School	Physical activity	Health promotion activities (BMI, pulse rate, physical activity, television viewing)	There is limited evidence that school-based physical activity interventions have a small to moderate impact on behavioural outcomes related to physical activity as well as on some physical health status measures.	Up to Oct 2011

Risk factor: physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Ickes 2013	To review recess interventions aimed to improve PA among youth, and make recommendations to develop related best practices	3–12 years	School	Physical activity	Recess interventions: added equipment/ materials, markings, zones, teacher involvement, active video games, activity of the week, and activity cards	A number of simple, low-cost strategies can be implemented to maximise the amount of recess time students are allotted. Long-term follow-up studies are warranted for each of the recess strategies identified to be effective. Most studies incorporated additional equipment or materials for students during recess increased PA of the students, both in short-term studies (1–2 weeks) and over the course of a school year (seven months).	1986–2011
Lamboglia 2013	Systematic review analysing the use of exer-gaming as a strategic tool in the fight against childhood obesity	6–15 years	Home, school	Physical activity	Exer-gaming as an alternate to sedentary gaming time.	Exer-gaming was found to increase physical activity levels, energy expenditure, maximal oxygen uptake, heart rate, and percentage of physical activity engaged in and to reduce waist circumference and sedentary screen time.	2008–Apr 2012
Lonsdale 2013	To determine the effectiveness of interventions designed to increase the proportion of physical education (PE) lesson time that students spend in moderate to vigorous physical activity (MVPA)	6–13 years	School	Physical activity	Increasing the proportion of physical education lesson time in MVPA (altered teaching strategies, fitness infusion methods)	Although evidence is limited, interventions can increase the proportion of time students spend in MVPA during PE lessons. As most children and adolescents participate in PE, these interventions could lead to substantial public health benefits.	1991–Mar 2012
Lu 2013	Systematic review examining the effect of health videogames on childhood obesity	<18 years	Home, school, recreation facilities	Physical activity	e-interventions – health video games (Wii and PlayStation)	Positive outcomes related to obesity were observed in about 40% of the studies (n=4), all of which targeted overweight or obese participants.	2005–2013
Richards 2013	To compare the effectiveness of face-to-face interventions for PA promotion in community dwelling adults (aged 16 years and above) with a control exposed to placebo or no or minimal intervention	≥16 years	Community, home	Physical activity	Face-to-face delivery methods compared to placebo/no intervention	There was some indication that the most effective interventions were those that offered both individual and group support for changing PA levels using a tailored approach. Although there was evidence to support the effectiveness of face-to-face interventions for promoting PA, at least at 12 months, the effectiveness of these interventions was not supported by high quality studies.	Up to Oct 2012
Saunders 2013	To assess the health effects of active travel specifically	All ages	Community	Physical activity	Active travel	Active travel may have positive effects on health outcomes, but there is little robust evidence to date of the effectiveness of active transport interventions for reducing obesity. Future evaluations of such interventions should include an assessment of their impacts on obesity and other health outcomes.	1991–2011

Risk factor: physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Sun 2013	To evaluate the effectiveness of school-based physical activity interventions on fitness, adiposity and cardio-metabolic outcomes among schoolchildren	5–18 years	School	Physical activity	School-based programs, education, physical work capacity at 170 beats per minute, maximal ventilatory oxygen uptake, shuttle run	Dose of school-based physical activity is an important determinant of trial efficiency. Some large, higher quality RCTs provided strong evidence for interventions to decrease skin-fold thickness, increase fitness and high-density lipoprotein cholesterol. Evidence for body mass index, body fat and waist circumference, blood pressure and triglycerides, low-density lipoprotein cholesterol and total cholesterol remain inconclusive and require additional higher quality studies with high dose of interventions to provide conclusive evidence.	Up to Oct 2012
Xu 2013	To examine the relationships between active transport to work or school and cardiovascular health, body weight, or other health outcomes	General population	Work or school	Physical activity	Active travel	Active transport to work or school was significantly associated with improved cardiovascular health and lower body weight. However, the strength of the evidence varied from weak (mental health and cancer), moderate (body weight), to strong (cardiovascular health).	Up to Sep 2012
Robertson-Wilson 2012	To examine school-based physical activity policies for youth over the past 10 years	Children 5–12 years adolescents 13–18 years	Policy – school	Physical activity	Law, bill, policy reflective of PA based on government initiatives. State level policies dealing with safe routes to school, PA-only initiatives, or combinations	This evaluation of the impact of policies on school-based physical activity indicates that such policies can affect health outcomes, specifically by increasing levels of physical activity. This study highlights the value of policy reform and calls attention to the need for independent evaluation of such policies.	2000–Jan 2011
Metcalf 2012	To determine whether, and to what extent, physical activity interventions affect the overall activity levels of children	≤16 years	Home, school, community	Physical activity	Incorporated a component designed to increase the physical activity of children/ adolescents and was at least four weeks in duration	There is strong evidence that physical activity interventions have had only a small effect (approximately four minutes more walking or running per day) on children's overall activity levels. This finding may explain, in part, why such interventions have had limited success in reducing the body mass index or body fat of children.	0–Mar 2012
Atkin 2011	Systematic review of interventions to promote physical activity in young people conducted in the hours immediately after school	5–18 years	School/after school	Physical activity	Physical activity	There is some evidence that single-behaviour interventions may be most successful during after-school hours. Further work is required to develop interventions delivered during this time and determine whether changes in behaviour can be maintained over extended periods of follow-up.	1990–Mar 2010

Risk factor: physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Camacho–Minano 2011	Narrative systematic review of physical activity (PA) interventions that targeted girls aged 5–18 years and to determine their effectiveness and key characteristics of success	Girls 5–18 years	School/after school	Physical activity	Multi-component school based	Multi-component school-based interventions that also offer a physical education that address the unique needs of girls seemed to be the most effective. Although family support is revealed as ineffective, peer strategies and social support especially during adolescence transition showed promising evidence.	2000–Jul 2010
Chillon 2011	To review intervention studies related to active school transport to assess quality and effectiveness	6–18 years	School	Physical activity	Physical activity, active travel	Almost all the interventions reported a small effect size on active travel. However, methods used to assess change and effect sizes varied limiting ability draw conclusions. The review highlights the importance of community involvement for success (schools, parents and community). Interventions with the highest effectiveness shared a strong school involvement, and parents receiving specific materials and being encouraged to walk. Interventions which focused on AST may be more effective than broader focused initiatives.	Up to Jan 2010
Conn 2011	A meta-analysis summarising the effects of interventions designed to increase physical activity among healthy adults	Adults	Work, home, community	Physical activity	Behavioural, individually delivered, physical activity behaviour	Exploratory moderator analyses suggested that the characteristics of the most effective interventions were behavioural interventions instead of cognitive interventions, face-to-face delivery versus mediated interventions (e.g. via telephone or mail), and targeting individuals instead of communities.	1960–2007
Hamel 2011	To examine evidence regarding computer- or web-based interventions to increase pre-adolescent and adolescent physical activity	8–18 years	Multiple – school, home, community	Physical activity	e-interventions – computer and web-based physical activity interventions	Although most interventions demonstrated statistically significant increases in physical activity or positive health changes related to physical activity, findings were small or short lived.	1998–2010
Kriemler 2011	To review recent reviews and new studies aimed at increasing PA or fitness in youth	6–18 years	School	Physical activity	Multi-component school-based interventions combining educational, curricular and environmental elements	The school-based application of multi-component intervention strategies was the most consistent, promising strategy, while controversy existed regarding the effectiveness of family involvement (particularly adolescents), focus on healthy populations at increased risk or duration and intensity of the intervention.	2007–2010
Leavy 2011	To systematically review the literature on physical activity mass media campaigns, 2003–2010	General population	Social marketing mass media, physical activity	Physical activity	Mass media marketing	The review found that beyond awareness raising, changes in other outcomes were reported in varying ways. While there is improvement in evaluation, the limited evidence of campaign effects remains.	2003–2010

Risk factor: physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Hosking 2010	To assess the effects of organisational travel plans on health, either directly measured, or through changes in travel mode Cochrane	All ages – including children	School, workplace	Physical activity	Active travel	There is insufficient evidence to determine whether organisational travel plans are effective for improving health or changing travel mode. Organisational travel plans should be considered as complex health promotion interventions, with considerable potential to influence community health outcomes depending on the environmental context in which they are introduced. Given the current lack of evidence, organisational travel plans should be implemented in the context of robustly designed research studies, such as well-designed cluster randomised trials.	Up to Dec 2009
Faulkner 2009	To investigate if children who actively commute to school are more physically active than children who travel by motorised transport and if children who actively commute to school (also) have a healthier bodyweight than passive commuting children	5–17 years	School, community,	Physical activity	Active travel, Physical activity	Active school commuters tend to be more physically active overall than passive commuters. However, evidence for the impact of active school travel in promoting healthy body weights for children and youth is not compelling.	1990–Dec 2007
O'Connor 2009	A systematic review of interventions with physical activity and parental components among healthy youth to identify how best to involve parents in physical activity interventions for children	9 months–18 years	Family	Physical activity	Family interaction with a physical activity program. This included parent training/counselling, participation in exercise with children, telephone contact with parents and newsletters/communication	There is little evidence for the effectiveness of family involvement methods in programs for promoting physical activity in children, because of the heterogeneity of study design, study quality, and outcome measures used.	1980–2008
Parrish 2009	To systematically examine the effects of recess-based interventions on the physical activity (PA) levels of school-aged children and adolescents	5–18 years	School	Physical activity	Recess and Lunch physical activity programs	Five studies demonstrated a positive intervention effect on children's PA levels, with four reporting statistically significant increases and two reporting significant decreases in recess PA. The summary of the levels of evidence for intervention effects found inconclusive results for all intervention types, though promising strategies that require further investigation were identified.	2000–Apr 2011

Risk factor: nutrition and physical inactivity

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Chaplais 2015	To provide a comparative evaluation of the effectiveness of using smart phones in the multidisciplinary treatment of child and adolescent overweight or obesity, with a specific interest in behaviour change	Overweight/ obese 7–17 years	Community	Nutrition and physical activity	E-interventions – Smartphone based intervention	E-contact should be used for its significant capacity to prolong engagement and decrease withdrawal during sustainability phases that follow intensive intervention for weight management in young populations. Despite increasing popularity in published protocols of weight management trials, the effectiveness of the impact of smart phone technology in paediatric programs remains equivocal.	Up to Sep 2014
Hernandez - Alvarez 2015	To determine the effectiveness of prescribing physical activity to the population of overweight and obese children, in accordance with the levels of evidence	5–16 years obese and overweight	Multiple – home, school, community	Physical activity and Nutrition	Three main groups – exercise vs no exercise; exercise plus diet; and exercise programs vs exercise/diet counselling	The most effective intervention achieving a reduction in obesity among obese and overweight children was based on exercise plus diet interventions versus diet, indicating the need for programs composed of structured exercise with clear prescription variables: intensity, duration, frequency and time complemented by a diet with specific hypo-caloric dietary prescription.	Up to Jun 2012
Kader 2015	To review the effectiveness of universal parental support interventions to promote dietary habits, physical activity (PA) or prevent overweight and obesity among children; and effectiveness in relation to family socio-economic position	2–18 years	Family	Nutrition and physical activity	Parental support; face-to-face counselling, group education, information sent home and telephone counselling	Face-to-face or telephone counselling was effective in changing children's diet, while there was only weak evidence for improvement in PA. Sending home information was not effective. Concerning body weight, group education seemed more promising than counselling. Intervention effectiveness was generally higher in younger compared to older children	1990–2013
Wang 2015	To systematically evaluate the effectiveness of childhood obesity prevention programs conducted in high-income countries and implemented in various settings	2–18 years	School, home, community	Nutrition and physical activity	Multiple – school based; daily physical education classes, nutritional education. Home based; parental education and involvement	The following intervention points are effective for childhood obesity prevention: <ul style="list-style-type: none"> • Schools are an important setting to implement effective intervention programs and concomitant involvement of the home/family and community is desirable • Improving access to PA facilities and healthful food choices such as fruits and vegetables both at school and home is effective • Home or parental and family involvement is important. 	Up to Apr 2013

