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Health, Happiness and Wellbeing in the Transition from Adolescence to Adulthood

A Systematic Overview of Population Level Interventions

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Executive summary

This is the report of the systematic overview titled 'Health, Happiness and Wellbeing in the Transition from Adolescence to Adulthood: A Systematic Overview of Population Level Interventions'. It is one of two linked reviews commissioned by The RSE Scotland Foundation (The Foundation), a charity connected to the Royal Society of Edinburgh.

This systematic overview has been undertaken by a consortium led by the Mental Health Foundation, in partnership with Glasgow Caledonian University, University of Strathclyde, University of Edinburgh, University of Stirling and Children in Scotland. The consortium was supported by an Expert Advisory Group of major authorities in this field, who advised the Project Team at key points. An Adolescent and Young Adult Stakeholder Group (AYASG) brought a live perspective enabling the review process and outputs to be influenced by, and have relevance to, the priorities of adolescents experiencing the transition to adulthood in Scotland today.

Background

Adolescent transitions to adulthood have been identified as an important phase of life for short-term and long-term health, happiness and wellbeing. Adolescence is a phase of development when risk behaviours such as substance use and sexual behaviour come into focus, and it can also be associated with the onset of long-term psychological difficulties. Evidence indicates that health promoting behaviours in adolescence may have a long-term impact into adulthood. Therefore, prevention approaches during adolescence, might lead to lasting improvements in adult health, happiness and wellbeing.

There is evidence of social inequalities in the health, happiness, and wellbeing of Scottish youth. Social inequalities are evident in relation to a range of areas of adolescent health including substance use, violence and abuse, and mental health. Compared to youth in other countries Scottish adolescents are more likely to experience drunkenness, have poor mental health (especially girls), be overweight or obese, and experience teen pregnancy. The Scottish Government has a vision to make Scotland *'the best place in the world to grow up'* [1]. The Children and Young People (Scotland) Act 2014 enshrines in law the actions required to support the wellbeing of Scotland's children and young people. It builds on 'Getting it Right for Every Child' (GIRFEC), the Scottish Government's national approach to improving outcomes and supporting the wellbeing of children and young people[2].

There is a need to identify interventions that enhance health, happiness and wellbeing, and which aim to reduce inequalities in health among adolescents.

Aims of the overview

The main aim of this systematic overview was to systematically review and synthesise the research evidence on the impact of population interventions that were intended to improve health, happiness and wellbeing and/or reduce inequalities for young people undergoing transition to adulthood. The project team took a holistic approach to the scope of the overview, covering key aspects of physical health and mental wellbeing. This systematic overview is intended to make a contribution towards decision making about priorities for investment in, and the design of, future innovative and evidence informed universal interventions.

The overview set out to answer the question:

What works in population interventions designed to improve health, happiness and wellbeing or reduce inequalities for young people undergoing the transition to adulthood?

Methods

A step-wise methodology was used[3,4]. The stepwise approach is an efficient and effective methodology for reviewing large bodies of evidence systematically, by identifying the highest quality evidence in a hierarchical and systematic way. This approach avoids duplication of effort and is particularly useful for reviews being undertaken within tight timescales.

A systematic search of electronic databases was performed. The search was limited to systematic reviews published between 1 January 2005 and 7 March 2016 and only included systematic reviews published in English. Pre-specified eligibility criteria were used to focus on the most relevant research evidence which was studies focusing mainly on population groups defined as 'adolescent' and/or of people aged 10-24 and of interventions aimed at the whole or 'average' population (i.e. irrespective of level of risk) with the intended outcome of improving health, happiness and wellbeing, or supporting successful transition from adolescence to adulthood, or reducing inequalities and building resilience. Studies were excluded if they focused on interventions which targeted clinical populations, the impact of interventions on disease end points, and those of interventions targeted at young people in higher risk groups.

Data extraction was carried out by a sub-group of the team to provide a rigorous and systematic approach to deriving and categorising studies. The quality of all relevant reviews was assessed using ROBIS tool[5]. Mapping of themes for meta-synthesis evidence was based on topics proposed by the American National

Prevention Strategy[6]. Narrative synthesis of evidence for each theme was carried out by a team member with expertise in that field.

Results

The literature searching identified 35310 possible records (4196 duplications). After elimination of 29161 obviously irrelevant records, two independent reviewers screened 1953 abstracts and considered 566 full papers. A total of 150 papers were selected for inclusion in the overview, all of which were judged either as low risk of bias or unclear risk of bias. Eleven overviews were also identified through the search and although not included were used to inform the synthesis. A summary of the evidence for each intervention area is provided below:

Mental health and wellbeing: Mental wellbeing and prevention programmes can have positive effects on young people and show potential for reducing wellbeing inequities amongst them. The majority of the evidence addresses prevention of clinical conditions such as depression and anxiety and much less is available for interventions promoting positive mental health and wellbeing. Depression and anxiety prevention programmes reduce symptoms but are more effective when targeting indicated or selected populations. Online interventions and mindfulness-based interventions show promise, but more rigorous, higher quality evaluations, conducted with more diverse samples of youth are still required. School-based interventions and those that increase contact between youth and trained professional may reduce suicide attempts and suicidal ideation. There is little attention paid to addressing issues of inequality in the design, delivery and evaluation of interventions to promote mental health and wellbeing in young people. There is little focus on interventions that directly address youth transitions.

Tobacco free living: A combination of school-based, community-based and home-based interventions that focus on social competence, alongside targeted mass media campaigns and wider public policy interventions to increase tax/price and restrict access would be the most effective approach for achieving sustained reductions in smoking amongst young people. There is promising evidence of the impact of price/tax policies on reducing smoking inequalities amongst young people whilst other smoking prevention interventions can exacerbate and increase smoking inequalities. There is a strong theme emerging from the evidence of the importance of parent and family-based interventions. State level policies to increase cigarette taxation and pricing combined with mass media campaigns targeted towards lower socio-economic groups of young people could be an effective way to reduce smoking amongst young people as well as smoking inequalities. Evaluations are required that support an understanding of the mechanisms which might explain why tobacco interventions have positive and negative effects and importantly

whether and how they are more or less effective for lower socio-economic groups (e.g. smoking restrictions in schools).

Preventing drug abuse and excessive drinking: As with tobacco, the evidence suggests that a combination of structural interventions such as taxation, pricing and availability combined with social competence based interventions that include active parental involvement and a peer element would be most effective in preventing alcohol use. It is important to consider the cognitive needs and capacities of adolescents when designing interventions given that different intervention types are more or less effective at different ages. The impact of mass media and advertising bans and the long-term effects of interventions to prevent alcohol and drug use are less clear. The issues of inequality and transition are not well addressed. More research is required on the potential for computer and mobile phone-based intervention delivery, effective strategies for the prevention of illicit drug use, and on whether and how family involvement in interventions can be inclusive of diverse family types.

Sexual and reproductive health: Multi-component interventions (educational, skills building, motivational training and contraception promotion) aimed at improving sexual health and preventing pregnancy can be effective in school and community settings. Interactive computer-based interventions are moderately effective in increasing knowledge about sexual health, have a small effect on self-efficacy, safer-sex intentions and have a small effect on sexual behaviour. Social marketing interventions can be effective across a range of outcome areas and effectiveness is higher for longer-term programs. Brief counselling interventions, outreach contraceptive services and abstinence plus are also amongst interventions shown to be effective. Overall there is little convincing evidence that interventions led by peers contribute to improved sexual health outcomes for adolescents. There is a general lack of implementation process and long-term impact data, the use of sexual wellbeing as an outcome and a lack of consideration across the reviews of the socio-economic status of participants in universal interventions that aim to improve sexual and reproductive health. To increase engagement, school-based interventions should be designed with young people taking account of their self-reported needs and delivered with enthusiasm, expertise and in a supportive school culture. There may be limited transferability of much of this evidence because of the focus on populations from the United States.

Violence and abuse free living: School-based educational interventions have a positive impact on knowledge and attitudes regarding bullying and abuse prevention. Interventions that are school-based but reach out to parents, peers and the school community appear to be more effective in creating the right environment for behaviour change. Reviews differed in the extent to which they

provided good descriptions of the interventions but the content and pedagogy of interventions are likely to have an impact on outcomes. A common theme in papers was the gap between knowledge, attitude and behaviour, and the need to address this in terms of building interpersonal and conflict resolution skills among young people. Some studies may be limited in transferability because of the focus on populations in the United States. There is a need for UK and specifically Scottish studies in this area. Research has fallen behind social changes in internet usage and engagement in social media among adolescents. School-based interventions are able to have an influence on behaviours in schools (school-based bullying) but may not reach behaviour in broader social and virtual communities or reach older adolescents who are outside of formal education.

Active living: Interventions to improve low physical activity (particularly those in the school setting) can have positive effects on some outcomes. However, these effects can be small, and when measured objectively there may only be limited effect. There is evidence that active video games (AVGs) can improve "light to moderate" physical activity or energy expenditure, but there is less impact on more intense physical activity and the available evidence is of limited quality. There is less evidence for sedentary behaviour interventions (compared to physical activity interventions) but the evidence suggests they can lead to small changes in sedentary behaviour (though this is based on limited evidence and mostly with children). The potentially negative effects of physical activity interventions have not been studied. There is a lack of evidence on the impact of active living interventions on inequalities. There is less evidence on interventions with adolescents compared to children, and transition to adulthood is not considered specifically. Specific interventions require more research, including environmental changes to schools, active travel and increasing sports participation. A range of practical and methodological issues need to be addressed including (but not limited to) the measurement of outcome, study design and longer term follow up.

Healthy eating: For improving nutritional intake in general, there is evidence for policies and interventions to improve the food environment, for direct economic incentives (i.e. price changes) and for educational or combined (educational and environmental) interventions in school settings. For improving fruit and vegetable intake, there is evidence that school-based policies can be effective in improving fruit and vegetable accessibility. There is evidence for multi-component, educational and behavioural school-based interventions with children; however there is currently less available evidence for adolescents. The available evidence does not yet support menu calorie labelling or 'indirect' economic incentives to improve nutritional intake, and family-based interventions do not appear to improve fruit and vegetable accessibility. The evidence base provides very little evidence on

the impact of healthy eating interventions on inequalities. There is much less evidence for adolescents compared to children, and there was no consideration of transition to adulthood specifically. Given relatively less evidence on this topic area in general, further research is warranted, especially in relation to environmental and combined (educational plus environmental) interventions to improve nutritional intake in adolescents, economic incentives specifically, and policies to increase fruit and vegetable accessibility. A range of methodological limitations in the evidence must be addressed, particularly the measurement of outcome.

Obesity: Lifestyle interventions appear to be effective for obesity prevention. However, the results seem clearer for stand-alone health behaviour interventions, including sedentary behaviour interventions or nutrition education than combined interventions. The results do not appear to support the effectiveness of lifestyle interventions in adolescents and young adults. Indeed the dearth of studies focusing on this age group may have contributed to this finding. The use of appropriate outcome measures requires attention, as BMI alone may not give a full understanding of weight status in a healthy weight population. It is recommended that targeted health behaviours and key components should be explicitly stated and further investigation of individual components undertaken. Adolescents and young people should be a focus of future studies and reviews in order to understand more fully interventions which are effective for this age group. It was found that physical activity interventions are not effective in obesity prevention. Furthermore, sedentary behaviour should be considered as a stand-alone effective intervention for obesity prevention. Finally, lifestyle or health behaviour change is only one aspect of obesity prevention. Equal importance, in terms of intervention and outcome, should be given to other contextual or psychosocial factors.