Risk factor: nutrition and physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Ajie 2014	To evaluate recent research regarding the use of computer-based nutrition education interventions targeting adolescent overweight and obesity	12–18 years	Community	Nutrition and physical activity	E-interventions – computer-based nutrition education training	Recommendations included application of health behaviour theory and computer tailoring for feedback messages. Future research should include thorough description of intervention content (messages, theory, multimedia, etc.), application of rigorous methodology, as well as consideration of covariates such as parental involvement and gender. With further research and evidentiary support, this approach to obesity-related nutrition education has the potential to be successful.	2002–Aug 2013
Cai 2014	To assess the effects of childhood obesity prevention programs on blood lipids in high-income countries	2–18 years	Multiple – school, community, home,	Nutrition and physical activity	School-based Obesity prevention program	Childhood obesity prevention programs targeting diet and/or PA significantly improved lipid profiles in children interventions taking place in a school-only setting had a significant favourable effect on HDL-C, while interventions taking place in multiple settings (e.g. school, home, and community) had a significant and favourable effect on LDL-C and TG. This inconsistency may be attributed to the small number of studies.	Up to Apr 2013
Chen 2014	To explore if components of specific interventions were associated with a reduction in body mass index	12–18 years	Community	Nutrition and physical activity	E-interventions – technology based intervention (web-based, e-learning, active video games)	All effective interventions used dietary and physical activity strategies as part of intervention components. Because of the variation in duration of intervention (10 weeks to two years), it is not clear what length of intervention is most effective. Future research should assess the long-term impact of technology-based interventions and evaluate mediators and moderators for weight change in adolescents.	1990–2014
Lima-Serrano 2014	To summarise the characteristics and effects of school-based interventions acting on different behavioural domains of adolescent health promotion	11–17 years	Home, community, parents	Nutrition and physical activity	Technology, environmental changes, parental and community activities and training	This exhaustive review found that well-implemented interventions can promote adolescent health. These findings are consistent with recent reviews.	2007–2011
Marsh 2014	To examine the effectiveness of these interventions with respect to decreasing sedentary time, and the secondary aim was to investigate whether level of family involvement/engagement affects this outcome	2–18 years	School, home and family, community, primary care	Nutrition, physical activity and sedentary behaviour	Interventions to decrease sedentary time	This review supports the need for interventions that focus on the family and, more specifically, interventions that involve a parent at more than just a supervisory or administrative level. There is also a need to consider child characteristics and the motivation of the parent, with interventions tailored accordingly. Finally, more research is required to address how food-related behaviours moderate the relationship between screen time and overweight in youth and how such an understanding may be incorporated into future interventions.	0–Mar 2012

Risk factor: nutrition and physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Vasques 2014	Meta-analysis assessing the efficacy of school-based and after-school intervention programs on the BMIs of child and adolescents, addressing the correlation between some moderating variables	6–19 years	School, community	Nutrition and physical activity	School based and after-school based (PA at individual, interpersonal and environment levels. community based)	Although of low magnitude, the intervention programs had a positive effect on prevention and decreasing obesity in children. This effect seems to be higher in older children, involving interventions with physical activity and nutritional education combined, with parent's participation and with one-year duration. School or after-school interventions had a similar effect.	2000–2011
Ho 2013	To compare the effects of diet-only intervention with those of diet plus exercise or exercise only on weight loss and metabolic risk reduction in overweight children	Overweight <18 years	School, home, community	Nutrition and physical activity	Dietary; traffic light diet, calorie restriction, education PA; aerobic exercise, resistance training, physical skills development program. Combination of these	Based on the small number of short-term randomised trials available, we found that diet plus resistance training led to a greater gain in LBM and reduction in %BF compared with diet alone. Some evidence of achieving greater improvement in HDL-C, fasting glucose, and fasting insulin levels by adding exercise training to dietary interventions was found, although diet-only intervention had a greater reduction in triglycerides levels immediately following intervention.	1975–2010
Hutchensson 2013	To evaluate randomised controlled trials of weight management interventions specifically targeting young women.	Women 18–35 years	Health care, home	Nutrition and physical activity	Behavioural weight gain prevention (science course, exercise program, daily weighing)	The majority of interventions achieved statistically significant improvements in participants' weight status when compared with no intervention control groups. Two of the five effective interventions were eight gain prevention programs that targeted diet, exercise and behaviour change. The short- and long-term effectiveness of weight management interventions targeting young women remains unclear.	1980–Dec 2011
Martin 2013	To find evidence of behaviour change techniques that are most effective in changing physical activity and/or eating behaviour for the prevention or management of childhood obesity	2–18 years	School, home, healthcare, community	Nutrition and physical activity	Information on consequences of behaviour, communication skills and training, environmental restructuring, prompt practice.	For management trials, providing information on the consequences of behaviour in general was a feature of non-effective interventions and for prevention trials, providing information on the consequences of behaviour in general, providing rewards contingent on successful behaviour and facilitating social comparison were non-effective.	1990–Dec 2009
Sbruzzi 2013	To assess the effectiveness of educational interventions including behavioural modification, nutrition and physical activity to prevent or treat childhood obesity through a systematic review and meta-analysis of randomised trials	6–12 years	School	Nutrition and physical activity	School-based (education, classroom lessons, orientation to increase fruit intake, modification of PA classes)	Educational interventions are effective in treating, but not preventing, childhood obesity and its consequences. Educational interventions were associated with a significant reduction in waist circumference.	Up to May 2012

Risk factor: nutrition and physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Showell 2013	Systematic review of the effectiveness of home-based interventions on weight, intermediate (e.g. diet and physical activity), and clinical outcomes	2–18 years	Home	Nutrition and physical activity	Home-based – diet, physical activity, sedentary behaviours	There is low strength of evidence for the effectiveness of home-based child obesity prevention programs. Additional research is needed to test interventions in the home setting, particularly those incorporating parenting strategies and addressing environmental influences.	Up to Aug 2012
Sobol–Goldberg 2013	Systematic review and meta-analysis of childhood obesity reduction through school-based programs	5–18 years	School	Nutrition and physical activity	School-based (education, increase PA, modified environment, parental involvement)	Unlike earlier studies, more recent studies showed convincing evidence that school-based prevention interventions are at least mildly effective in reducing BMI in children, possibly because these newer studies tended to be longer, more comprehensive and included parental support.	2006–Jan 2012
Williams 2013	Systematic review of the effects of policies related to diet and physical activity in schools, either alone, or as part of an intervention program on the weight status of children	4–11 years	School policies	Nutrition and physical activity	Nutrition; school breakfast program, NLSP, limiting availability of certain foods PA; general physical activity policy, more activities in breaks, PA incorporated into lessons Combination of these	When implemented alone, school diet and physical activity related policies appear insufficient to prevent or treat overweight or obesity in children. However, they appear to have an effect when developed and implemented as part of a more extensive intervention program.	Up to 2013
Friedrich 2012	To evaluate the effect of intervention programs using nutritional education, physical activity or both on the reduction of body mass index in school-age students	4–19 years	School	Nutrition and physical activity	School-based nutrition education, physical activity or combination of the two	Isolated physical activity interventions did not present a significant reduction in BMI. A similar result was observed in the isolated interventions of nutritional education. When the interventions with physical activity and nutritional education were combined, the result of the meta-analysis presented a statistically significant effect in the reduction of body mass index in school-age students.	1998–2010
Guerra 2013	To evaluate the effectiveness of interventions that promoted physical activity in the school environment and reduced overweight and obesity in children and adolescents. The secondary goal was to evaluate the outcome of these interventions on high blood pressure (BP)	6–17 years	School	Physical activity and nutrition	Physical activity	Physical activity interventions in schools were not found to have a statistically significant influence on BMI, body weight or BP of children. The evidence regarding the effectiveness of school-based PA interventions to reduce BMI in children and adolescent is mixed and prone to bias.	Up to Sep 2012

Risk factor: nutrition and physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Laska 2012	To review studies examining weight gain prevention interventions among young adults	18–35 years	University	Nutrition and physical activity	Individual level interventions about weight-related knowledge	There is an urgent need to develop effective young adult-focused weight gain prevention strategies. This review identified promising areas for future work, although much additional research is needed.	1985–2011
Lavelle 2012	A systematic review of published studies of school-based interventions aimed at reducing the body mass index (BMI) of children	<18 years	School	Nutrition and physical activity	Education, PA only, improved nutrition, combination, environmental	There is accumulating evidence that school-based interventions can significantly reduce children's BMI, especially if they include a physical exercise component. The evidence is reasonably consistent in that a relatively large number of studies have now demonstrated a benefit. The effect size did not vary by length of follow-up, suggesting that the benefits may be maintained over time, but only one study followed up participants for more than four years. Evidence of significant benefit is lacking for interventions that do not include a physical activity component. The absolute reduction in BMI was greater for interventions targeting overweight and obese children, but studies delivered to all children nonetheless produced a significant reduction in overall BMI.	1991–2010
Luckner 2012	To evaluate interventions that promote healthy weight in general populations using a comprehensive meta-analysis	All ages including children 0–18 years	Home, school, community	Nutrition and physical activity	Physical activity, nutrition, health education and combinations of these	The evidence for the effectiveness of promoting healthy weight in general populations is limited, though multi-component interventions in schools and encouraging reduced children's television viewing are promising strategies. Improving the reporting of outcomes is vital, as imputation of inadequately reported measures may have contributed to the observed heterogeneity. Longer follow-up is essential for understanding policy relevance.	Up to Nov 2008
Niemeier 2012	To review child and adolescent weight-related health intervention characteristics, with a particular focus on levels of parental participation, and examine differences in intervention effectiveness	2–19 years	School, parents	Nutrition and physical activity	Nutrition and physical activity education, physical activity sessions, behaviour education, or a combination of these activities	This study suggests that weight-related health interventions that require parent participation more effectively reduce the BMIs of child and adolescent participants. In addition, longer interventions that include parent participation appear to have greater success.	2004–Dec 2010
Steeves 2012	To describe strategies used in interventions designed to either solely target sedentary screen behaviours or multiple health behaviours, including sedentary screen behaviours	1–12 years	Research centres, community, home, school	Nutrition and physical activity	Behaviour modification strategies (positive reinforcement, stimulus control, social support) TV allowance time	Many interventions (50%) significantly reduced sedentary screen behaviours; however the magnitude of the significant reductions varied greatly (-0.44 to -3.1 h/day) and may have been influenced by the primary focus of the intervention, number of behaviour modification strategies used, and other tools used to limit sedentary screen behaviours.	1985–2010

Risk factor: nutrition and physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Kesten 2011	To determine the effectiveness of interventions designed to prevent overweight and obesity in pre-adolescent girls	Girls 7–11 years	Community, family, school	Nutrition and physical activity	Knowledge, attitudes and health-related behaviours	Interventions aimed at pre-adolescent girls have the potential to reduce risk factors associated with childhood overweight and obesity, although the sustainability of the effects of such interventions is less clear.	1990–2011
Larson 2011	This review examines the scientific literature on state regulations, practices and policies, and interventions for promoting healthy eating and physical activity, and for preventing obesity in preschool-aged children attending childcare	2–5 years	Childcare, community, family	Nutrition and physical activity	Parenting styles, skills, and child management principles	Most states lack strong regulations for childcare settings related to healthy eating and physical activity. Recent assessments of childcare settings suggest opportunities for improving the nutritional quality of food provided to children, the time children are engaged in physical activity, and caregivers' promotion of children's health behaviours and use of health education resources. A limited number of interventions have been designed to address these concerns, and only two interventions have successfully demonstrated an effect on child weight status.	2000–Jul 2010
Waters 2011	This review updates the previous Cochrane review of childhood obesity prevention research and determines the effectiveness of evaluated interventions intended to prevent obesity in children, assessed by change in body mass index (BMI)	6–12 years	Multiple	Nutrition and physical activity	Update of Cochrane review of childhood obesity prevention research	There is strong evidence to support beneficial effects of child obesity prevention programs on BMI, particularly for programs targeting children aged 6–12 years. However, given the unexplained heterogeneity and the likelihood of small study bias, these findings must be interpreted cautiously.	Up to Mar 2010
Ciampa 2010	To assess the evidence for interventions designed to prevent or reduce overweight and obesity in children younger than two years	0–2 years	Family, parents	Nutrition and physical activity	Education, physical activity programs	There is limited evidence that interventions may improve dietary intake and parental attitudes and knowledge about nutrition for children in this age group. For clinically important and sustainable effect, future research should focus on designing rigorous interventions that target young children and their families.	1966–Dec 2009
Hesketh 2010	To provide an update of the rapidly emerging evidence in this area and to assess the quality of studies reported	0–5 years	Preschool, home, primary care	Nutrition and physical activity	Multifaceted approaches – focus on pre-school approaches	There is support for the premise that parents and caregivers are receptive to intervention programs and in some cases can be supported to make positive changes to dietary, physical activity, and sedentary behaviours of their young children. While the evidence base is growing, there remains an urgent need to build on this existing evidence base in a substantial and integrated way.	2005–Aug 2008

Risk factor: nutrition and physical inactivity – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Bond 2009	To review and synthesise studies of the effectiveness and cost-effectiveness of weight management schemes for the under-fives	≤5 years	Home, preschool	Nutrition and physical activity	Home-based health education, parental skills course/ homework	No controlled trials addressing the issue of treating obesity or evidence of cost-effectiveness studies in the under-fives population were found. From the three prevention studies, apart from the larger US trial, the interventions showed no statistically significant differences in BMI and weight between the intervention and control. These conclusions are based on only three dissimilar studies, making the drawing of firm conclusions difficult.	1990–Feb 2009
Brown 2009	To determine the effectiveness of school-based interventions that focus on changing dietary intake and physical activity levels to prevent childhood obesity	5–18 years	School	Nutrition and physical activity	School-based nutrition and PA interventions	There is insufficient evidence to assess the effectiveness of dietary interventions to prevent obesity in school children or the relative effectiveness of diet versus PA interventions. School-based interventions to increase PA and reduce sedentary behaviour may help children to maintain a healthy weight but the results are inconsistent and short term. PA interventions may be more successful in younger children and in girls.	2006–Sep 2007
Oude 2009	To assess the efficacy of lifestyle, drug and surgical interventions for treating obesity in childhood	Children, adolescents <18 years	Community, health care, home	Nutrition and physical activity	Lifestyle, drug and surgical interventions	While there are limited quality data to recommend one treatment program over another, combined behavioural lifestyle interventions compared with standard care or self-help can produce a significant and clinically meaningful reduction in overweight in children and adolescents. In obese adolescents, consideration should be given to the use of either orlistat or sibutramine, as an adjunct to lifestyle interventions, although this approach needs to be carefully weighed up against the potential for adverse effects. Furthermore, high-quality research that considers psychosocial determinants for behaviour change, strategies to improve clinician-family interaction, and cost-effective programs for primary and community care is required.	1985–May 2008
Connelly 2007	To present practice-relevant guidance on interventions to reduce at least one measure of adiposity in child populations that do or do not contain overweight or obese children	<18 years	Home, school, community (e.g. sporting clubs)	Nutrition and physical activity	Nutritional education, nutritional skills training, voluntary and compulsory physical activity	By using a novel approach to synthesising trials, a decisive role for the 'compulsory' provision of aerobic physical activity has been demonstrated. Further research is required to identify how such activity can be sustained and transformed into a personally chosen behaviour by children and over the life course.	Up to Apr 2006
Saunders 2007	To review the prevention of obesity in pre-school children to inform policies at both local and regional levels that are required for effective interventions	<5 years	Pre-school, family	Nutrition and physical activity	Range of interventions relating to environmental factors	There is limited and immature evidence and lack of comprehensive evidence on effective strategies to prevent obesity in younger children. The overall quality of studies is poor. The need remains for structured, focused and systematic research on child obesity prevention. Well-designed studies examining a range of interventions remain a priority.	Up to May 2007

Risk factor: smoking

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
King 2016	<p>1. What can be determined about the overall quality of smoking cessation interventions using nicotine replacement therapy (NRT) for adolescents?</p> <p>2. On which methodological quality aspects do the interventions excel?</p> <p>3. Where are the greatest opportunities for improvement?</p>	Adolescents and youth (<18 years)	Primary health care	Smoking	Nicotine replacement therapy	While the interventions scored well on four of the methodological criteria, improvement is needed regarding sample size and representativeness. To truly understand whether NRT is effective, interventions need to have adequate sample sizes that account for attrition.	1996–2014
de Kleijn 2015	To study the effect of school-based interventions on smoking prevention for girls	Girls <18 years	School	Smoking	School-based smoking prevention programs	There was no evidence that school-based smoking prevention programs have a significant effect on preventing adolescent girls from smoking. Combining school-based programs with mass media interventions, and developing girl-specific interventions, deserve additional study as potentially more effective interventions compared to school-based-only intervention programs.	1992–Jan 2015
Peirson 2015	To determine the effectiveness of primary healthcare relevant interventions to prevent and treat tobacco smoking in school-aged children and adolescents	School children 5–12 years Youth 13–18 years	Health care	Smoking	Prevention approaches behavioural (education, counselling) Treatment – alternative or complimentary approaches counselling, education, acupuncture, hypnosis	The mostly moderate quality evidence suggested targeted behavioural interventions can prevent smoking and assist with cessation. Primary care relevant behavioural interventions improve smoking outcomes for children and youth. The evidence on key components is limited by heterogeneity in methodology and intervention strategy.	1980–Apr 2015
Thomas 2015	To assess effectiveness of school-based smoking prevention	Never smokers aged 5–18 years	School	Smoking	School-based smoking prevention curricula	RCTs of baseline never smokers at longest follow-up found an overall significant effect with average 12% reduction in starting smoking compared with controls, but no effect for all trials pooled at ≤ 1 year. However, combined social competence/social influences curricula showed a significant effect at both follow-up periods. Programs led by adults may be more effective than those led by young people. There is no evidence that delivering extra sessions makes the intervention more effective.	Up to 2014

Risk factor: smoking – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Thomas 2015	To assess the effectiveness of interventions to help families stop children start smoking	Children 5–12 years Adolescents 13–18 years	Family	Smoking	Family-based interventions or school-based interventions	There is moderate quality evidence to suggest that family-based interventions can have a positive effect on preventing children and adolescents from starting to smoke. There were more studies of high-intensity programs compared to a control group receiving no intervention than there were for other comparisons. The evidence is therefore strongest for high-intensity programs used independently of school interventions. Programs typically addressed family functioning, and were introduced when children were aged 11–14 years. The common feature of the effective high-intensity interventions was encouraging authoritative parenting (which is usually defined as showing strong interest in and care for the adolescent, often with rule setting). This is different from authoritarian parenting (do as I say) or neglectful or unsupervised parenting.	Up to 2014
Coppo 2014	To assess the effectiveness of policies aiming to prevent smoking initiation among students by regulating smoking in schools	10–18 years	School	Smoking	School tobacco policies (STPs) tobacco policy, environmental changes, and communication activities	Despite a comprehensive literature search, and rigorous evaluation of studies, there was no evidence to support STPs. The absence of reliable evidence for the effectiveness of STPs is a concern in public health. There is a lack of RCTs in this area.	Up to 2014
Brown 2014	To identify which types of policies/interventions may be effective in reducing inequalities in smoking, that is, have a greater impact on low SES young people	Youth 11–25 years	Policy	Smoking	Smoke free, price/tax, mass media campaigns, advertising controls, access controls, school-based programs, multiple policies, individual-level cessation support, and individual-level support for smoke-free homes	Very few studies have assessed the equity impact of tobacco control interventions/policies on young people. Price/tax increases had the most consistent positive equity impact. There is a need to strengthen the evidence base for the equity impact of youth tobacco control interventions.	1995–Oct 2013
Wolfenden 2014	To identify effective implementation or dissemination interventions, targeting the adoption of school-based tobacco prevention programs	Adolescents	School	Smoking	Tobacco policies or programs in schools	Little rigorous evidence exists to guide the implementation and dissemination of tobacco prevention programs in schools.	1992–2012
Brown 2013	To review available evidence on tobacco treatment Internet interventions with young adults	18–30 years	College	Smoking	e-interventions – Internet, e-mail, text messaging, computer, or Web-based	Use of technology-based interventions, such as the Internet, may be an effective tool for tobacco treatment interventions, especially with college students. There is great potential to reach large numbers of students, many of whom may not identify themselves as smokers or seek traditional methods for treatment.	1999–Feb 2011