General health: School-based universal interventions have potential to improve or exacerbate inequalities amongst adolescents. Digital interventions show promise for improving health behaviours of adolescents but the evidence base is in its infancy. Supportive school environments can have a positive effect on young people's health and wellbeing and may contribute to reducing inequalities. Health Promoting Schools can improve health in a range of areas but more evidence is required to assess impact on some health areas and school attainment. Whole school interventions are evidenced to be effective in preventing bullying, smoking and teenage pregnancy. Recreational dance may have a positive impact on physical health and psychosocial wellbeing. Reducing the size, availability and appeal of larger-sized portions, packages and tableware has potential to reduce the amount of food selected and consumed. Community volunteering may be beneficial for young people in relation to personal, social and academic outcomes.

Adolescent and Young Adult Stakeholders Consultation (AYASG): The Adolescent and Young Adult Stakeholder group identified several priorities, including: being comfortable in who they are and what they look like, having supportive friend(s) or network, services available to offer support over the age of 16, and access to a helpful and supportive teacher or tutor in school or college. In response to the emerging evidence from this systematic overview, the AYASG recognised the importance of school as a setting for the delivery of interventions, but that many of the interventions in the overview did not occur in Scottish schools. The AYASG also highlighted the limited support available to older adolescents who are not in school. They felt that mental health was a central issue upon which other topic areas can impact. The group also identified the following key gaps: inequalities, peer involvement, positive mental health, a focus on transition and its determinants, social media, suicide, lesbian gay bisexual and transgender (LGBT) issues, and detailed evidence explaining why interventions may or may not be successful. Based on the gaps identified in the evidence, the participants felt that more knowledge is required on inequalities, and on how current practice contributes to and utilises evidence. Their priorities were to ensure there is collaborative translation of the evidence into action and that more holistic interventions are developed with a direct focus on transition. They called for interventions to be school and community-based, peer-involving, family involving, social media-based, more inclusive and focussed on relationships. Peer participation in agenda setting and intervention development was considered vital. Finally, they called for the need to map current practice in Scotland and the associated evidence of what is working.

Discussion

Several common features across the different topics were evidenced as contributing to intervention effectiveness including: approaches that ensure interventions are relevant, accessible, interactive and appealing for adolescents to increase engagement; the intensity and duration of interventions; the use of social media and multi-media; skills building, and personal development.

The evidence in this overview is largely focused on proximal causes of health and wellbeing and primarily based on interventions that aim to achieve change at the individual level. Evidence on distal causes and structural level interventions is much less available. Key social determinants of health and wellbeing, relevant to young people growing up in Scotland today, such as poverty, employment, training and education opportunities, housing availability and ethnicity remain largely unaddressed. Across all of the topic areas, the impact of interventions on inequalities was rarely analysed. Where inequalities were considered there was little consistency across systematic reviews or the primary studies they evaluated. As a

key policy and practice problem the evidence base provides insufficient insight into how population level interventions can be employed to reduce inequalities.

The inclusion of parents and the family setting was a key theme across the overview and was often found to contribute to impact. Having supportive parents was identified by the AYASG as a priority factor for their wellbeing during transition to adulthood. This overview provides mixed and complex evidence on the effectiveness of peer-led interventions. The evidence on digital interventions suggests that social reinforcement is important for the adoption of new health behaviours but more evidence is required on how this might apply to more complex health behaviours (e.g. diet, smoking, exercising).

Across most of the topic areas schools were a key context for delivering population interventions to improve the health and wellbeing of adolescents. However, many of the types of interventions described did not occur in Scottish schools. The review evidence suggests that behaviour change may be facilitated where community level changes have also been created, (such as whole school anti-bullying environments), where positive social norms are established and individual knowledge and attitude changes more readily lead to behaviour change. It was evident from the literature that there was a lack of specific focus on the transition from adolescence to adulthood. An important finding was that programmes could differ in their effectiveness at different developmental stages including childhood, early, middle or late adolescence.

In attempting to answer the research question, a large number of gaps in the evidence base have emerged. These include: inequalities; resilience; digital interventions; process evaluation; long-term impact data; the perspectives and priorities of young people; structural health determinants; cost effectiveness; promotion of positive wellbeing; positive mental health and wellbeing and mental health management; psychosocial aspects of obesity; obesity prevention interventions with older adolescents; school environment; gang involvement prevention; cyberbullying; illicit drug use; sedentary behaviour; sports participation; and the impact of physical activity on mental health.

There appeared to be some disconnection between the evidence revealed in the systematic review of the scientific literature and the results of engagement with the Adolescent and Young Adult Stakeholder Group. The social worlds of adolescents are rapidly changing with digital technology and globalisation. Academic research may be somewhat behind the real life experiences of adolescents living in Scotland today. New participatory approaches to intervention development and intervention evaluation are required to keep pace with changing social and technological

environments in order to promote health, happiness and wellbeing in the transition from adolescence into adulthood.

Conclusions

A key implication of this overview is for the Royal Society of Edinburgh Foundation to make the empowerment of young people in decisions affecting their wellbeing a central guiding principle in their future work. This should include disseminating the results of this overview and may involve discussion regarding priority setting for action. The Foundation should also consider facilitating joint action with young people and a range of relevant practitioners and policy makers in response to the overview findings. Given that this overview did not directly include grey literature and there appeared to be less evidence from the Scottish context, the Foundation may also wish to consider ways in which future work can be informed by current practice in Scotland.

The findings presented in this overview provide valuable evidence to support policy making across a range of areas relevant to the Scottish Government, including; mental health, wellbeing, food, and violence prevention. With a new Programme for Government published in September 2016, this report has been produced at a time when there is real opportunity to inform current policy making across the next parliamentary term, particularly as priority areas are in the process of being developed, such as the work of the Scottish Food Commission and the development of the next Scottish Mental Health Strategy.

Those involved in designing interventions should take note of the evidence on intervention components that are demonstrated to contribute to effectiveness in this overview. In addition, the evidence suggests a number of other priorities for future practice including addressing inequity; harnessing the digital revolution; involvement of adolescents in intervention design and delivery; focus on transition, the whole person and wellbeing; and building on schools-based programmes that are shown to work.

The overview highlights a large number of gaps in the evidence base, which should be useful in informing future research priorities. This overview would support the newly established mandate by the National Institute for Health Research (NIHR), which calls for research and evaluation to include analysis of social gradient and inequality impact within evaluations of universal interventions. Investment is also required in the production of high quality real-time process evaluations that provide insight into why some interventions work and others do not. It may be helpful for these evaluations to be reported in a way that is helpful to policy makers and those commissioning and designing interventions.

Research needs to be responsive to the constantly changing influences on health, happiness and wellbeing such as e-cigarettes, social media or food insecurity. Research that focuses on key adolescent transition points and resilience is also needed. More experimental research is needed to determine the effectiveness of digital interventions delivered via existing social networking sites in improving health and wellbeing amongst adolescents, with a focus on how to achieve optimal engagement levels.

Given the promising evidence on the contribution of parental involvement to the effectiveness of interventions, more research is required on this as an intervention component specifically, and in combination as part of multi-component interventions, including how this can be inclusive of diverse family types. Further research is required on how body image, self-esteem, self-efficacy, motivation, family influences and environmental factors can inform effective interventions to prevent obesity.

Finally, there is a need to shift the emphasis of enquiry from individual behaviour factors to structural factors such as employment and poverty, and to consider the complex interactions between the determinants of health at different levels.

Introduction

The RSE Scotland Foundation (The Foundation), a connected charity of the Royal Society of Edinburgh, plans to initiate a new programme of research in the area of 'health, happiness and wellbeing', specifically aimed at understanding factors that enable young people to make successful transitions from adolescence to adulthood. As a first step, the Foundation has funded two systematic reviews of empirical evaluations of interventions intended to improve health, happiness and wellbeing or reduce inequalities for young people undergoing the transition to adulthood. The aim of the systematic literature reviews is to inform a second stage of research, which will focus on novel studies leading to the development and delivery of an intervention study in Scotland. As only review level evidence has been included in the results, this study then is essentially a review of reviews and is appropriately referred to as an 'overview'.

This is the report of one of these reviews, 'Health, Happiness and Wellbeing in the Transition from Adolescence to Adulthood: A Systematic Overview of Population Level Interventions'. This overview has been undertaken by a consortium led by the Mental Health Foundation, in partnership with Glasgow Caledonian University, University of Strathclyde, University of Edinburgh, University of Stirling and Children in Scotland. The research consortium was supported by an Expert Advisory Group of major authorities in this field, who advised the Project Team at key decision making points. Another key component of the overview was the Adolescent and Young Adult Stakeholder Group. This group brought a live perspective from adolescents and young adults enabling the review process and outputs to be influenced by, and have relevance to, the priorities of adolescents experiencing the transition to adulthood in Scotland today.

Background

Adolescence, defined here as the period between 10 and 24 years of age, is a time of major developmental transitions including puberty and fundamental changes in social development (e.g. transition to secondary schooling, leaving school, starting work, developing self-identity, attending higher education, becoming independent and in control of their lives, embarking on sexual and emotionally intimate relationships)[7,8]. Adolescence is also a time when rapid brain, cognitive and emotional development is experienced. As young people begin to strive for independence, relationships with family change, peer influence and acceptance is highly significant, and risk-taking behaviours are common[9,10].

These multiple transitions combine to form risk and protective factors for development leading young people to take different trajectories from adolescence into early adulthood. During adolescence many health related behaviours are formed. In some circumstances if unhealthy behavioural patterns are established in adolescence they are likely to continue into adulthood[11] leading to otherwise preventable long-term physical and mental health problems. Poor mental health is closely related to other health and social concerns for young people, including educational achievement, employment, relationships and substance misuse[12,13]. There is clear evidence that young people who are involved in unhealthy behaviours such as drug taking have poorer mental health[14]. There is a strong correlation between mental health problems developed in childhood and adolescence and mental health problems in adulthood[15,16]. There is a strong evidence base of the links between all aspects of mental and physical wellbeing[17].

While research on adolescent development reveals it to be a sensitive period for the development of health and wellbeing in the longer term, the rapid social changes experienced by young people growing up in Scotland today provide further opportunities and risks for the transition into adulthood. In comparison to their parents' generation, adolescents in Scotland today are growing up in an age of global financial crisis and austerity and face increasing societal barriers in their path to establishing an independent adult life where they feel secure in education, work and housing[18]. The proportion of Scottish 15 year olds who feel schoolwork pressure is high in comparison to those from other countries is increasing (from 46% to 59% for boys and 60% to 80% for girls between 2006 and 2014). These life pressures are known risk factors for poor mental health[19]. In a cross national study (HBSC) Scotland remains one of the countries with the highest prevalence of reported drunkenness amongst the 15 years old age group (approximately one third) of young people [20]. Social changes have led not only to increased risk but also positive changes in adolescent health. For example, there is evidence that some reduction has taken place in Scotland over recent years in drug, alcohol and tobacco consumption and teenage pregnancy rates[14].

Additionally, the increasing digitisation of life, particularly for young people, is changing the pace of life, relationship dynamics, how young people learn and communicate, how their attitudes are formed, how safe they feel/are and how they make life choices that affect their health and wellbeing. For youth, the Internet presents a number of risks along with opportunities. Research suggests young people face risks of addiction, exposure to inappropriate material, cyber bullying, sexual solicitation and harassment[21]. Even with these risks, there is evidence that the Internet can be beneficial in promoting cognitive, social, and physical

development[21]. The Internet is increasingly used to complement more traditional methods of delivering interventions.

Importantly, within these patterns of changing adolescent behaviour there is growing evidence of inequalities in health and wellbeing among Scottish adolescents with socio-economically disadvantaged groups more likely to misuse drugs, smoke and have unintended pregnancies. These kinds of health inequalities are socially produced, systematic in their unequal distribution, avoidable and unfair[22,23]. Young people in Scotland experience greater socioeconomic health inequalities compared to most other countries as evidenced in the recent HBSC study which looked at life satisfaction, self-reported health, multiple health complaints, ease of parental communication, dietary behaviours (soft drink consumption, fruit consumption, daily breakfast consumption, evening family meals), sedentary behaviours (e.g. watching television), physical activity and substance use (tobacco and cannabis) [20].

Therefore adolescence is a crucial developmental phase for preventative and health promoting interventions that equip young people with the awareness, opportunities and skills that will empower them (and their families) to make healthy choices and enable them to seek early support before they are unwell and/or in crisis[7,14]. It is crucial to build in to these interventions consideration of how they can be effective in reducing inequalities to better equip more of Scotland's young generation to successfully navigate their way through the transition to adulthood. The World Health Organisation recommends that proportionate universalism is the most appropriate way to achieve mental health equity[19]. Proportionate universalism defines goals for everyone, identifies obstacles faced by specific groups, and tailors strategies to address the barriers in those situations[2,24].This approach recognises that universal interventions can be effective overall but still result in a health gap between socio-economic classes and that targeted interventions can have little or no impact on the unequal health gradient relative to socioeconomic status[23]. These interventions may require a specific approach for adolescents; it is not established that what works for adults will work for young people[7]. Understanding and responding to these challenges in the design of interventions is of growing importance to ensure that interventions are appropriate, engaging and empowering for young people today and help to mitigate unfair health inequalities.

The Scottish Government has a vision to make Scotland 'the best place in the world to grow up' [1]. The Children and Young People (Scotland) Act 2014 enshrines in law action to support the wellbeing of Scotland's children and young people. It builds on Getting it Right for Every Child (GIRFEC)[2], the Scottish Government's national approach to improving outcomes and supporting the wellbeing of children and young people.

GIRFEC[2] calls for children and young people in Scotland to be:

- Safe - protected from abuse, neglect or harm
- Healthy – mentally and physically
- Achieving – learning, skills, confidence and self-esteem
- Nurtured where they live and grow
- Active in a range of activities
- Respected – to be given a voice and involved in decision
- Responsible - taking an active role in school and community
- Included – helped to overcome social, educational, physical and economic inequalities and accepted as full members of their community

These eight wellbeing indicators, and the GIRFEC approach [2] as a whole, build on the rights set out in the United Nations Convention on the Rights of the Child (UNCRC), which was ratified by the UK Government in 1991. As part of their responsibility to ratify the UNCRC and meet their duties under Part 1 of the CYP Act, the Scottish Government has brought in Child Rights and Wellbeing Impact Assessments to assess all Government policies, measures and legislation for the extent to which they help make child rights a reality in Scotland, and promote and protect their wellbeing, as defined by the wellbeing indicators above. This should mean that all policy making in Scotland is now undertaken with children and young people's wellbeing in mind – an important and significant development.

While there are clear theoretical, empirical and policy imperatives for promoting a positive transition from adolescence into adulthood, it is vital to involve young people in decision making to ensure that interventions are acceptable and relevant. This means taking a participatory approach to both research and policy creation. There has always been something of a generational cultural and social gap between those who hold positions of power in society and its institutions, the decision makers and the younger generation. The life circumstances of young people today means that this gap is inevitably and constantly evolving; the choices that adults make about what is good for young people is influenced by this gap which is not fully understood.

Aims of the overview

The aim of the overview is to systematically review and synthesise the high quality research evidence of impact of population interventions that are intended to improve health, happiness and wellbeing or reduce inequalities for young people undergoing transition to adulthood. It will take a holistic approach, covering key aspects of physical health and mental wellbeing. The overview is intended to make a contribution towards decision making about priorities for investment in and the design of future innovative and evidence informed universal interventions.

The overview set out to answer the question:

What works in population interventions designed to improve health happiness and wellbeing or reduce inequalities for young people undergoing the transition to adulthood?

Scope of the overview

Involving young people and those working with them

This overview incorporates international evidence with a clear remit to consider the evidence within the Scottish context. To facilitate this, the overview included consultation with Scottish adolescents through an Adolescent and Young adults Stakeholder Group (AYASG) recruited from across the country and with an Expert Advisory Group (EAG) consisting of leading professionals and academics working in the field of adolescence and equality.

A key aspect of GIRFEC[2] is that young people in Scotland are respected through giving them a voice to be involved in decisions that affect their wellbeing. This was also a key priority for this overview. The implementation of the overview included consultation with an AYASG. This group brought a live perspective from adolescents and young adults ensuring the review process and outputs have relevance to the priorities of adolescents experiencing transition to adulthood in Scotland today.

Additionally it has been important to establish a set of definitions that help to define the parameters of the overview.

Definitions

To ensure clarity and focus for the overview, a number of working definitions are used. The literature concerning the impact of population interventions intended to improve health, happiness and wellbeing or reduce inequalities for young people undergoing transition to adulthood impact is complex and wide ranging. Therefore a number of definitions have been employed in order to provide focus and consistency within the report. The definitions therefore help to articulate the inclusion and exclusion criteria employed in this Overview (as detailed in the Method section below).

Adolescence

This is defined as the period between 10 and 24 years of age[25,26]; the particular focus of this overview is throughout adolescence and the transition to adulthood up to age 24 years[27,28].

Transition

For the purposes of this overview transition is defined as achieving adulthood. The defining of a successful transition is guided by the definitions used by authors in selected papers and by the consultation with the AYASG. However it should be noted that success has been defined within the bounds of what is reasonable rather than exceptional.

Health

In line with the World Health Organisation's definition, health is defined as "*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"* [29].

Happiness

Happiness is about our lives as a whole: it includes the fluctuating feelings we experience everyday but also our overall satisfaction with life[30]. So, for this overview happiness is defined in terms of living a good life and flourishing, rather than simply as an emotion.

Wellbeing

For this overview wellbeing is defined as a concept that encapsulates all areas of quality of life including; mental, physical, social, economic, and spiritual wellbeing. Drawing from the Scottish Government[31] and WHO[32], wellbeing includes both *how people feel* - their emotions and life satisfaction - and *how people function* - their self-acceptance, positive relations with others, personal control over their environment, purpose in life and autonomy, realization of his or her own potential, ability to cope with the normal stresses of life, ability to work/study productively and fruitfully, and ability to make a contribution to her or his community. This is closely related, but not identical to the definition of wellbeing developed by the Scottish Government to support the implementation of GIRFEC.

Inequality

This overview draws on the World Health Organisation definition of health inequalities as *"differences in health status or in the distribution of health determinants between different population groups"* [33].

Equity

Equity in health implies that ideally everyone should have a fair opportunity to attain their full health potential and, more pragmatically, that no one should be disadvantaged from achieving this potential, if it can be avoided. Equity is therefore concerned with creating equal opportunities for health and with bringing health differentials down to the lowest level possible [23].

Intervention

Drawing on Geoffrey Roses' [34] classic model of approaches to prevention, this overview makes a distinction between individual interventions: which are targeted at individuals who are at a higher risk; and population interventions: which are aimed at the whole or 'average' population.

This overview focuses on interventions targeted at the average population of adolescents regardless of individual levels of risk with the intended outcome of improving health, happiness and wellbeing and/or reducing (rather than widening) inequalities for adolescents undergoing transition to adulthood.

Clinical population

This is defined as a group of people in receipt of care and treatment for a clinically diagnosed illness. This does not include people with learning or physical disabilities.

Evidence

There is no current consensus in health, public health and social care as to what constitutes evidence. Therefore, in this overview, the application of a pragmatic approach to defining evidence is appropriate when guided by the overall purpose of the overview which in this instance is to support the information needs of decision-makers by gathering and synthesising relevant evidence using systematic methods[35].

Empirical research, whether qualitative or quantitative in design, provides the best evidence of effectiveness of interventions and it has been argued that systematic reviews form the highest quality of research evidence available.

Evidence-based, emerging and promising interventions

Recognising interventions that are not based on high quality evidence can provide valuable learning, this overview has employed the following definitions to categorise different types of interventions[36]

- Evidence-based interventions: where original data, utilising scientifically based rigorous research designs has been collected to determine the effectiveness of the intervention.
- Promising interventions: defined as interventions where theory or research has informed their development (such as programme evaluations and/or studies with inadequate designs), but for which an insufficient amount of original data has been collected to fully determine the effectiveness of the intervention.
- Emerging interventions: these are Interventions that are not based on research or theory and on which original data have not been collected but for which anecdotal evidence and professional wisdom exist.

Report structure

A brief account of the methodology is provided in the next section. Following this the results are reported in ten separate sections; nine of these are narrative synthesis of the included papers. These are organised by nine categories adapted from the American National Prevention Strategy[6] including:

- Mental health and wellbeing
- Tobacco free living
- Preventing drug abuse and excessive drinking
- Sexual and reproductive health
- Violence and abuse free living
- Active living
- Healthy eating
- Obesity
- General health

The final results section provides the key findings of the consultation work with the Adolescent and Young Adult Stakeholder Group (AYASG) and the Expert Advisory Group (EAG). A discussion of key themes arising from the synthesis is followed by final conclusions around the implications of the review for future work.

Method

Design

The overview employed a step-wise methodology[3,4]. The stepwise approach is an efficient and effective methodology for reviewing large bodies of evidence systematically by identifying the highest quality evidence in a hierarchical and systematic way avoids duplication of effort and is particularly useful for reviews being undertaken within tight timescales.

Figure 1: Step-wise approach to searching for research evidence

Step 1| Search for high quality reviews
Identify areas where no such evidence exists.

Step 2| Search for primary studies (databases and Internet search)
Identify areas where no such evidence exists.

Step 3| Search for other evidence (grey literature)
Identify areas where no such evidence exists.

Step 4| Map the evidence into categories and select best quality and most recent studies for inclusion.