Risk factor: smoking – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Civiljak 2013	To determine the effectiveness of Internet-based interventions for smoking cessation	People who smoked, with no exclusions based on age, gender, ethnicity, language or health status	Online	Smoking	Any type of internet intervention	Some Internet-based interventions can assist smoking cessation at six months or longer, particularly those that are interactive and tailored to individuals. However, trials that compared Internet interventions with usual care or self-help did not show consistent effects and were at risk of bias.	Up to 2009
Patnode 2013	To review the evidence for the efficacy and harms of primary care-relevant interventions that aim to reduce tobacco use among children and adolescents	Children and adolescent	Health care	Smoking	Behaviour-based interventions, prevention of smoking among non-smokers, cessation among smokers and bupropion interventions	Primary care-relevant interventions may prevent smoking initiation over 12 months in children and adolescents.	1998–2008
Stanton 2013	To evaluate the effectiveness of strategies that help young people to stop smoking tobacco	Young people <20 years regular tobacco smokers	Family, school, community	Smoking	Any interventions; these could include pharmacotherapy, psycho-social interventions and complex programs targeting families, schools or communities. We excluded programs primarily aimed at prevention of uptake	Complex approaches show promise, with some persistence of abstinence (30 days point prevalence abstinence or continuous abstinence at six months), especially those incorporating elements sensitive to stage of change and using motivational enhancement and CBT. Given the episodic nature of adolescent smoking, more data are needed on sustained quitting. There were few trials with evidence about pharmacological interventions (nicotine replacement and bupropion), and none demonstrated effectiveness for adolescent smokers.	Up to 2013
Thomas 2013	To conduct a systematic review of mentoring to prevent/reduce youth smoking	Children (6–12) and adolescents (13–18)	Multiple	Smoking	Mentoring (consistent companionship, support, guidance to develop youth competence and character)	Only one study reported that mentoring (by peers) reduced adolescent smoking. Heterogeneity of both participants and outcome measures did not permit meta-analysis. There is limited literature on this topic. Further research achieving sample sizes required by power computations, minimising attrition, and ascertaining mentoring content and achievements from mentor and mentee perspectives is needed.	Up to Jan 2013
Carson 2012	To evaluate the effectiveness of intervention programs to prevent tobacco use initiation or progression to regular smoking among young Indigenous populations and to summarise these approaches for future prevention programs and research	Indigenous youth <18 years	Multiple	Smoking	Interventions aiming to prevent tobacco use initiation or progression from experimentation to regular tobacco use in Indigenous youth. Interventions – school-based, mass media, multi-component community level interventions, family-based programs or public policy.	Based on the available evidence, a conclusion cannot be drawn as to the efficacy of tobacco prevention initiatives tailored for Indigenous youth (only two studies included and all among Native American youth)	Up to 2011

Risk factor: smoking – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Isee 2012	To meta-analyse randomised controlled trials on the effects of smoke free classes (SFC) on current smoking at latest follow-up in adolescents	Adolescents 11–14 years	School	Smoking	SFC are used widely throughout Europe, where youth generally aged 11–14 years commit to being smoke free for a six-month period. If 90% or more of the class is non-smoking at the end of the six months, the class goes into a competition to win prizes	Of 24 records identified, five fulfilled the inclusion criteria. SFC appear to be an effective tool in school-based smoking prevention.	Up to 2011
Johnston 2012	To determine whether incentives prevent children and adolescents from starting to smoke	5–18 years, non-smokers at baseline	School	Smoking	Incentives to not smoke – any tangible benefit externally provided with the explicit intention of preventing smoking, includes contests, competitions, incentive schemes, lotteries, raffles, and contingent payments to reward not starting to smoke	Incentive programs have not been shown to prevent smoking initiation among youth, although there are relatively few published studies and these are of variable quality. Trials included in this meta-analysis were all studies of the SFC competition, which distributed small to moderately sized prizes to whole classes, usually through a lottery system.	Up to May 2012
Carson 2011	To determine the effectiveness of multi-component community based interventions in influencing smoking behaviour	Young people <25 years	Community and primary health	Smoking	Community-based interventions focused on preventing the uptake of smoking in young people and encouraging current smokers to stop	There is some evidence to support the effectiveness of community interventions in reducing the uptake of smoking in young people, but the evidence is not strong and contains a number of methodological flaws.	Up to 2010
Durkin 2011	To summarise the impact of mass media campaigns on promoting quitting among adult smokers overall and for subgroups; the influence of campaign intensity and different channels; the effects of different message types	Adults ≥18 years	Community – mass media	Smoking	Mass media campaigns	There is strong empirical evidence that, within the context of comprehensive tobacco control programs, mass media campaigns can promote adult quitting and reduce adult smoking prevalence. Effectiveness may depend upon campaign reach, intensity, duration and the messages used.	Up to 2011
Hutton 2011	Systematic review of RCTs to evaluate the efficacy of Web-based interventions in adults, college students, and adolescents	Adults, college students (18–24 years) and adolescents	Community	Smoking	E-intervention: web-delivered smoking cessation program with a minimum of one-month follow-up intervention	Evidence supporting the use of Web-based interventions for smoking cessation is insufficient to moderate in adults and insufficient in college students and adolescents. However, these RCTs have elucidated clinical, methodological, and statistical practices that are likely to improve future trial design and treatment delivery.	1990–2009

Risk factor: smoking – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Kim 2011	A meta-analysis to evaluate the effectiveness of pharmacologic therapy for smoking cessation in adolescent smokers	13–20 years	Community	Smoking	Pharmacologic therapy	Pharmacologic therapy for smoking cessation among adolescent smokers did not have a significant effect on abstinence rates at short-term and mid-term follow-up times of <26 weeks, and the RCTs examined found few adverse events. However, the results may have been affected by the limited number of participants in published trials.	1991–2009
Lovato 2011	To assess the effects of tobacco advertising and promotion on non-smoking adolescents' future smoking behaviour	Adolescents ≤18 years	Policy	Smoking	Marketing/promotion advertising	Tobacco advertising and promotion increases the likelihood that adolescents will start to smoke. There are no trials of the impact of tobacco advertising and promotional activities on people taking up smoking. However, there are studies following non-smokers and their exposure to advertising (such as the number of tobacco advertisements in the magazines they read). The review found that in all these studies, non-smoking adolescents who were more aware of, or receptive to, tobacco advertising were more likely to become smokers later.	Up to Aug 2011
Brinn 2010	To evaluate the effectiveness of mass media interventions to prevent smoking in young people in terms of reduced smoking uptake, in addition to secondary outcomes including improved smoking outcomes, attitudes, behaviours, knowledge, self-efficacy and perception. Cochrane	Young people <25 years	Community – mass media	Smoking	Mass media campaigns (defined as channels of communication such as television, radio, newspapers, bill boards, posters, leaflets or booklets)	There is some evidence that mass media can prevent the uptake of smoking in young people, however the evidence is not strong and contains a number of methodological flaws. Campaigns that researched and developed their message to reach their target audience had a higher success rate than those that did not. Overall, effective campaigns lasted longer with a minimum of three consecutive years, and were also more intense than less successful ones for both school-based lessons (minimum eight lessons per grade) and media spots (minimum four weeks' duration across multiple media channels with between 167 and 350 TV and radio spots). Changes in attitudes, knowledge or intention to smoke did not generally seem to affect the long-term success of the campaigns.	1997–2010
Heckman 2010	A systematic review and meta-analysis to investigate the efficacy of interventions incorporating motivational interviewing for smoking cessation and identify correlates of treatment effects	All samples (adults and adolescents analysed separately)	Multiple colleges, hospitals, schools	Smoking	Motivational interviewing	This is the most comprehensive review of motivational interviewing for smoking cessation to date. These findings suggest that current motivational interviewing smoking cessation approaches can be effective for adolescents and adults. However, comparative efficacy trials could be useful.	Up to Aug 2008

Risk factor: smoking – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Villanti 2010	To conduct a systematic review of smoking-cessation interventions for US young adults (aged 18–24 years)	18–24 years	Multiple	Smoking	Smoking-cessation interventions for young adults in the US BI e-interventions	There is limited evidence of the efficacy of smoking-cessation interventions for US young adults. There were no pharmacologic interventions included in this review. Promising interventions were brief, with extended support via telephone and electronic media. Further high-quality studies using standardized smoking measures and additional studies outside the college setting are needed to identify and tailor effective smoking-cessation interventions for at-risk young adults in the US.	Up to Aug 2009
Richardson 2009	To examine existing evidence on the effectiveness of interventions that are designed to prevent the illegal sale of tobacco to young people. The review considers specific sub-questions related to the factors that might influence effectiveness, any differential effects for different sub-populations of youth, and barriers and facilitators to implementation	Young people under the age of 18	Policy – access restriction	Smoking	Interventions designed to prevent the illegal sale of tobacco to young people included: educate merchants and the general public about the minimum age law; proof of age – age or identification requests; and regulation and law enforcement including encouraging members of the community to help enforce the law	Access restriction interventions may produce significant reductions in the rate of illegal tobacco sales to youth. However, lack of enforcement and the ability of youth to acquire cigarettes from social sources may undermine the effectiveness of these interventions. When access interventions are applied in a comprehensive manner, they can affect young people's access to tobacco. Further research is required to examine the effects of access restriction interventions on young people's smoking behaviour.	1990–2007
Dobbins 2008	To evaluate the effectiveness of school-based tobacco use prevention strategies for preventing tobacco use in children and youth	Children and youth	School	Smoking	School-based tobacco use prevention interventions	School-based tobacco use prevention interventions are effective in reducing smoking prevalence, smoking initiation and intended smoking intentions in the short term. There is some evidence of the effectiveness of prevention programs on smoking behaviour and initiation, although this is short term. Multi-faceted and comprehensive programs are effective at reducing youth smoking initiation rates and the overall prevalence of youth smoking. Effective school-based strategies provide refusal skills and social influences training along with peer support.	1970–2007
Sherman 2008	To explore characteristics of successful school-based tobacco interventions	10–18 years	School	Smoking	School-based tobacco interventions	New school-based programs are needed to address current issues in tobacco control. To improve chances of success, these programs may wish to target certain specific high-risk demographic groups, use professional health educators and/or trained community members, and build in methods of updating material.	Up to Jun 2008

Risk factor: smoking – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Sussman 2006²	Meta-analysis of 48 teen cigarette smoking cessation studies, the first meta-analysis of its kind	12–19 years	Multiple	Smoking	Multiple in many different settings	Relatively higher quit rates were found in programs that included a motivation enhancement component, cognitive-behavioural techniques, and social influence approaches. Also, relatively higher quit rates were found in school-based clinic and classroom modalities. Relatively higher quit rates were found for programs consisting of at least five quit sessions. The effects were maintained at short term (one year or less) and longer term (longer than one year) follow-ups. Much more teen smoking cessation research is needed, but teen smoking cessation program is effective, and the present study provides a framework to move forward.	1970–2003
Stead 2005	The review assesses the effects of interventions to reduce underage access to tobacco by deterring shopkeepers from making illegal sales	Minors – legal age limit in the communities studied	Policy	Smoking	Retailers – education, legislative enforcement	Few of the communities studied in this review achieved sustained levels of high compliance. This may explain the limited evidence for an effect of intervention on youth perception of ease of access to tobacco, and on smoking behaviour. If young people are unable to purchase cigarettes, it may reduce the number who start to smoke. Various interventions including warnings and fines for retailers who illegally make sales to underage youth have been shown to reduce the proportion of retailers who are willing to sell tobacco during compliance checks. However, it has been difficult to demonstrate a clear effect on young smokers' perceptions of how easily they can buy cigarettes, or on their smoking behaviour.	Up to Apr 2008