The review methods, including inclusion criteria and analysis, were specified in advance and documented in an Inception Report and submitted to the Foundation for approval. The step-wise method comprises a series of steps based on a hierarchy of evidence from systematic review to primary and then grey evidence, with progression between steps determined through iterative team discussion to weigh up the benefits of additional searching and evidence in relation to the quantity and quality of evidence identified, and the time and resources of the review process.

A large volume of evidence was identified in Step 1, the search for systematic reviews. The team discussion reached consensus that, because of the quantity and quality of evidence identified within these systematic reviews, there would be no step-wise progression to subsequent steps. Therefore, the decision was reached to complete a systematic review of reviews, also known as a narrative overview of reviews or overview for short. A detailed description of the methods of this overview is provided below.

Stakeholder involvement

Active involvement of people affected by a research topic has been argued to be beneficial to the quality, relevance and impact of research; it enhances the perceived

usefulness of systematic review evidence and addresses barriers to the uptake of synthesised research evidence [37,38].

The Project Team recruited and consulted an Adolescent and Young Adult Stakeholder Group (AYASG) comprising 10-15 purposively selected young people aged 10-24 years (Appendix 1). Ethical approval for this process was obtained from Glasgow Caledonian University [Reference: HLS/NCH/15/23].

The AYASG were consulted twice. At the first meeting AYASG were consulted on what is/will be/ has been important to them in relation to their own transition from adolescence to adulthood. The discussion focussed on how the group would define a successful transition and health, happiness and wellbeing. The group explored what transition outcomes really matter and what interventions can/may have an important contribution to make. At this meeting the group also explored the extent to which commonly used literature and science based outcomes and definitions of successful transition are relevant to them and their peers today in Scotland.

An Expert Advisory Group (EAG) comprising invited experts in the field (Appendix 1) were consulted at key stages in the review process to ensure relevance, reach and engagement. The EAG were asked to provide written feedback on the Inception Report and inclusion and exclusion criteria by email. The EAG were also consulted on the final papers to be selected for inclusion.

Both groups were invited to attend a meeting to provide their perspectives on the implications of the research findings. The results of these discussions were documented and used to inform the review process, and reports.

Identification of reviews for inclusion in the overview

Search strategy

A systematic search of electronic databases was performed in 2 stages:

Stage 1:

- Cochrane Database of Systematic Reviews
- Health technology assessments (HTA);
- Campbell Collaboration;
- EPPI;
- Joanna Briggs Library;
- PROSPERO (an international prospective register of systematic reviews) and
- Database of Reviews of Effects (DARE)[1].

[1] DARE includes systematic reviews that evaluate the effects of health and social care interventions and the delivery and organisation of health and social care services. It also includes reviews of the wider determinants of health such as housing, and transport where these impact directly on health, or have the potential to impact on

Stage 2:

Because DARE was not updated beyond March 2015, the search was updated in the following databases (MEDLINE, EMBASE, CINAHL, PsycINFO and PubMed) to ensure that critical review papers were not missed.

A comprehensive search strategy was developed using a combination of key MeSH terms and free text words, and included sub-searches of the title, original title, abstract and subject-headings. Examples of the search architecture are shown in Appendix 2. The search was limited to include reviews published between 1 January 2005 and 7 March 2016 and included only reviews published in English.

It should be noted that as this was a rapid overview, the search strategy was not designed to be exhaustive, but was designed to enable efficient identification of key reviews published in leading peer-review journals.

Eligibility criteria

To be eligible for inclusion studies had to meet the following selection criteria:

Inclusion criteria:

- Studies published within the last 10 years conducted in any country where the results may be relevant to Scotland;
- Studies published in English;
- Studies focusing mainly on population groups defined as 'adolescent' and/or of people aged 10-24;
- Studies of interventions targeted at the whole or 'average' population (i.e. irrespective of level of risk) with the intended outcome of improving health, happiness and wellbeing, or supporting successful transition from adolescence to adulthood or reducing inequalities and building resilience.

Exclusion criteria:

- Studies of interventions which target clinical populations;
- Studies of the impact of interventions on disease end points;
- Studies of interventions targeted at young people in higher risk groups (e.g. young people with physical disabilities, learning disabilities, those identified as 'looked after' or 'in care').

Studies were not excluded on the basis of type and quality at the search stage.

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health and wellbeing. DARE indexes reviews sourced from weekly searches of MEDLINE, EMBASE, CINAHL, PsycINFO and PubMed.

Methods of identifying relevant reviews

One reviewer (PC) ran the search strategy, read the titles of the identified references and eliminated any obviously irrelevant studies. Abstracts were obtained for the remaining studies and then, based on selection criteria (as stated above), two reviewers (CT and PC or AM) independently ranked these as relevant, irrelevant or unsure. A quality control check on a random sample of 10% abstracts was performed by the principle investigator (PI) (JM).

All abstracts ranked as irrelevant by all reviewers were excluded and the full text for all remaining studies was obtained. Full papers for the remaining studies identified were then read by two reviewers (CT and PC or AM) and reviewed against the inclusion criteria. Consensus meetings were organised to discuss any disagreement regarding selection with the final selection approved by the PI (JM).

Assessment of quality of reviews

The quality of all relevant reviews was assessed using ROBIS tool[5]. ROBIS was used to assess the risk of bias within each included review. ROBIS was completed in three phases: (1) Assess relevance; (2) identify concerns with the review process; and (3) judge risk of bias in the review.

The second phase includes assessment of whether

- review eligibility criteria were clear, appropriate and pre-specified;
- all relevant primary studies should have been identified and included in the review;
- bias may have been introduced through the data collection or risk of bias assessment processes;
- appropriate methods have been used for any meta-analyses.

Two reviewers (CT, PC or AM) independently used the rating guidance published with the ROBIS tool[5] to judge the risk of bias of each review as to be at low, high or unclear risk of bias. Disagreements between independent overview authors were resolved through discussion, involving a third reviewer if necessary. Reviews that were classified as high risk of bias based on ROBIS were excluded from the overview.

All relevant reviews that were classified as either low or unclear risk of bias, based on ROBIS, were included within the subsequent overview stages.

Data collection and management

Data extraction

One reviewer (CT) extracted information relating to the focus of the review, including information on the review aim, participants, interventions, comparisons

and outcomes. A second reviewer (PC) checked these data; any disagreements that arose were resolved by discussion between the reviewers.

We used a data collection form that was specifically designed and previously used by the overview team. Using this form, we extracted and recorded key features of each review. The extraction fields are listed in Appendix 3.

Mapping, coding themes and subthemes

Initial exploration of titles and abstracts to map, or group, key topics and themes relating to populations, interventions and outcomes covered within the included reviews was carried out by all overview team members. A series of team discussions were held to reach consensus on methods for grouping included reviews into relevant themes. Through an iterative process, agreement was reached to use themes based on topics proposed by the American National Prevention Strategy[6]. These themes were:

1. Mental health and wellbeing
2. Tobacco free living
3. Preventing drug abuse and excessive drinking
4. Sexual and reproductive health
5. Violence and abuse free living
6. Active living
7. Healthy eating

Using title, abstract and extracted data, and with reference to full papers if necessary, two reviewers (CT, PC) coded an initial sample of the reviews independently, compared notes and reached consensus drawing on a third reviewer (JM) where necessary.

A number of included reviews were found to cover topic areas which did not easily fit within these seven NPS categories. These reviews were discussed at team meetings, and consensus reached that these should be placed within an eighth theme of General Health and Wellbeing. Due to the large number of reviews identified that focussed primarily on obesity prevention it was also agreed to create a ninth topic of Obesity Prevention.

Once all reviews were placed under one of these nine themes, the topics covered within each theme were explored by the overview authors. Using an iterative process, involving discussion between two topic experts on the review team (JM and MM), a number of subthemes based on the primary problem area addressed were generated under each of the nine themes. Discussions continued until consensus was reached on the classification of each review under a subtheme.

During this stage, in which detailed consideration and discussion occurred around the mapping of individual reviews to topic areas, a number of reviews were identified not to meet the inclusion criteria. These reviews were then excluded; details of these excluded reviews were collated, and are reported in Supplementary Table A.

Assessing the relevance of the review to UK/ Scotland

In order to assess the relevance and applicability of the evidence to the UK/Scotland, each review was categorised using the following categories:

A. Directly relevant to Scotland only
B. Relevant to the UK
C. Includes non-UK studies, but the context / population group would apply equally to UK settings
D. Includes non-UK studies that may have some application to UK settings, but should be interpreted with caution. There may be strong cultural or institutional differences that would have limited applicability in the UK
E. Includes non-UK studies that are clearly not relevant to UK settings

Data synthesis

Data from all included reviews were synthesised within evidence tables, categorised according to themes and subthemes, and relevance to the UK/Scotland. Results of all included reviews within each of the themes and subthemes were explored, including the results of any meta-analyses. Key findings from reviews were brought together within a narrative synthesis by project team members with expertise in theme areas including JM, AM, MM, JW and CT.

Results

Results of the search

Results of the search are displayed as a PRISMA statement in Figure 2. Our searching identified 35310 possible records (4196 duplications). After elimination of 29161 obviously irrelevant records, 1953 abstracts were screened and 1387 papers were excluded at this stage. Full papers were screened for the remaining 566 potentially relevant reviews, 416 reviews were excluded at this stage. Of these, 275 were excluded because they were found not to meet the selection criteria for the Overview. Reasons for this type of exclusion were primarily due to: study design (e.g. not a systematic review); participants were out with the age range or classed as an at-risk' population; not an intervention (e.g. reviews focused on service delivery) or the review was not relevant. A further 106 were judged to be at high risk of bias[39-144] (see References p.189). Twenty-four reviews were identified to be on-going[145-168] (see References p.194). Eleven overviews were also identified through the search[7,169-178] (see References p.188), and although not included were used to inform the synthesis.

A total of 150 papers were selected for inclusion in the review, all of which were judged either as low risk of bias or unclear risk of bias (see Appendix 4 and/or References p.180).

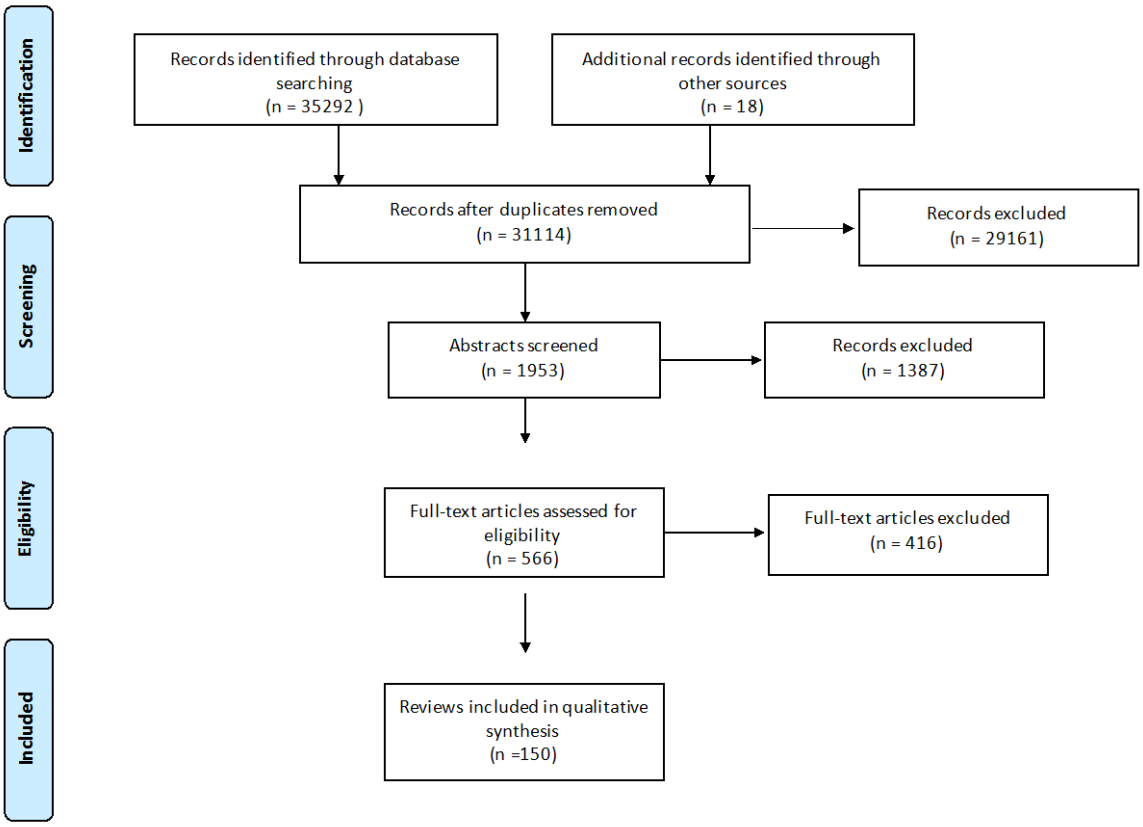
Summary of included reviews

The reviews and overviews were assigned to nine main categories as follows:

1. Mental health and wellbeing (20 included reviews[22,179-197]; 5 overviews [169,170, 171-173] identified) (Table 1, Appendix 4)
2. Tobacco free living (12 included reviews[198-209]) (Table 2, Appendix 4)
3. Preventing drug abuse and excessive drinking (22 included reviews[9,210-230], 2 overviews [7,174]) (Table 3, Appendix 4)
4. Sexual and reproductive health (13 included reviews [231-243]) (Table 4, Appendix 4)
5. Violence and abuse free living (11 included reviews [244-254], 1 overview identified[175]) (Table 5, Appendix 4)
6. Active living (22 included reviews [255-272]) (Table 6, Appendix 4)
7. Healthy eating (8 included reviews[273-280], 1 overview[176] identified) (Table 7, Appendix 4)
8. Obesity (23 included reviews [281-303], 1 overview[177]) (Table 8, Appendix 4)
9. General health (19 included reviews [304], 1 overviews identified[178]) (Table 9, Appendix 4)

Much of the data included in this review is based on studies conducted in the USA, and to a lesser extent data is based on studies from Australia, Canada, UK, South Africa, Thailand, India, Norway, Netherlands, New Zealand, France, Belgium, Brazil, Sweden, Finland, Germany, Portugal, Spain, Israel, China and Ireland. The reviews included a wide range of primary study designs including: randomised controlled trials (RCTs), quasi-experimental studies, controlled trials, observational studies, prospective cohort studies, interrupted time series studies and qualitative studies. Some reviews undertook elements of meta-analysis where possible but most undertook narrative synthesis due to the heterogeneity of the studies they included. The numbers of participants included within this review is therefore vast; readers may refer to the evidence tables in Appendix 4 for a full account.

Figure 2: PRISMA statement



To make the main text of this review accessible to the lay reader and succinctly convey the evidence in the included papers, the findings are reported in narrative format and do not include full quantitative data. In the event that the reader requires more detail on results, they are directed to the evidence tables in Appendix 4.

Largely it has been possible to allocate papers entirely to the above categories but a number of papers in the general health category have evidence relevant to more

than one category. These papers will therefore appear in more than one section of the results to ensure that the evidence within them is reported alongside other relevant evidence.

Although reviews included tended to focus on one or a few outcome areas, there tended to be some overlap in interventions outcome focus especially across tobacco, drug, alcohol and sexual and reproductive health.

Mental health and wellbeing

Key findings

- Mental wellbeing and prevention programmes can have positive effects on young people and show potential for reducing wellbeing inequities amongst them.
- The majority of evidence addresses prevention of clinical conditions such as depression and anxiety and much less is available for interventions promoting positive mental health and wellbeing.
- Depression and anxiety prevention programmes do reduce symptoms but are more effective when targeting indicated or selected populations.
- On-line based interventions and MBI's show promise but more rigorous, higher quality evaluations conducted with more diverse samples of youth are required in these areas.
- School-based interventions and those that increase contact between youth and trained professional may reduce suicide attempts and suicidal ideation. Issues of gender and ethnicity need more attention when addressing problems such as self-harm and suicide.
- The potential for evidencing universal interventions that address the social gradient is currently untapped. There is also little attention paid to addressing issues of inequality in the design, delivery and evaluation of interventions to promote mental health and wellbeing in young people.
- There is little focus on interventions that directly address youth transitions.

Context

The promotion of mental wellbeing and prevention of mental illness in young people undergoing transition into adulthood is a crucial aspect of supporting their over-all health and wellbeing.

Mental wellbeing is a broad concept encompassing a wide range of concepts including resilience, mental assets and resources, self-efficacy, self-esteem and optimism[305] and flourishing [31]. It is now generally understood that adolescence and early adulthood is the peak age of onset for mental ill-health and the period when initial care is required[306]. Major depression is one of the most common psychiatric problems faced by adolescents and one that can subsequently recur throughout their lifetime. It is also associated with an increased risk of suicide, academic failure, interpersonal problems, unemployment, and legal problems [307].

Poor mental health is closely related to many other health and social concerns for young people, including educational achievement, employment, relationships and substance misuse[13, 12]. There is a clear social gradient linked to socio-economic status

in mental illness amongst young people [308]. However, evidence suggests that access to mental health services is worse for this age group than for any other [309].

Mental health and wellbeing was the top priority for the young people consulted in this review. Recent research led by the Scottish Youth Parliament reinforces the importance of mental wellbeing as a priority for young people in Scotland today[310]. The research revealed that three-quarters of young people do not know how to access information and support about mental health in their area and identify a range of barriers to talking openly about their mental health. It emphasises the demand amongst young people to be educated about their rights when accessing mental health support.

In line with Welsh et al (2015) and others [311], this overview is based on a view that mental wellbeing can only be promoted, while mental illness can be either prevented, subject to early intervention, or treated[312]. As such, the overview is focused only on interventions which promote mental wellbeing and those which aim to prevent mental illness, and does not include treatment interventions for clinical (mental illness) conditions. Prevention is defined as those interventions that occur prior to the onset of a clinically diagnosed disorder [312].

Summary of included reviews

Twenty reviews[22,179-197] were included in this section and are synthesised in two sections:

- Interventions addressing general mental wellbeing/emotional health, and
- Interventions addressing mental health problems.

Five overviews were identified, but these covered 3 diverse areas (school based mental health promotion[172,173], suicide prevention[170], and prevention of depression and anxiety disorders[169,171]. These overviews are incorporated as additional evidence within specific sub-sections where appropriate. Table 1 (Appendix 4) provides details of the interventions within each of the included reviews.

Six reviews covered general mental wellbeing/emotional health including:

- Teacher involvement in school mental health interventions[183];
- Impact of the school environment on adolescent emotional health[186];
- Youth online mental health promotion and prevention interventions [181];
- Mindfulness in improving mental health symptoms of children and adolescents[184];
- Intervention which are or could be used to promote mental wellbeing and reduce inequities in children and young people[22];

- School programmes targeting stress management in children and adolescents[187].

Fourteen reviews were identified which focused on mental health problems. These were further sub-divided into 5 areas:

- Prevention of mental disorders which included 6 reviews covering: interventions for the prevention of depression in children and adolescents[188,194]; interventions for the prevention of anxiety in children and adolescents[195]; (non-school) community based prevention programmes for anxiety and depression in youth[180]; internet interventions to prevent eating disorders [191]; and physical activity interventions for depression in children and adolescents [179]. One overview by Stockings et al, (2016)[171] is also considered alongside the three reviews on prevention of depression and anxiety[188,194,195].
- Impacting on self-efficacy and self-esteem which included a review of the evidence for the impact of Youth Employment Programmes on adolescent self-efficacy and self-esteem[190]; a review of exercise interventions to improve self-esteem in children and young people[182].
- Interventions addressing internalising, externalising or prosocial behaviours which included the impact of teacher classroom management on disruptive or aggressive student behaviour[192]; a review of effectiveness of creative bibliotherapy for internalizing, externalizing, and prosocial behaviours in children[189]; a review of programmes for prevention of externalising problems in children[193].
- Youth suicide prevention which included only one review of 2 youth suicide prevention programmes[197], and therefore the overview by Bennett et al, (2015)[170] is also included here.
- Help seeking for mental health which included one review on the effectiveness of current online mental health services in facilitating the help-seeking process in young people[185].

Evidence of interventions that have promise in supporting successful (healthy and happy) transition to adulthood

Interventions promoting general mental wellbeing

A recent scoping review including over 1000 studies describing or evaluating interventions to promote wellbeing concluded that wellbeing promotion can be effective and could have the potential to reduce inequities in children's and young people's wellbeing[22].

Family and Educational Settings

There is particularly encouraging evidence that interventions in family and educational settings are successful in building children's strengths and supporting positive parenting both universally and within disadvantaged groups[22].

Some universal school-based interventions which aim to cultivate young people's strengths and the creation of a positive family environment (such as Mind Matters, FRIENDS, Triple P-Positive Parenting Program) were found to improve mental wellbeing in diverse groups include socio-economically disadvantaged and cultural minorities. Although no evidence of impact on inequities could be found, Welsh et al (2015)[22] findings suggest potential for these programmes to reduce inequity and would support the use of universal approaches that also emphasise and address issues of equity in their design, delivery and evaluation.

There is some evidence that individual perceptions of school connectedness and teacher support predict future emotional health[186].

School programs targeting stress management or coping skills show some promise in reducing stress symptoms and enhancing coping skills[187].

Online interventions

Online mental health promotion and prevention interventions show potential in promoting youth wellbeing and reducing mental health problems[181], and there is some more limited evidence that on-line skills-based mental health interventions presented in a module-based format can have a significant impact on adolescent mental health[181].

Cognitive Behavioural Therapy-based online prevention interventions can have a positive effect on adolescents' and emerging adults' anxiety and depression symptoms but rates of non-completion are moderate to high. Implementation findings provide some evidence that participant face-to-face and/or web-based support was an important feature in terms of program completion and outcomes[181].

Mindfulness-based interventions

Mindfulness-based interventions (MBI's) such as Mindfulness Based Stress Reduction (MBSR) and Mindfulness Based Cognitive Therapy (MBCT) appear useful in improving stress, anxiety, and depressive symptoms and quality of life in children and adolescents in both clinical and nonclinical samples[184]. Other MBIs (not MBSR or MBCT) were also effective improving anxiety and stress but not depression in nonclinical populations compared to non-active control[184].