² Information outdated therefore not included in summary

Risk factor: alcohol

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Carney 2016	To evaluate the effectiveness of brief school-based interventions in reducing substance use and other behavioural outcomes among adolescents compared to another intervention or assessment-only conditions	Adolescents <19 years attending school or college	School	Alcohol	Brief interventions Delivery of the interventions was individual or group face-to-face feedback across high schools and further education colleges. All interventions were up to four sessions in length	There is low- or very low-quality evidence that brief school-based interventions may be more effective in reducing alcohol and cannabis use than the assessment-only condition and that these reductions are sustained at long-term follow-up. There is moderate-quality evidence that, when compared to information provision, brief interventions probably do not have a significant effect on substance use outcomes.	1966–Feb 2015
Diestelkamp 2016	To assess the effectiveness and feasibility of the use of Brief Interventions in the emergency department (ED)	12–25 years treated in an ED following an alcohol-related event	Primary health care/ health service	Alcohol	Brief interventions	Through the unique combination of a systematic review and additional evidence synthesis, this review provided an overview of evidence for brief interventions in ED for adolescents and young adults following an alcohol-related event that goes beyond effectiveness by including evidence on current implementation, acceptance and reach. Evidence regarding their effectiveness and feasibility is limited.	Up to May 2012
Hindmarsh 2015	To examine key considerations to develop an effective school-based alcohol media literacy program	Children 6–12 years adolescents 13–19 years	School	Alcohol	Policy – advertising/ marketing	This systematic review identified key considerations for the future planning and development of media literacy programs to address young people’s alcohol-related cognitions, attitudes and behavioural intentions. The small pool of studies highlights the emerging nature of this research area and the need for more rigorous evaluations of programs to be conducted.	1997–May 2014
Dedert 2015	To characterise treatment intensity and systematically review the evidence for efficacy of e-interventions, relative to controls, for reducing alcohol consumption and alcohol-related impairment in adults and college students	Adults and college students high-risk of alcohol misuse	Primary healthcare/ health service	Alcohol	E-intervention was brief feedback on alcohol consumption	Low-intensity e-interventions produce small reductions in alcohol consumption at six months, but there is little evidence for longer-term, clinically significant effects, such as meeting drinking limits.	2000–Mar 2015

Risk factor: alcohol – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Kohler 2015	The effect of motivational interviewing (MI), delivered in a brief intervention during an emergency care contact, on the alcohol consumption of young people who screen positively for present or previous risky alcohol consumption	13–25 years ED visit	Primary health care/ health service	Alcohol	Brief interventions – MI	MI appears at least as effective and may possibly be more effective than other brief interventions in emergency care to reduce alcohol consumption in young people.	Up to Sep 2013
Hennessy 2015	To determine the effectiveness of school-based brief alcohol interventions among adolescents and to examine possible iatrogenic effects due to deviancy training in group-delivered interventions	Adolescents in secondary school	School	Alcohol	Brief interventions around alcohol and alcohol-related harms	Some school-based brief alcohol interventions are effective in reducing adolescent alcohol consumption but may be ineffective if delivered in group settings.	Dec 2012–2015
Merz 2015	To assess the effectiveness of interventions to reduce the recurrence of alcohol-related events and their consequences in young adults (18–24 years) admitted to an emergency ward following alcohol intoxication	18–24 years ED visit	Primary health care/ health service	Alcohol	Brief interventions – brief motivational interview, personalised feedback or an educational brochure	The evidence is inconclusive, but the most effective interventions include at least one therapeutic contact several days after the event.	Up to Mar 2014
Nelson 2015	To explore the effects of alcohol prices (or tax surrogates) on binge drinking for three age groups: youth, young adults and adults	18–26 years and adults	Community	Alcohol	Policy – pricing	Increased alcohol taxes or prices are unlikely to be effective in reducing binge drinking regardless of gender or age group.	2008–2015
Healey 2014	To determine the effectiveness of alcohol harm reduction interventions aimed at children and adolescents under the age of 18 years	Children and adolescents <18 years	Primary health care/ health service, school	Alcohol	Indicated interventions	There is a lack of concrete evidence regarding the effectiveness of brief interventions for children and adolescents under the age of 18 years.	2002–Nov 2012

Risk factor: alcohol – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Patton 2014	To explore the evidence base on alcohol screening and brief intervention for adolescents to determine age appropriate screening tools, effective brief interventions and appropriate locations to undertake these activities	Adolescents 10–21 years	Primary health care/ health service	Alcohol	The term brief intervention (BI) encompasses a range of therapeutic processes from advice to extended counselling, and typically is delivered in short sessions on one or more occasions	Motivational interventions delivered over one or more sessions and based in healthcare or educational settings are effective at reducing levels of consumption and alcohol-related harm. Screening and BI activity should be undertaken in settings where young people are likely to present. The use of electronic (web/smart-phone based) screening and intervention shows promise. Based on the reviews to date and the RCTs undertaken from 2010 onwards, MI/MET approaches appear to be associated with reductions in alcohol consumption and related harms, with health settings proving to be a promising location for such programs. E-BIs (computer, web and phone based) offer both effective and cost effective delivery of interventions across settings that may prove to be more acceptable to the target population than more traditional (face to face) approaches.	2003–2013
Siegfried 2014	To evaluate the benefits, harms and costs of restricting or banning the advertising of alcohol, via any format, compared with no restrictions or counter advertising, on alcohol consumption in adults and adolescents	Adolescents (10–19 years) and adults	Community Media	Alcohol	Marketing – advertising	There is a lack of robust evidence for or against recommending the implementation of alcohol advertising restrictions. Advertising restrictions should be implemented within a high-quality, well-monitored research programs to ensure the evaluation over time of all relevant outcomes in order to build the evidence base.	1966–May 2014
Newton 2013	To determine the effectiveness of ED-based brief interventions (BIs)	Youth ≤21 years attending ED	Primary health care/ health service	Alcohol	Universal and targeted BIs – motivational interviewing; parental involvement; peer-delivered; computer-based MI	Clear benefits of using ED-based BIs to reduce alcohol and other drug use and associated injuries or high-risk behaviours remain inconclusive because of variation in assessing outcomes and poor study quality.	Up to Apr 2011
Thomas 2013	To undertake a systematic review of mentoring in preventing/reducing adolescents' alcohol and drug use	Adolescents	Community – treatment/ clinics	Alcohol	Mentoring at-risk/high-risk	Very few well-designed studies evaluate the effects of mentoring on adolescent drug and alcohol use.	Up to Jan 2013
Jonas 2012	To evaluate the benefits and harms of behavioural counselling interventions for adolescents and adults who misuse alcohol	Adults or adolescents with alcohol misuse young adults or college students	Primary health care/ health service	Alcohol	Counselling – brief advice, feedback, motivational interviews. Cognitive behavioural strategies – self-completed action plans, written health education or self-help materials, drinking diaries, problem-solving exercises to complete at home	For most health outcomes, available evidence found no difference between intervention and control groups, such as for mortality (low SOE), or was insufficient to draw conclusions about the effectiveness of behavioural interventions. Brief multi-contact interventions (about 10 to 15 minutes per contact) have the best evidence of effectiveness for adults.	1985–Jan 2012

Risk factor: alcohol – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Scott-Sheldon 2012	To examine the efficacy of alcohol expectancy challenge interventions for college alcohol abuse prevention	College students	School – college	Alcohol	Interventions challenging alcohol expectancies have been developed as a means to reduce alcohol consumption. The expectancy challenge intervention is designed to illustrate the effects of alcohol-related expectancies through experiential learning in a group setting.	Overall, expectancy challenge interventions succeeded at reducing positive alcohol expectancies, the quantity of alcohol consumed, and the frequency of heavy drinking for as long as one-month post-intervention. Quantity of alcohol consumed and the frequency of heavy drinking were not sustained at longer follow-ups (i.e. up to six months post-intervention). Compared with controls, expectancy challenge interventions were more successful at reducing positive alcohol expectancies, the quantity of alcohol consumed, and the frequency of heavy drinking.	Up to May 2010
Yuma-Guerrero 2012	To review the evidence around screening, brief intervention, and referral to treatment (SBIRT) with adolescent patients in acute care settings	11–21 years in acute care	Primary health care/ health service	Alcohol	MI and received written resources Interactive computer program-based intervention MI intervention, a personalised feedback sheet, and written resources	Based on existing evidence, it is not clear whether SBIRT is an effective approach to risky alcohol use among adolescent patients in acute care. Additional research is needed around interventions and implementation.	Up to Jan 2011
Foxcroft 2011	To review evidence on the effectiveness of universal school-based prevention programs in preventing alcohol misuse in school-aged children up to 18 years of age	Students ≤18 years	School	Alcohol	Universal school-based prevention programs	Most commonly observed positive effects across programs were for drunkenness and binge drinking. Certain generic psychosocial and developmental prevention programs can be effective and could be considered as policy and practice options. These include the Life Skills Training Program, the Unplugged program, and the Good Behaviour Game.	Up to Jul 2010
Foxcroft 2011	To systematically review evidence on the effectiveness of universal family-based prevention programs in preventing alcohol misuse in school-aged children up to 18 years of age	Students ≤18 years	Family/Home	Alcohol	Universal family-based prevention programs	Most studies included in this review reported positive effects of family-based universal programs for the prevention of alcohol misuse in young people. The effects of family-based prevention interventions are small but generally consistent and also persistent into the medium to longer term.	Up to Jul 2010
Foxcroft 2011	To systematically review evidence on the effectiveness of universal multi-component prevention programs in preventing alcohol misuse in school-aged children.	School-aged children > 18 years	Multiple settings – school, family	Alcohol	Universal multi-component prevention programs (intervention delivered in more than one setting). Multi-component prevention programs are defined as those prevention efforts that deliver interventions in multiple settings, for example in both school and family settings, typically combining school curricula with a parenting intervention	A majority of the studies included in this review reported positive effects of multi-component programs for the prevention of alcohol misuse in young people, with effects persisting into the medium- and longer-term. There is some evidence that multi-component interventions for alcohol misuse prevention in young people can be effective. However, there is little evidence that interventions with multiple components are more effective than interventions with single components.	Up to Jul 2010

Risk factor: alcohol – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Khadjesari 2011	To determine the effects of computer-based interventions aimed at reducing alcohol consumption in adult populations.	Adults ≥18 years	Community	Alcohol	E-interventions – Computer-based – personalised feedback on current levels of drinking and comparison with safe drinking limits. Included normative feedback, associated health risk, information on calculating units and support services. Some interventions designed to resemble the campus setting such as interactive games and assignments, motivational feedback and information on risk taking and refusal skills	Computer-based interventions may reduce alcohol consumption compared with assessment-only; the conclusion remains tentative because of methodological weaknesses in the studies.	Up to Dec 2008
McQueen 2011	To determine whether brief interventions reduce alcohol consumption and improve outcomes for heavy alcohol users admitted to general hospital inpatient units	Adults and adolescents ≥16 years admitted to general inpatient hospital care for any reason other than specifically for alcohol treatment	Primary health care/ health service	Alcohol	Education/counselling – Brief Intervention	There are benefits to delivering brief interventions to heavy alcohol users admitted to general hospital wards in terms of reduction in alcohol consumption and death rates. However, these findings are based on studies involving mainly male participants. Further research is required determine the optimal content and treatment exposure of brief interventions in general hospital settings and whether they are likely to be more successful in patients with certain characteristics.	1966–Mar 2011
Riper 2011	To assess the overall effectiveness of e-health interventions.	Adult problem drinkers ≥18 years	Community	Alcohol	e-intervention – online/ computer	E-self-help interventions without professional contact are effective in curbing adult problem drinking in high-income countries.	1997–Feb 2010
Thomas 2011	Assess effectiveness of structured mentoring to prevent adolescent alcohol/ drug use	Adolescents 9–16 years	Structured mentoring programs	Alcohol	Structured mentoring	All four RCTs were in the US, and included “deprived” and mostly minority adolescents. Participants were young (in two studies age 12, and in two others 9–16). All students at baseline were non-users of alcohol and drugs. Two RCTs found mentoring reduced the rate of initiation of alcohol, and one of drug usage. The ability of the interventions to be effective was limited by the low rates of commencing alcohol and drug use during the intervention period in two studies (the use of marijuana in one study increased to 1% in the experimental and to 1.6% in the control group, and in another study drug usage rose to 6% in the experimental and 11% in the control group). However, in a third study there was scope for the intervention to have an effect as alcohol use rose to 19% in the experimental and 27% in the control group.	1950–Jul 2011