Interventions aimed at prevention of mental disorders

There is some evidence that depression prevention programmes reduce depressive symptoms and show a decrease in episodes of depressive illness over a year[188,194], and that this evidence supports both targeted and universal programmes[188]. Larger effects emerged for depression prevention programs targeting high-risk individuals, samples with more females, samples with older adolescents, programs with a shorter duration and homework assignments, and programs delivered by professional interventionists[194].

Physical activity (PA) interventions for the prevention of depression show small but significant positive effects. Studies which achieved greater reductions were those that included both education and PA as part of the intervention and/or targeted overweight or obese groups[179].

Anxiety prevention programs are also effective in reducing anxiety symptoms. Indicated/selective prevention programs showed lager effect sizes than universal programs. Smaller effects were found in samples with higher percentages of girls, and stronger effect sizes are observed for programs focusing primarily on anxiety prevention[195].

Prevention interventions using (mostly) psychological strategies are efficacious in reducing internalizing disorders and symptoms in the short term[171] (Stockings et al, 2016). Cognitive behavioural therapy (CBT) based programs were consistently found to lower symptoms or prevent depression or anxiety. Computer based CBT interventions are also effective[180].

Self-efficacy and self esteem

Only one review was found which addressed self-esteem and this was focused on the evidence for exercise to improve self-esteem[182]. The authors concluded that evidence from several low quality trials indicates that exercise may have short term beneficial effects on self-esteem in children and adolescents but more evidence from larger high quality trials is needed[182].

Internalising, externalising and prosocial behaviours

Teachers' classroom management practices have a significant, positive effect on decreasing problem behaviour in the classroom, showing less disruptive, inappropriate, and aggressive behaviour compared to untreated students in the control classrooms[192].

Creative bibliotherapy can have a small to moderate positive effect on child behaviour. Although no definitive model of creative bibliotherapy emerges from the included studies, to some extent all interventions reflected CBT mechanisms[189].

Suicide prevention

A review by Wei et al, (2015)[197] only focused on the evidence relating to 2 specific youth suicide prevention programmes: the Signs of Suicide (SOS) and Yellow Ribbon (YR) suicide prevention programs. They found no evidence that these programmes prevented youth suicide.

The overview by Bennett et al, (2015)[170] provides the most up to date evidence in this area. They found that school-based interventions may reduce suicide attempts and suicidal ideation and interventions that increase contact between youth and trained professionals show promise in preventing youth suicide attempts and suicidal ideation[170].

What doesn't work so well or at all?

General mental wellbeing

There is limited evidence that the physical and cultural school environment has a major influence on adolescent mental health, although student perceptions of teacher support and school connectedness are associated with better emotional health[186].

Prevention of mental disorders

For the prevention of eating disorders concluded there was no robust evidence on the impact of internet-based prevention strategies on eating disordered symptomatology and on putative factors that contribute to eating disorder development[191].

Self-efficacy and self esteem

There is no sufficient evidence base to support Youth Empowerment Programmes for impacting on developmental assets such as self-efficacy and self-esteem[190].

Internalising, externalising and prosocial behaviours

A review of programmes for the prevention of externalising problems in children found the evidence for preventive effects was meagre, largely due to insufficient follow-up post intervention. Long-term trials showed small and inconsistent effects[193].

Only one 'universal' programme was supported by evidence (others were selective or indicated): this was the school based Good Behaviour Game programme[193].

Suicide prevention

There is no evidence that the Signs of Suicide (SOS) and Yellow Ribbon (YR) suicide prevention programs that target adolescents prevent suicide[197].

Help seeking

Overall, online mental health services do not facilitate mental health help-seeking in young people but they may fill some needs for young people[185].

What are the key gaps in evidence in this area?

Inequalities

The evidence suggests that little attention is paid to the issue of inequity in the design, delivery and evaluation of universal interventions to promote mental health and wellbeing in young people, with none tackling a universal approach that focuses on the social gradient[22]. Issues of gender and ethnicity are rarely considered when designing or evaluating intervention effectiveness; more attention is required here, specifically when addressing problems such as self-harm and suicide where gender differences are significant. Where attention is paid to equity the focus is on high-risk groups. Although many policies exist that recognise the social determinants of and consequential inequities in the mental health and wellbeing of young people, they provide inadequate direction on intervention design and [191] implementation.

General mental wellbeing

There are still few studies which provide direct evidence on wellbeing interventions specifically for adolescents, with substantially more interventions either preventing or intervening in the development of mental illness. For on-line mental health promotion and prevention interventions, additional research examining factors affecting exposure, adherence and outcomes is required. The quality of evidence across the studies varied significantly, thus highlighting the need for more rigorous, higher quality evaluations conducted with more diverse samples of youth[181]. Similarly future research into programmes targeting stress management in children and adolescents should use clear quality criteria and strive for less diversity in methodology and outcome assessment[187]. Larger scale empirical research is required to further improve our understanding on the impact of mindfulness based interventions on young people and assessing mindfulness as a mechanism of change[184].

Prevention of mental disorders

Further research is required to provide more insight into preventing depression, anxiety, stress and eating disorders. There is a general lack of research which compares different programmes tackling prevention of depression or other common mental health problems. This inhibits our ability to make recommendations for specific programmes. Further research should be undertaken to identify the most effective programmes and to test these in the real world[188]. In particular:

- More efforts are needed for assessing the long-term program effects on the risk for developing anxiety disorders, and for improving long-term prevention effects on young[195];
- Interventions aimed specifically at the male population are required as existing interventions are less effective in this population[194];
- More outcome-focused, high-quality trials of physical activity are required to effectively inform the implementation of programmes to reduce depressive symptoms in children and adolescents[179];
- More research into intervention development and on the effectiveness of interventions for the prevention and early intervention of eating disorders with particular attention to study design is needed [191].

Self-efficacy and self esteem

There was a general lack of evidence for interventions tackling either or both self-efficacy and self-esteem. One focused solely on exercise interventions and one solely on YEP's. Broader systematic review of this area is required as well as primary research. In relation to exercise, high quality research on defined populations with adequate follow up is needed to establish whether exercise interventions improve self-esteem in children and young people [182]. Further research into Youth Empowerment Programmes using rigorous impact study designs alongside mixed-methods process studies is needed to provide more useful evidence for practitioners and policy-makers[190].

Internalising, externalising and prosocial behaviours

There is still no evidence to understand what components make up the most effective and efficient classroom management programs[192]. To further explore the effectiveness of creative bibliotherapy for internalising, externalising and prosocial behaviours, research is required to: 1) model the change processes taking place when children experience stories; 2) develop and pilot an intervention; 3) assess subgroup effects by gender, age, modality and literacy[189]. More long-term follow up assessment of interventions to prevent externalizing problems in children is needed[193].

Suicide prevention

Given the severity of the problem of suicide there is a paucity of high quality RCTs of youth suicide prevention programs. Little data exist regarding the impact of youth suicide prevention programs on death by suicide (most focus on reduction of suicide attempts, suicidal ideation and proxy measures of suicide risk). Little or no evidence exists regarding sex and (or) gender differences in intervention effectiveness or suicide prevention in minority ethnic populations.

This is an area where better understanding of whether universal or targeted approaches work best would be beneficial. Both the benefits and harms of interventions need to be evaluated before widespread use.

Help seeking

Further exploration into what young people use online mental health services for is warranted alongside more rigorous evaluation of on-line help-seeking programmes (regarding sample size, follow-up, use of validated measures)[185].

Tobacco free living

Key findings

- The evidence suggests that a combination of school-based, community-based and home-based interventions that focus on social competence alongside targeted mass media campaigns and wider public policy interventions to increase tax/price and restrict access would be the most effective approach for achieving sustained reductions in smoking amongst young people.
- There is promising evidence of the impact of price/tax policies on reducing smoking inequalities amongst young people whilst other smoking prevention interventions can exacerbate and increase smoking inequalities.
- There is a strong theme emerging from the evidence of the importance of parent and family-based interventions.
- State level policies to increase cigarette taxation and pricing combined with targeted mass media campaigns to lower socio-economic groups of young people could be an effective way to reduce smoking amongst young people and smoking inequalities.
- Evaluations that support understanding of the mechanisms of why tobacco interventions have positive and negative effects and importantly whether and how they are more or less effective for lower socio-economic groups (e.g. smoking restrictions in schools) are required.

Context

Worldwide, smoking is the leading preventable cause of poor health and death with an average of 5 million annual deaths predicted to rise to 8 million by 2030[2]. In England, 18% of young people under the age of 16 have tried smoking [3] and 40% of adult smokers started smoking under the age of 16. [4] A widely held theory is that if smoking does not occur in adolescence it will never occur[5]. In 2008, the Scottish Government introduced Scotland's Future is Smoke Free: A Smoking Prevention Action Plan. This may have contributed to a reduction in smoking rates in Scotland. In 2013, 2% of 13 year olds and 9% of 15 year olds reported being regular smokers;

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[2] Warren CW, Lea V, Lee J, Jones NR, Asma S, McKenna M., Change in tobacco use among 13–15 year olds between
1999 and 2008: findings from the Global Youth Tobacco Survey. *Global Health Promotion* 2009;**16**:38. [DOI: 10.1177/1757975909342192]

[3] The NHS Information Centre for Health and Social Care. Smoking, drinking and drug use among young people in England in 2014 (link is external). 2014

[4] Office for National Statistics. General Lifestyle Survey Overview: A report on the 2011 General Lifestyle Survey. 2013.

[5] US Department of Health and Human Services. Preventing Tobacco Use among Young People. A Report of the Surgeon General. Rockville, Maryland: US DHHS, 1994.

the lowest rate since the start of the SALSUS survey in 1982[14]. The proportion of 13 and 15 year old pupils reporting that they had never smoked has also dramatically increased from 45% in 2002 to 76% in 2013[14]. Although numbers of smokers have declined in Scotland, smoking remains a troubling health inequality problem with 40% smoking prevalence in the most deprived areas compared to 11% prevalence in the least deprived areas.[6] Socio-economic status is a key determinant of smoking uptake amongst adolescents[7] and children from lower socio-economic backgrounds are more likely to perceive smoking as the norm than children from more affluent homes[8]. Smoking rates amongst people who experience mental health problems is higher than the general population, and this is linked to the socio-economic inequalities in mental health. However it is also linked to the false perception that smoking can alleviate symptoms of stress, depression and anxiety.[9] 'Creating a Tobacco Free Generation: a Tobacco Control Strategy for Scotland', aims to tackle the inequalities of smoking by creating an environment where young people choose not to smoke, are protected from passive smoking, and are helped to stop smoking. The policy sets out that all smoking prevention interventions meet the needs of the most deprived communities in Scotland and that they are linked to tackling the root causes of health inequalities such as poverty, unemployment and low educational attainment. The target is to reduce smoking prevalence in Scotland to below 5% by 2034 with a key focus on maintaining the downward trend in smoking uptake amongst young people in Scotland. Exposure to smoke in the home is the main factor evidenced to encourage adolescents to take up smoking alongside other factors such as the ease of obtaining cigarettes, peer influence, lower socio-economic status, marketing and media portrayals[10]. This highlights the need to identify interventions that impact on the most deprived communities and which are effective in driving down inequalities in smoking.

Summary of included reviews

Twelve included reviews were directly relevant to the category of Tobacco Free Living, including evidence on a range of population interventions targeted at adolescents. These included state-level interventions such as mass media campaigns[198], plain packaging[202], tax and pricing[206], as well as interventions such as incentives[201], internet-based programs[204], community-based[200], school-based[208], family-based[207], multi-sectoral[203], and primary care interventions[205] and interventions focused on equity impact[199,209].

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[6] The Scottish Government, 2012, Scotland's People: Annual Report Scottish Household Survey Results from 2011

[7] Hiscock R, Bauld L, Amos A et al. Socioeconomic status and smoking: a review. Ann N Y Acad Sci, 2012: 1248:107-23

[9] https://www.mentalhealth.org.uk/a-to-z/s/smoking-and-mental-health

[10] Passive smoking and children. Royal College of Physicians, London, 2010

There is also some overlap between the Tobacco Free Living and preventing Drug Abuse and Excessive Drinking categories in this overview (e.g. MacArthur et al. 2016[223]; Onrust et al. 2016[9]), so where relevant we present the tobacco related evidence in this section also (see Table 2, Appendix 4). Relevant evidence on preventing alcohol and drug use is reported in the Drug Abuse and Excessive Drinking section (see Table 3, Appendix 4). Both of these sections are supported by evidence cited in related overviews (e.g. Stockings et al. 2016[7]) where appropriate.

The outcomes measured included, changes in smoking uptake, how much and often people smoke, smoking cessation and the reduction of social inequalities in smoking. Most of the evidence on tobacco control is from USA with a lesser amount from European countries and Australia and fewer from Canada, New Zealand, China, India, South Africa, Thailand, Brazil and Israel.

Evidence of interventions that have promise in supporting healthy and happy transition to adult- hood

Price / tax increases

There is clear evidence to suggest that increasing the price of tobacco is effective in reducing smoking amongst adolescents[199,206,209]. In a review specifically focused on pricing, Rice et al (2009)[206] found that price increases are effective in reducing smoking initiation, participation, and prevalence and in encouraging cessation in young people aged 25 or under. However, the size of the effect (i.e.) the association between the extent of price increase and the extent of reduction in smoking was unclear. However, the authors highlighted that the representativeness of the survey data used in the studies they included was often unclear or poor, and generalisations should be made with caution[206].

The strongest evidence of an intervention reducing smoking inequalities was for increases in price/tax of tobacco products[199]. Brown et al (2014) found a consistent effect whereby adolescents from lower socio-economic backgrounds were more susceptible to price/tax increases than those with high socio-economic status[199]. There is also tentative evidence that pricing is more effective amongst young black Americans and amongst females[206,209].

Smoking restrictions

Smoking restrictions in public places have been evidenced to reduce smoking prevalence amongst adolescents[7]. Smoking restrictions in schools and restrictions on sales to minors may be more effective amongst girls than boys, but there is as yet no evidence of the impact on socio-economic inequalities[209].

Controls on access to tobacco products

There is limited evidence to suggest that controls on access to tobacco products could reduce inequalities with comprehensive and enforced state level age of sale policies linked to lower smoking uptake amongst adolescent girls (although the effect sizes were small)[199].

Advertising bans

There is clear evidence that advertising bans reduce smoking prevalence by up to 7% [7].

Plain packaging

Branded packaging of tobacco products is one of the few ways in which tobacco companies can still legally market their products and use interactive packaging to encourage smoking.[11] One review examined the impact of plain packaging on the appeal of cigarette products[202]. They found that plain packaging reduced the appeal of cigarette products to a greater extent amongst younger respondents, females and non-smokers; however they did not find any differences by socio-economic status or ethnicity. The review also suggests that plain packaging increases the recall of health warnings[202].

Mass media

Campaigns delivered by the mass media (television, radio, online, newspapers, billboards etc.) designed to influence the behaviour of young people (for example presenting role models rejecting cigarettes or highlighting alienation with the hope that young people will change their behaviour) are a common intervention. One review found limited evidence (3 out of 7 studies) that mass media interventions reduce smoking behaviour amongst young people[198]. Two of the campaigns that were effective used a social influences (Social Learning Theory) approach and the other used provocative messages to cause affective personal reactions. The campaigns that had a positive effect were of higher intensity and duration than those that were not effective and benefitted from input from the target audience to the campaign design. They were also targeted at specific groups including girls and those with low attainment and low parental income. The authors warn that the studies, whilst the most rigorous available, all had some risk of bias and should be interpreted with caution.

Internet-based programs

One review focussed on internet-based programs[204]. These typically included information delivery, video content and stories, discussion boards, question and answer sections, sometimes motivational interviewing, and some were based on

[11] http://www.tobaccolabels.ca/interactive-cigarette-packaging-with-qr-code/

theoretical models such as Social Cognitive Theory. The reviewers found evidence that the programs had some effectiveness in reducing smoking intention, improving attitudes, self-efficacy and cessation although there was significant variation (ranging from 1% to 40%) in quitting rates. A key advantage is that such programs can be used in a range of settings. The review also identified that internet-based programs may be particularly effective when used as personalised follow-up interventions that employ interactive and multi-media elements that young people find engaging[204]. However few studies in the review used controls and it was not possible to derive from the available evidence which components within multi-component contribute most to the outcomes. There was also no data on equality group[204].

Behavioural interventions

In a comparatively early review, Muller-Riemenschneider et al (2008) compared school-based, community-based and multi-sectoral behavioural (combined school and out of school) interventions to prevent smoking amongst adolescents[203]. They found stronger evidence of moderate effectiveness of community and multi-sectoral interventions and the evidence for schools-based programs was inconclusive. The interventions were highly heterogeneous. The review evidence suggested that some intervention components seemed to be more associated with additional effectiveness including family-based interventions. They also identified culturally adapted interventions to be more effective than standardised approaches[203] (Table 2, Appendix 4).

Family-based interventions

As mentioned above, one of the factors associated with smoking amongst adolescents is the family environment. One review examined the effectiveness of family-based interventions intended to prevent children and adolescents starting smoking[207]. The moderate evidence was strongest for intensive family-only interventions (i.e. not combined with school interventions), which had a positive impact on experimentation with smoking where participants had never smoked. In studies where some of the participants had experience of smoking, no similar effect was found. There was also weaker evidence of a positive impact of combined family- and school-based interventions (Table 2, Appendix 4)[207]. The reviewers identified authoritative parenting (a strong interest in care combined with rule setting) as the effective intervention component, which was encouraged through a range of mediators such as GP visits to mothers, family resource centres in schools, motivational interviewing, telephone support, parent and child sessions to nurture parenting skills e.g. setting limits, peer resistance skills and freedom-based decision making. This review did not produce any data on equality groups[207].

School-based interventions

School-based anti-smoking programs vary in intervention approach. They typically may include *information only*, *social competence* (improving personal and social skills such as assertiveness, self-control, self-esteem, stress management and decision making), *social influences* (raising awareness of media and peer influences and teaching skills to resist offers and deal with pressures) and multi-modal (the above combined with parent, community and/or state level measures e.g. taxes). In their review, Thomas et al (2015)[208] found no effect of school-based curricula at one year or less but they were found to be effective (a 12% reduction in smoking onset) when assessed at a longer follow-up point (mainly 5 years). This suggests there is more evidence of effect over a longer time period, but there is no evidence to suggest why this should be the case.

The only individual approaches that were found to be effective were social competence and social competence combined with social influences. It is proposed that social competence has a broader appeal in that it provides students with important general life skills and has application to other health areas such as drugs and sexual health. Notably 60% of the trials in the review on social influences alone were not found to be effective[208].

One such program is DARE (Drug Abuse Resistance Education), which is used in 75% of USA school districts and was found to be largely ineffective by Onrust et al (2015)[9]. Interventions delivered by adults were found to be more effective than those delivered by peers and where sub-analyses were possible interventions were shown to be more effective for female students than males. The impact of policies to ban smoking in school grounds is not yet known[7].

Combined community interventions

Similar to family contexts, the broader community context is an important influencing factor in the smoking behaviour of adolescents. One review looked at multi-component community interventions (e.g. combined school-based, media campaigns, public policy or workplaces)[200]. The evidence in this area was relatively weak. Studies included communities ranging from large cities to small rural communities and varied in their intended outcome from smoking prevention and cessation, to alcohol and drugs, and involved a range of adult and peer facilitators and organisations. They found evidence in 10 of their 25 studies that combined community programs could be associated with a reduction in smoking uptake amongst young people. These programs had a number of common features including school-based multi-component interventions, delivery by teachers, parental involvement, durations over 12 months and were based on social influences or social learning theory[200].

However, the authors note the criticism in the literature of social influences only programs [200], also supported by findings reported in Thomas et al, (2015)[208] (see school-based interventions above). There were mixed effects for the inclusion of other components including mass media, community leader participation and peer involvement. The reviewers concluded that community programs are not easily replicated due to the influence of local factors and therefore future programs should incorporate the above elements shown to be effective and developed with representatives of the particular targeted community[200].

This is one of the few reviews identified that considered cost effectiveness[200]. They found that cost varied enormously from Smokebusters in Wensleydale costing £6,000 to a $2million a year state-wide initiative in the USA where they estimated a public health cost saving of $40679 for each boy and $13232 for each girl[200].

Peer-led interventions

Evidence suggests that peer-led interventions can have a low to moderate effect on reducing tobacco use, although these results should be interpreted with caution due to small study sizes[223].

Primary care relevant interventions

Patnode et al, (2013) concluded from their review that interventions in primary health care settings could add value as a complementary component of broader tobacco control programs[205]. They found that there was a small level of effectiveness for behaviour-based interventions with adolescents who were non-smokers with a reduction in smoking initiation. The reviewers were not able to identify any clear patterns in terms of links between intervention characteristics or design and effect. Perhaps as a consequence of this, the review reported very little detail on the intervention components that were successful which limits the transferability of this evidence[205].

What doesn't work so well or at all?

Incentives

Johnston et al, (2012) found no evidence to support incentive-based interventions[201]. The studies in their review were mainly based on the Smoke Free Class Competition where classes make a social contract to not smoke for six months and the successful are given prizes in a competition with other classes[201].

Smoking bans

There is mixed evidence on the effectiveness of smoking restrictions in workplaces and public areas such as schools[7]. This is supported by evidence from Bonell et al (2013)[313-315] reported in the General Health section below.

Social influences only interventions

Schools-based interventions that were based only on social influences were not found to be effective[208].

Inequity

A number of interventions appear to be ineffective in *reducing smoking inequities* including: smoking restrictions in cars, schools, workplaces and other public places, mass media campaigns, controls on advertising and marketing, school-based interventions, multiple policies (e.g. smoking restrictions and increased tax, access to tobacco and smoking restrictions, smoke-free, age-of-sale and health warnings)[199,209].