Risk factor: alcohol – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Elder 2010	To assess the effectiveness of alcohol tax policy interventions for reducing excessive alcohol consumption and related harms	<25 years	Community	Alcohol	Tax policy, cost	Higher taxes or prices were associated with reductions in alcohol consumption in general and excessive alcohol consumption in particular. Although effects were not restricted to a particular demographic group, there is some evidence that they may be more pronounced among groups with a higher prevalence of excessive alcohol consumption (e.g. young men). Among underage populations, increased taxes were also significantly associated with reduced consumption and alcohol-related harms. These results constitute strong evidence that raising alcohol excise taxes is an effective strategy for reducing excessive alcohol consumption and related harms. The impact of a potential tax increase is expected to be proportional to its magnitude and to be modified by such factors as disposable income and the demand elasticity for alcohol among various population groups.	Up to Jul 2005
Ryan 2010	To identify strategies associated with adolescent alcohol consumption that parents can use to implement new national guidelines regarding alcohol consumption by people under the age of 18	8–17 years	Home	Alcohol	Different modes of parenting – parental modelling, provision of alcohol, alcohol-specific communication, disapproval of adolescent drinking, general discipline, rules about alcohol, parental monitoring, parent-child relationship quality, family conflict, parental support, parental involvement, and general communication	Delayed alcohol initiation was predicted by parental modelling, limiting availability of alcohol to the child, parental monitoring, parent-child relationship quality, parental involvement and general communication. Reduced levels of later drinking by adolescents were predicted by parental modelling, limiting availability of alcohol to the child, disapproval of adolescent drinking, general discipline, parental monitoring, parent-child relationship quality, parental support and general communication.	1980–Oct 2009
Tripodi 2010	To assess the effectiveness of substance abuse interventions for their ability to reduce adolescent alcohol use	12–19 years	Multiple	Alcohol	Multiple interventions	This meta-analysis found that numerous treatments for adolescents contribute to the reduction of alcohol use overtime. When synthesising all 16 studies and 26 outcomes treatment has a medium effect on the reduction of alcohol use for adolescents. The differences between individual- and family-based interventions found in the study may lack reliability because of the small number of studies that satisfied inclusion criteria.	1960–2008
Wachtel 2010	To investigate the effectiveness of brief interventions for adolescent alcohol misuse and to determine if these interventions are useful in reducing alcohol consumption	12–25 years	Primary health care/ health service	Alcohol	Brief interventions – MI	No single intervention could be confidently recommended due to confounding evidence.	1998–Oct 2008

Risk factor: alcohol – continued

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
White 2010	To review the efficacy of online interventions for alcohol misuse	General population – university students 18–25 years	Community	Alcohol	E-intervention – online/ computer	The available evidence suggests that users can benefit from online alcohol interventions and that this approach could be particularly useful for groups less likely to access traditional alcohol-related services, such as women, young people, and at-risk users. However, caution should be exercised given the limited number of studies, the heterogeneity of outcome measures and follow-up periods.	1998–2010
Anderson 2009	To assess the impact of alcohol advertising and media exposure on future adolescent alcohol use	Adolescents ≤18 years or below the legal drinking age of the country of origin of the study, whichever was the higher	Community	Alcohol	Advertising, marketing	Conclusion that alcohol advertising and promotion increases the likelihood that adolescents will start to use alcohol, and to drink more if they are already using alcohol.	1990–Sep 2008
Smit 2008	To quantify the effectiveness of family interventions in reducing adolescent drinking	<16 years	Family	Alcohol	Family – group sessions, skills training, booklets, CD Rom programs	The results from this meta-analysis suggest that the overall effect of family interventions on adolescent alcohol use is small, yet consistent and effective even at 48 months. Family interventions are likely to be effective in delaying the age of alcohol initiation and in curbing risky drinking behaviours in young people.	1995–Sep 2006
Spoth 2008	To clarify the nature and extent of the current evidence base on prevention interventions addressing underage drinking	< 10 years, 10–15 years, and 16 to ≤ 20 years	Multiple – family/home, school, community	Alcohol	Universal, selective (those at higher risk), indicative Interventions were categorised into three groups: 1. Educational/ awareness-building (information/knowledge programs, values clarification, and normative re-education); 2. Cognitive-behavioural skills-based (expectancy challenge programs, self-monitoring, multi-component alcohol skills training, and general life skills training) 3. Motivational feedback-based (brief motivational interventions and mailed or computerised motivational feedback)	A number of prevention interventions, particularly universal and selective ones, significantly reduced the rate of alcohol use in underage populations, as well as bolstered protective factors among children that reduce risks for alcohol use.	mid 1990s–2007

Risk factor: alcohol and smoking

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Flynn 2015	Systematic review identifying independently evaluated RCTs of universal, middle school-based drug abuse prevention curricula; extract data on study quality and substance use outcomes; and assess evidence of program effectiveness	Adolescents (middle school)	School	Alcohol, smoking	School-based drug prevention	There is a lack of research that appropriately evaluates the effectiveness of universal, middle school-based drug prevention curricula. Independent evaluations show little evidence of effectiveness for widely used programs. New methods may be necessary to approach school-based adolescent drug prevention.	1984–Mar 2015
Mason 2015	To determine the comparative effectiveness of text message interventions relative to control conditions among adolescents and young adults using tobacco or alcohol	Adolescents and young adults 12–29 years	Community	Alcohol, smoking	Text messages increasing access to substance use interventions	Results from 14 studies with effect sizes are ranging from 0.25 to 0.54. Combining the effect sizes across studies yielded a summary effect size of 0.25, indicating that in general, text interventions have a positive effect on reducing substance use behaviours.	Up to 2014
Yonker 2015	To identify research on the use of social media for interacting with adolescents and young adults to achieve positive health outcomes	11–25 years	Community	Alcohol, smoking	Social media as a medium by which health behaviours can be influenced by positive messages	The majority of studies have been preliminary and limited in their methodologies, and mostly centre around evaluating how adolescents and young adults use social media and the resulting implications for their health. Further exploration and development of these strategies into building effective interventions is necessary.	2002–Oct 2013
Danielson 2014	To review research on the effects of telephone and/or internet-based support for tobacco smoking, alcohol use or gambling	Adults ≥18 years	Community	Alcohol, smoking	Telephone or web-based interventions to provide help to those with alcohol, tobacco or gambling addictions	There are some positive findings regarding Internet-based support for heavy alcohol use among US college students. However, evidence on the effects of Internet-based support for smoking, alcohol use or gambling are to a large extent inconsistent.	1996–2013
Hale 2014	To identify randomised controlled trials that reported significant universal or selective intervention effects for at least two health risk behaviours among adolescents	10–19 years	Multiple – school, community	Alcohol, smoking	Universal or selective interventions of which most were school based	Effects were small. In some studies, effects for more than one health risk behaviour only emerged at long-term follow-up. Integrated prevention programs are feasible and effective and may be more efficient than discrete prevention strategies.	1980–Apr 2012
Petrie 2007³	To assess the effectiveness of parenting programs in preventing or reducing use, misuse or abuse of drug, alcohol or tobacco by children under the age of 18 years compared with no intervention or other interventions	Parents with children <18 years	Family	Alcohol, smoking	Parenting programs – any intervention involving parents designed to develop parenting skills, improve parent/child communication or enhance the effects of other interventions	Parenting programs can be effective in reducing or preventing substance use. The most effective appeared to be those that shared an emphasis on active parental involvement and on developing skills in social competence, self-regulation and parenting. However, more work is needed to investigate the change processes involved in such interventions and their long-term effectiveness. The transition from primary school to secondary school appeared to be an effective time to intervene.	1960–2003

³ Outdated information therefore not included in summary

Multiple risk factors

First author year	Aim	Population	Setting	Risk factor	Intervention strategy	Main findings	Years included
Cushing 2014	To systematically review and meta-analyse the literature comparing motivational interviewing (MI) with a control condition for adolescent health behaviour change	13–18 years	All settings	Behaviours other than substance abuse (physical activity, diet)	Motivational interviewing	MI interventions produced a small, but significant, aggregate effect size for short-term post intervention effects compared with control conditions. This effect was sustained at follow-up assessments averaging 33.6 weeks post-intervention. MI interventions for adolescent health behaviour appear to be effective. However, significant lack of clarity exists regarding interventionist training requirements necessary to ensure intervention effectiveness.	Up to Jun 2013
Gayes 2014	To investigate the overall effectiveness of MI in the context of child and adolescent health behaviour change and health outcomes	Average age ≤18 years	Multiple – health care, school, home	General wellbeing	Motivational interviewing	MI seems to be most effective when both parent and child participate in sessions and when the cultural background of the practitioner matches the family. Overall, these findings indicate that MI is an effective and appropriate intervention for targeting child health behaviour changes.	Up to 2013
Langford 2014	To assess the effectiveness of the Health Promoting Schools framework in improving the health and well-being of students and their academic achievement	4–18 years	Schools	General health	The WHO Health Promoting Schools Framework	There were positive effects for some interventions for: body mass index, physical activity, physical fitness, fruit and vegetable intake, tobacco use, and being bullied. Intervention effects were generally small but have the potential to produce public health benefits at the population level. There was little evidence of effectiveness for standardised body mass index and no evidence of effectiveness for fat intake, alcohol use, drug use, mental health, violence and bullying others.	Up to 2014
Saraf 2012	To assess the effectiveness of school-based interventions for prevention of non-communicable disease (NCD) risk factors (physical inactivity, diet, and tobacco consumption), and identify processes that affect the main outcome	School-aged children and adolescents	School, family, community	Physical activity, diet, smoking	School-based interventions	Overall, 80% of the studies reported at least some evidence of a positive intervention effect. The current literature search supports the effectiveness of school-based interventions for prevention of risk factors associated with NCDs.	2001–2010

Appendix 2: Search strategy in detail

A2.1 Outline of the search strategy according to the PICO framework

Poor nutrition

Population

[PI] Youth (those aged 0–24)

Settings

[Se1] Childcare

[Se2] Schools

[Se3] Primary health care

[Se4] Home/family

[Se5] Community

Risk Factor

[RI] Poor nutrition

Target strategies

[St1] Health promotion and education

[St2] Subsidising healthy products

[St3] Taxation of unhealthy products

[St4] Improved labelling

[St5] Cessation of advertising (unhealthy products)

[St7] Mass media communication

[St8] Parental education and involvement

[St9] School canteens

Comparison

Control group (e.g. RCT), non-equivalent control group (e.g. quasi-experimental design), baseline level (e.g. before and after studies)

Outcomes

Objectively or subjectively measured physical activity and eating behaviours. Eating behaviours can include types of food eaten (e.g. vegetables, fruits, EDNP foods), diet quality (food indices), breakfast programs, meals eaten out, fast food, takeaway food, portion size, or nutrition-related knowledge.

Physical inactivity

Population

[PI] Youth (those aged 0–24)

Settings

[Se1] Childcare

[Se2] Schools

[Se3] Primary health Care

[Se4] Home/family

[Se5] Community

Risk Factor

[RI] Physical inactivity

Target strategies

[St1] Health promotion and education

- [St2] Active travel
- [St3] Parental education and involvement
- [St4] Screen viewing
- [St5] School-based interventions
- [St6] Improved urban design
- [St7] Mass media communication

Comparison

Control group (e.g. RCT), non-equivalent control group (e.g. quasi-experimental design), baseline level (e.g. before and after studies)

Outcomes

Objectively or subjectively measured physical activity and eating behaviours. Physical activity-related outcomes can include intensity levels, duration of physical activity, frequency of physical activity or sedentary behaviour (e.g. screen time), or related knowledge in these.

Smoking

Population

[PI] Youth (those aged 0–24)

Settings

- [Se1] Childcare
- [Se2] Schools
- [Se3] Primary Health Care
- [Se4] Home/Family
- [Se5] Community

Risk Factor

[RI] Smoking

Target strategies

- [St1] Health promotion and education
- [St2] Regulation
- [St3] Taxation
- [St4] Packaging
- [St5] Cessation of advertising
- [St6] Policy change (industry and community)
- [St7] Mass media communication
- [St8] Parental education and involvement

Comparison

Control group (e.g. RCT), non-equivalent control group (e.g. quasi-experimental design), baseline level (e.g. before and after studies)

Outcomes

The successful cessation of smoking among existing smokers and the reduction of those beginning smoking. Decline in sales of tobacco products.

Excessive alcohol consumption

Population

[PI] Youth (those aged 0–24)

Settings

[Se1] Childcare

[Se2] Schools

[Se3] Primary Health Care

[Se4] Home/Family

[Se5] Community

Risk Factor

[RI] Excessive alcohol consumption

Target strategies

[St1] Health promotion and education

[St2] Regulation

[St3] Taxation

[St4] Packaging

[St5] Cessation of advertising

[St6] Policy change (industry and community)

[St7] Mass media communication

[St8] Parental education and involvement

Comparison

Control group (e.g. RCT), non-equivalent control group (e.g. quasi-experimental design), baseline level (e.g. before and after studies)

Outcomes

A reduction in those under 18 consuming alcohol products. An overall reduction in mortality and morbidity associated with alcohol abuse (chronic and acute). A decline in the overall sale of alcohol products and a decline in average drinks consumed per week.

A2.2 Search terms

Cinahl Plus Search Terms

#1 – Diet #2 – Diet, Food or Nutrition #3 – Food #4 – Nutrition #5 – Energy Intake #6 – Feeding Behavior #7 – Nutrition Assessment #8 – Nutritional Requirements #9 – #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 #10 – #9 [Limit by Subject Major Diet]

#11 – Exercise #12 – Physical Activity #13 – Motor Activity #14 – Sedentary #15 – Sedentary Lifestyle #16 – Physical Fitness #17 – Physical Endurance #18 – Exercise #19 – #11 or #12 or #13 or #14 or #15 or #16 or #17 #20 – #19 [Limit by Subject Major Physical Activity]

#21 – Smoking #22 – Tobacco #23 – Cigarette #24 – Adolescent Behavior #25 – Tobacco Addiction #26 – #21 or #22 or #23 or #24 or #25 #27 – #26 [Limit by Subject Smoking]

#28 – Alcohol #29 – Alcohol Abuse #30 – Underage Drinking #31 – College Drinking #32 – Alcohol-Related Disorders #33 – Alcohol Consumption #34 – #28 or #29 or #30 or #31 or #32 or #33 #35 – #34 [Limit by Subject Major Alcohol Drinking]

#36 – #10 or #20 or #26 or #35 #37 – English Language [Filter] #38 – Peer Reviewed [Filter] #39 – Research Article [Filter] #40 – Evidence-Based Practice [Filter] #41 – Publication type Review, Systematic Review [Filter] #42 – Publication Date 2005–2015 [Filter] #43 – Newborn: birth–1 month [Filter] #44 – Infant, Newborn 0–1 month [Filter] #45 – Infant, 1–23 months [Filter] #46 – Child, Preschool 2–5 years [Filter] #47 – Child, 6–12 years [Filter] #48 – Adolescence, 13–18 years [Filter] #49 – Adult: 19–44 years [Filter] #50 – #43 or #44 or #45 or #46 or #47 or #48 or #49 #51 – #36 and #37 and #38 and #39 and #40 and #41 and #42 and #50

Cochrane Search Terms

#1 – teenager:ti,ab,kw (Word variations have been searched) #2 – “adolescent”:ti,ab,kw (Word variations have been searched) #3 – “Child”:ti,ab,kw (Word variations have been searched) #4 – infant:ti,ab,kw (Word variations have been searched) #5 – young adult:ti,ab,kw (Word variations have been searched) #6 – #1 or #2 or #3 or #4 or #5

#7 – MeSH descriptor: [Diet] explode all trees #8 – MeSH descriptor: [Nutrition Assessment] explode all trees #9 – MeSH descriptor: [Food] explode all trees #10 – MeSH descriptor: [Feeding behaviour] explode all trees #11 – #7 or #8 or #9 or #10

#12 – MeSH descriptor: [Adolescent Behavior] explode all trees #13 – MeSH descriptor: [Tobacco Use] explode all trees #14 – MeSH descriptor: [Tobacco Use Cessation] explode all trees #15 – MeSH descriptor: [Tobacco Use Disorder] explode all trees #16 – MeSH descriptor: [Smoking Cessation] explode all trees #17 – #12 or #13 or #14 or #15 or #16

#18 – MeSH descriptor: [Adolescent Behavior] explode all trees #19 – MeSH descriptor: [Alcoholism] explode all trees #20 – MeSH descriptor: [Alcohol Drinking] explode all trees #21 – MeSH descriptor: [Alcohol-Related Disorders] explode all trees #22 – #18 or #19 or #20 or #21

#23 – MeSH descriptor: [Exercise] explode all trees #24 – MeSH descriptor: [Physical endurance] explode all trees #25 – MeSH descriptor: [Physical fitness] explode all trees #26 – MeSH descriptor: [Sedentary lifestyle] explode all trees #27 – MeSH descriptor: [Motor activity] explode all trees #28 – #23 or #24 or #25 or #26 or #27

#29 – #11 or #17 or #22 or #28 #30 – #6 and #29 #31 – Cochrane Reviews or Other Reviews [Filter] #32 – Publication date from 2005/01/01 to 2015/12/31 [Filter] #33 – #30 and #31 and #32

DoPHER Search terms

#1 – Freetext: Infant #2 – Freetext: Child #3 – Freetext: Adolescent #4 – Freetext: “School Aged” #5 – Freetext: “Young Adult” #6 – #1 or #2 or #3 or #4 or #5
#7 – Freetext: “Physical Activity” #8 – Freetext: Exercise #9 – Freetext: Sedentary Behavior #10 – Freetext: Sedentary #11 – Freetext: “Sedentary Lifestyle” #12 – Freetext: “Physical Exertion” #13 – Freetext: “Physical Endurance” #14 – Freetext: Fitness #15 – Freetext: “Physical Fitness” #16 – Freetext: “Screen Time” #17 – #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16
#18 – Freetext: Nutrition #19 – Freetext: Diet #20 – Freetext: Food #21 – Freetext: “Energy Intake” #22 – Freetext: “Caloric Intake” #23 – Freetext: Consumption #24 – Freetext: “Nutrition Assessment” #25 – Freetext: “Nutrition Requirement” #26 – #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25
#27 – Freetext: Smoking #28 – Freetext: Cigarette #29 – Freetext: Tobacco #30 – Freetext: “Tobacco Use” #31 – Freetext: “Smoking Cessation” #32 – Freetext: “Smoking Habit” #33 – Freetext: “Tobacco Addiction” #34 – #27 or #28 or #29 or #30 or #31 or #32 or #33
#35 – Freetext: Alcohol #36 – Freetext: “Alcohol Abuse” #37 – Freetext: Drinking #38 – Freetext: “Binge Drinking” #39 – Freetext: “Underage Drinking” #40 – Freetext: “Adolescent Drinking” #41 – Freetext: “Teenage Drinking” #42 – Freetext: “College Drinking” #43 – #35 or #36 or #37 or #38 or #39 or #40 or #41 or #42
#44 – #17 or #26 or #34 or #43 #45 – Freetext: Review #46 – #6 and #44 and #45

Embase Search terms

#1 – Child [MeSH Term] #2 – Adolescent [MeSH Term] #3 – Young Adult [MeSH Term] #4 – Infant [MeSH Term] #5 – #1 or #2 or #3 or #4
#6 – Adolescent Behavior [MeSH Term] #7 – Alcohol Consumption [MeSH Term] #9 – Alcohol Use Disorder [MeSH Term] #10 – Alcohol [MeSH Term] #11 – Alcohol Intoxication [MeSH Term] #12 – Alcohol Abuse [MeSH Term] #13 – Alcoholic Beverages [MeSH Term] #14 – #6 or #7 or #8 or #9 or 10 or #11 or #12 or #13
#15 – Diet, Food and Nutrition [MeSH Term] #16 – Caloric Intake [MeSH Term] #17 – Feeding Behavior [MeSH Term] #18 – Nutritional Assessment [MeSH Term] #19 – Nutritional Requirements [MeSH Term] #20 – #15 or #16 or #17 or #18 or #19
#21 – Exercise [MeSH Term] #22 – Physical Activity [MeSH Term] #23 – Motor Activity [MeSH Term] #24 – Endurance [MeSH Term] #25 – Fitness [MeSH Term] #26 – Sedentary Lifestyle [MeSH Term] #27 – #21 or #22 or #23 or #24 or #24 or #26
#28 – Adolescent Behavior [MeSH Term] #29 – Smoking Cessation Program [MeSH Term] #30 – Adolescent Smoking [MeSH Term] #31 – Smoking [MeSH Term] #32 – Smoking Cessation [MeSH Term] #33 – Tobacco #34 – Tobacco Consumption #35 – Tobacco Dependence #36 – #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35
#36 – #14 or #20 or #27 or #36 #37 – ‘Systematic Review’ or ‘Meta-Analysis’ #38 – ‘Human’ [Limit to] #39 – ‘English Language’ [Limit to] #40 – ‘Year 2005 to 2015’ [Limit to] #41 – #37 and #38 and #39 and #40
#42 – #5 and #36 and #41

Global Health Search terms

#1 – Children.sh #2 – Preschool Children [MeSH Term] #3 – School Children [MeSH Term] #4 – Adolescents [MeSH Term] #5 – Young Adults [MeSH Term] #6 – #1 or #2 or #3 or #4 or #5
#7 – Exercise [MeSH Term] #8 – Health Behavior.sh #9 – Physical Activity.sh #10 – Physical Activity [MeSH Term] #11 – Physical Fitness [MeSH Term] #12 – #7 or #8 or #9 or #10 or #11
#13 – Alcoholism.sh #14 – Alcohol Intake.sh #15 – Drinking [MeSH Term] #16 – Alcoholic Beverages [MeSH Term] #17 – #13 or #14 or #15 or #16
#18 – Smoking [MeSH Term] #19 – Tobacco Smoking [MeSH Term] #20 – Smoking Cessation [MeSH Term] #21 – #18 or #19 or #20
#21 – Energy Intake [MeSH Term] #22 – Nutrition [MeSH Term] #23 – Feeding Behavior [MeSH Term] #24 – Food [MeSH Term] #25 – Nutritional Assessment.sh #26 – #21 or #22 or #23 or #24 or #25
#27 – #12 or #17 or #21 or #26 #28 – ‘Systematic Review’ or ‘Meta-Analysis’ #29 – English Language [Filter] #30 – Year 2005–2015 [Filter] #31 – #27 and #28 and #29 #32 – #6 and #27 and #31

JBI Connect Search terms

#1 – Child.mp #2 – Adolescent.mp #3 – Young Adult.mp #4 – Teenager.mp #5 – School Aged.mp #6 – Primary School.mp #7 – High School.mp #8 – Infant.mp #9 – #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 #10 – Physical Activity.mp #11 – Exercise.mp #12 – Health Behavior.mp #13 – Motor Activity.mp #14 – Physical Endurance.mp #15 – Physical Exertion.mp #16 – Screen Time.mp #17 – Sedentary.mp #18 – Sedentary Lifestyle.mp #19 – #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 #20 – Diet.mp #21 – Diet, Food and Nutrition.mp #22 – Nutrition.mp #23 – Food.mp #24 – Energy Intake.mp #25 – Feeding Behavior.mp #26 – Nutrition Assessment.mp #27 – Nutrition Requirement.mp #28 – Consumption.mp #29 – #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 #29 – Adolescent Behavior.mp #30 – Alcohol Abuse.mp #31 – Alcohol Drinking.mp #32 – Alcohol.mp #33 – Alcohol-related Disorder.mp #34 – Binge Drinking.mp #35 – Drinking Behavior.mp #36 – Underage Drinking.mp #37 – #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 #38 – Smoking.mp #39 – Tobacco.mp #40 – Smoking Behavior.mp #41 – #38 or #39 or #40 #42 – #18 or #29 or #37 or #41 #43 – Systematic Review.mp #44 – Review.mp #45 – Meta-Analysis.mp #46 – #43 or #44 or #45 #47 – Publication year 2005–2015 [Limit To] #48 – #9 and #42 and #46 and #47

Medline Search terms

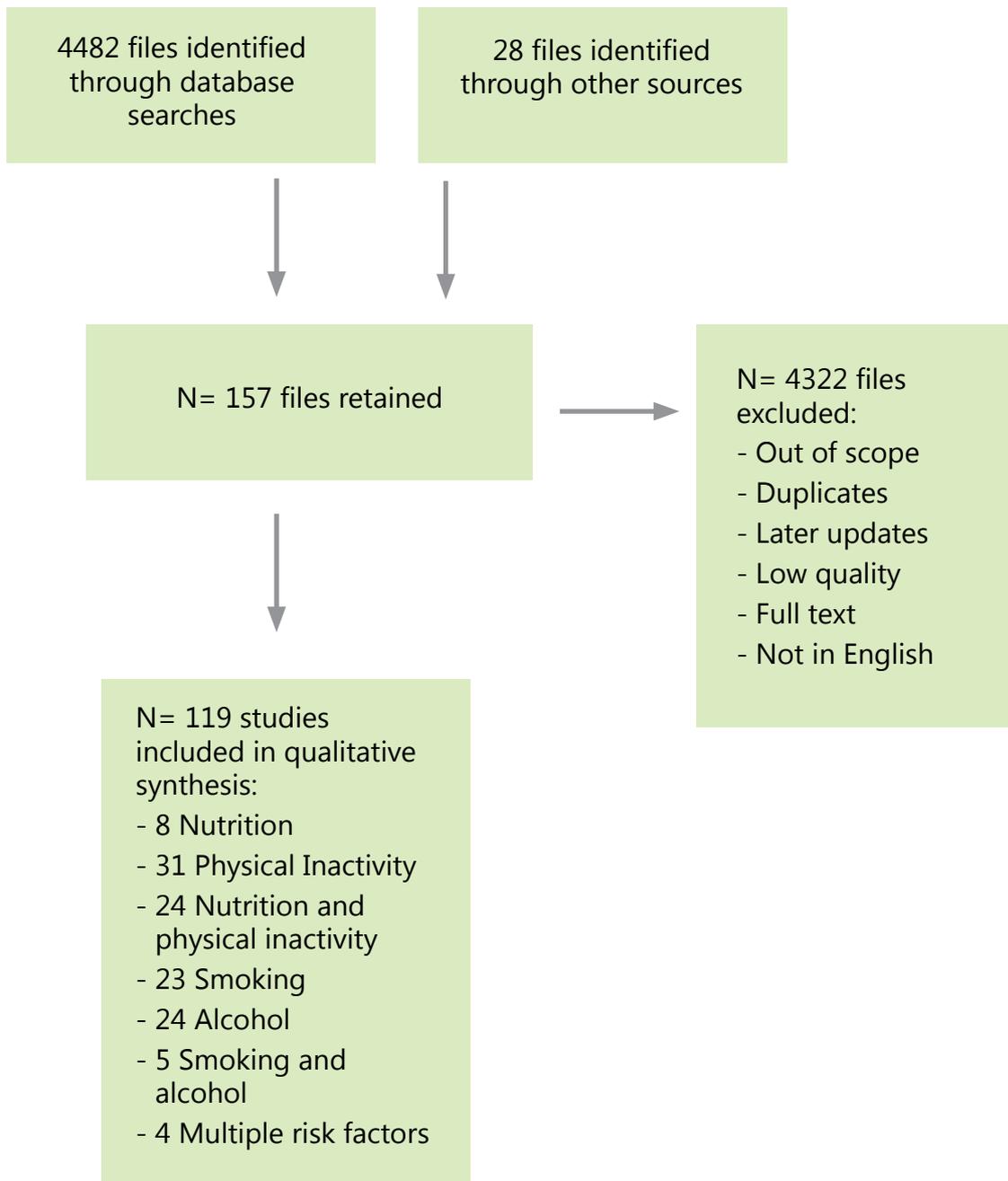
#1 –Infant [MeSH Term] #2 – Child, Preschool [MeSH Term] #3 – School Children [MeSH Term] #4 – Adolescent [MeSH Term] #5 – Young Adults[MeSH Term] #6 – #1 or #2 or #3 or #4 or #5 #7 – Tobacco Use [MeSH Term] #8 – Tobacco Use Disorder [MeSH Term] #9 – Tobacco [MeSH Term] #10 – Tobacco Use Cessation [MeSH Term] #11 – Smoking [MeSH Term] #12 – Smoking Cessation [MeSH Term] #13 – Adolescent Behavior [MeSH Term] #14 – #7 or #8 or #9 or #10 or #11 or #12 or #13 #15 – Adolescent Behavior [MeSH Term] #16 – Underage Drinking [MeSH Term] #17 – Alcohol Drinking [MeSH Term] #18 – Alcohol Drinking in College [MeSH Term] #19 – Drinking Behavior [MeSH Term] #20 –Drinking [MeSH Term] #21 – Binge Drinking [MeSH Term] #22 – Adolescent Behavior [MeSH Term] #23 – #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 #24 – Diet [MeSH Term] #25 – Food [MeSH Term] #26 – Nutrition Assessment [MeSH Term] #27 – Feeding Behavior [MeSH Term] #28 – Energy Intake [MeSH Term] #29 – #24 or #25 or #26 or #27 or #28 #30 – Motor Activity [MeSH Term] #31 – Exercise [MeSH Term] #32 – Physical Exertion [MeSH Term] #33 – Physical Fitness [MeSH Term] #34 – Sedentary Lifestyle [MeSH Term] #35 – #30 or #31 or #32 or #33 or #34 #36 – #14 or #23 or #29 or #35 #37 – #6 and #36 #38 – Evidence Based Medicine Reviews [Limit To] #39 – Review Articles [Limit To] #40 – Topic Reviews; Cochrane [Limit To] #41 – #38 or #39 or #40 #42 – Humans [Limit To] #43 – English Language [Limit To] #44 – Publication year 2005–2015 [Limit To] #45 – #37 and #41 and #42 and #43 and #44

PubMed Search terms

#1 – Consumption [tiab] #2 – Nutrient [tiab] #3 – Diet, Food and Nutrition [tiab] #4 – Diet [tiab] #5 – Food [tiab] #6 – Nutrition [tiab] #7 – Energy Intake [tiab] #8 – Feeding Behaviour[tiab] #9 – Nutrition Assessment [tiab] #10 – #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 #11 – Adolescent Behavior [tiab] #12 – Alcohol Abuse [tiab] #13 – Alcohol Drinking [tiab] #14 – Alcohol-Related Disorders [tiab] #15 – Binge drinking [tiab] #16 – Drinking Behavior [tiab] #17 – Underage Drinking [tiab] #18 – #12 or #13 or #14 or #15 or #16 or #17 #19 – Smoking [tiab] #20 – Adolescent Behavior [tiab] #21 – Tobacco [tiab] #22 – Cigarette [tiab] #23 – Tobacco Use Disorder [tiab] #24 – #19 or #20 or #21 or #22 or #23 #25 – Exercise [tiab] #26 – Motor Activity[tiab] #27 – Physical Activity[tiab] #28 – Physical Endurance[tiab] #29 – Physical Exertion[tiab] #30 – Physical Fitness[tiab] #31 – Screen Time[tiab] #32 – Sedentary Lifestyle[tiab] #33 – #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 #34 – #10 or #18 or #24 or #33 #35 – Meta-Analysis [Filter] #36 – Review [Filter] #37 – Systematic Reviews [Filter] #38 – #35 or #36 or #37 #39 – Publication date from 2005/01/01 to 2015/12/31 [Filter] #40 – Humans [Filter] #41 – English Language [Filter] #42 – Child: birth–18 years [Filter] #43 – Newborn: birth–1 month [Filter] #44 – Infant: birth–23 months [Filter] #45 – Infant: 1–23 months [Filter] #46 – Child: 6–12

years [Filter] #47 – Adolescent: 13–18 years [Filter] #48 – Young Adult: 19–24 years [Filter] #49 – Preschool Child: 2–5 years [Filter] #50 – #42 or #42 or #43 or #44 or #45 or #46 or #47 or #48 or #49 #51 – #34 and #38 and #39 and #40 and #41 and #50

A2.3 PRISMA flow diagram





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