It has also been suggested that compulsory smoke free laws can have a negative equity effect on smoking and increase socio-economic inequalities, and there is weaker evidence to suggest that individual smoke-free homes interventions and controls on advertising, promotion and marketing of tobacco can have the same negative effect[199].

Increase in minimum age

Generally, increasing the minimum legal age to purchase cigarettes to 18 does not reduce consumption[7].

Peer-led interventions

Peer-led interventions may have an adverse effect where participants report pro-smoking attitudes and have peers and/or a best friend who smoked[223].

What are the key gaps in evidence in this area?

Insights into attribution

A key gap in much of the evidence is why certain intervention components work and others do not, such as the apparent success of social competence compared to information or social influence only interventions. This is due in part to the lack of evaluation of the experience of interventions from the viewpoint of the young people they are targeted at[208]. Furthermore, studies on population tobacco control interventions can have weakness in attribution as they are often evaluated in isolation from other individual level interventions or contexts which may have a synergistic or adverse effect on the impact of a policy[209].

Inequity

Few of the included reviews addressed the issue of smoking inequalities; this is due in part to the extent to which primary studies include sub-analysis of socio-economic and ethnic groups. Smoking inequity is a fundamental policy problem in Scotland and other western countries and therefore the impact of interventions on

smoking inequalities should be a future research priority. Evaluations are required that help us to understand the mechanisms of why tobacco interventions have positive and negative effects, and importantly whether and how they are more or less effective for lower socio-economic groups (e.g. smoking restrictions in schools)[199]. This will also help to inform the design of more interventions that can reduce smoking inequalities[199].

Plain packaging

Plain packaging has been introduced in Australia and will come into force in France and the UK in 2017[12]. The Australian National Drug Strategy Household survey reported reduced smoking rates which have been attributed to the introduction of plain packaging but this is contested by recent research[13]. The impact of the implementation of plain packaging in the UK in 2017 should be evaluated for its impact on adolescents.

Community impact

Community interventions are usually measured at the individual level; this gives more power to the findings but may give an inaccurate picture of the impact on a community as a whole. Consideration should be given to the measurement of outcomes at a community level in evaluations of community interventions.

Impact of family

There is a lack of evidence on how interventions to reduce smoking amongst parents and grandparents impact on smoking on young people.

[12]http://www.aihw.gov.au/publication-detail/?id=60129549469

[13]http://www.lse.ac.uk/IPA/images/Documents/PublicSphere/2015/Issue%203%20Singles/Plainpackaging.pdf

Preventing drug abuse and excessive drinking

Key findings

- As with tobacco, the evidence suggests that a combination of structural interventions such as taxation, pricing and availability combined with social competence based interventions that include active parental involvement and a peer element would be most effective in preventing alcohol use.
- It is important to consider the cognitive needs and capacities of adolescents when designing interventions given that different intervention types are more or less effective at different ages.
- The impact of mass media and advertising bans and the long-term effects of interventions to prevent alcohol and drug use are less clear.
- The issues of inequality and transition are not well addressed.
- More research is required on the potential for computer and mobile phone-based intervention delivery, effective strategies for the prevention of illicit drug use, and on whether and how family involvement in interventions can be inclusive of diverse family types.

Context

Recent evidence suggests that overall alcohol and drug consumption and hospitalisation for alcohol related harm is reducing amongst Scottish youth; however inequities remain a problem. Scotland remains one of the countries in the world with the highest prevalence of alcohol misuse amongst young people[316]. For many, substance use behaviour patterns become established during adolescence[7,317]. Late adolescence is when alcohol and drug use can escalate with drinking becoming a common social context and drug taking increasingly normalized [318].

The SALSUS report[14] in 2014 reported a significant decrease in alcohol consumption between 2010 and 2013 amongst 13 and 15 year olds. Similarly the proportion of pupils who reported that they had ever/were using drugs was the lowest since the survey series began in 1998. Importantly, those who had used drugs in the month before had poorer mental wellbeing than those who had not.

There are no socio-economic inequalities in alcohol consumption amongst Scottish adolescents [316]. However, alcohol related harm in adults living in Scotland is highest amongst men and those living in the most deprived areas[319]. The final evaluation report of Scotland's alcohol strategy has little focus on young people[319]. It identified an increase in knowledge about alcohol related harm but attributed most change to wider influences such as the impact of the recent economic downturn on

affordability. A refresh of the Scottish Alcohol Strategy will be published in 2016 and it has been recommended to continue to focus on the implementation and evaluation of minimum unit pricing, restricting availability and marketing. The paucity of reliable policy evaluation implementation and impact data in recent years was noted and recommended as a future priority [319].

Summary of included reviews

This is a reasonably well-researched area and nineteen reviews were included and categorised as primarily reporting on preventing drug and alcohol use[9,210-219,221,223-225,227,228,230,320]. Table 3 (Appendix 4) provides details of the interventions within each of the included reviews.

Two relevant overviews were also identified[7,174]. One of these overviews[7] appraised 10 of the reviews included within our overview [210,212,213,215-219,224,227]. For efficiency, the evidence from these 10 reviews is reported under Stockings et al, (2016)[7].

The remaining reviews cover school-based programmes [9,211,214,221 228], peer-led interventions [223], mentoring [230,320] and primary care level interventions[225]. Several of the papers included in this category, also include tobacco as a substance. The relevant evidence on tobacco is reported earlier in the section on Tobacco Free Living. Table 3 (Appendix 4) provides details of the interventions within each of the included reviews.

Evidence of interventions that have promise in supporting healthy and happy transition to adult-hood

Availability and sales restrictions

The evidence on restricting access to sales of alcohol reduces consumption suggests it can have effect of increasing and decreasing consumption with alcohol related harm levels remaining stable but occurring earlier[7]. Interventions that aim to improve responsible service of alcohol to young people in bars and restaurants have not been shown to have any effect on alcohol consumption[7].

Age restrictions

There is evidence to suggest that raising the minimum legal age for drinking may reduce hospital admissions for alcohol related intoxication and motor accidents and deaths[7].

Price increases and taxation

There is strong evidence that increases in taxation and price reduces alcohol consumption and related harm amongst young people[7].

Advertising bans

There is insufficient evidence on whether banning the advertising of alcohol reduces alcohol use amongst young people[7].

Mass media

The evidence on the impact of mass media campaigns on alcohol use amongst young people is mixed, but there are some indications that they can reduce substance misuse as well as increase use of illicit drugs[7].

School-based interventions

The most developed evidence-base in this category is for schools-based interventions. According to Stockings et al (2016)[7] the quality of studies examining the impact of schools based interventions to reduce alcohol and drug misuse overall could be improved as many studies report improvements in knowledge and attitudes but not behaviour change. They also found that generic programmes that focus on substance misuse generally and develop psychosocial and life skills are most effective in reducing alcohol use.

In a review of school-based substance use interventions in Spain, Espada et al, (2015) [211] identified that school-based programs were effective in preventing alcohol use and changing attitudes to but not consumption of drugs. Interventions based on social learning theory and health education programs, presented by professionals and teachers together were found to be most effective. Strom et al, (2014)[228] found that school-based preventative interventions for alcohol use were effective in reducing alcohol use and this effect increased over time up to 1 year. Interestingly Espada et al, (2015)[211] and Strom et al, (2014)[228] found no evidence that the duration or intensity of the intervention were influential on the effect, contrary to many other types of interventions with adolescents such as mass media campaigns.

Interventions that combine social competence and social influence methods can result in small reductions in cannabis use. There is very limited evidence for school-based interventions being effective in reducing the use of amphetamines, heroin and cocaine[7].

Impact at different stages of adolescence

A review by Onrust et al, (2015) [9] suggests that school-based programmes can differ in their effectiveness at different developmental stages including childhood, early, middle or late adolescence. They found that social competence-based interventions that focus on self-control, decision making problem-solving skills and CBT-based interventions were effective for all stages of adolescence[9]. Social norms-based intervention components, which aim to challenge and 'correct' adolescents misperceptions of their peers actual substance use and their acceptance-levels, are most effective for early-adolescents. Refusal-skills training

based in a social influences approach can be effective in preventing substance use only in late adolescence; a period when adolescents are less susceptible to peer-pressure. Also health education based on the interference of substance use on achieving life goals is effective for those in late adolescence.

Brief alcohol interventions

Evidence suggests that school-based Brief Alcohol Interventions, delivered individually (interactive and personalised) and using motivational enhancement therapy, can be moderately effective (a reduction of 1.4 days drinking in past month) in reducing alcohol consumption amongst adolescent school students[221].

Family based interventions

The involvement of parents can be an effective substance misuse prevention strategy[7,9,226]. In a review of parenting programmes for preventing tobacco, alcohol or drugs misuse, Petrie et al (2007) found that parenting programmes can be effective in reducing or preventing substance misuse[226]. Key factors that contributed to effectiveness were active parental involvement[14] combined with the promotion of social competence skills that imbue a sense of personal responsibility amongst young people and self-regulation. Onrust et al (2015) also provide supporting evidence that parental involvement is associated with positive outcomes for interventions that aim to prevent substance use[9].

Additionally, interventions that strengthen parenting skills and parent-child relationships have been shown to delay the onset of alcohol use and reduce drinking frequency for up to 3 years[7]. Finally, illicit drug use can be prevented by parent training using cognitive behavioural therapy, family skills training and structured family therapy[7].

Peer-led interventions

There is some evidence to suggest a reduction is alcohol and cannabis use as a result of peer-led interventions[223].

Mentoring

There is very limited and mixed evidence that mentoring (defined as a caring individual providing consistent companionship, support and guidance aimed at developing the competence and character of an adolescent [321] can be effective in reducing alcohol and drug use[230,320].

Prohibition

There is limited evidence from the US that the legalisation of cannabis is linked to a reduction in cannabis use amongst 13-14 year olds[7].

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[14] (via homework, face to face meetings or telephone)

What doesn't work

Universal programs (including peer education) to prevent substance use have little effect on those in middle-adolescence; only interventions targeted at those already using or at high risk of using substances are effective for this age-group[9]. Refusal-skills training was also found to be related to adverse outcomes for early and middle adolescents[9].

Parental education alone is not effective in preventing illicit drug use[7]. Additionally non-active parental involvement in interventions (e.g. mailings), have not been found to be effective[226].

Social influence only-based interventions in the school setting such as DARE do not appear to be effective[7,214,226]. Programs that just focus on raising knowledge and awareness about illicit drug harm do not seem to result in behaviour change[7].

Current evidence suggests that Brief Alcohol Interventions delivered in school to groups rather than individuals are ineffective[221].

Peer-led interventions may have an adverse effect where participants report existing networks of substance-using[223].

What are the key gaps in evidence in this area?

Focus on transition

Only one of the reviews[226] on preventing drug abuse and excessive drinking specifically addressed the issue of transitioning to adulthood but this was restricted to those transitioning to high school[226].

Digital interventions

More research is required on the potential for computer and mobile phone-based intervention delivery which is low cost, has universal application whilst interactive and offering tailored feedback. To date, evaluation of these types of interventions has been of poor quality [7].

Early adolescence

There is a lack of consensus on what kinds of interventions are effective in preventing illicit drug use amongst early adolescents, due in large part to the dearth of robust, high quality, independent evaluation of drug prevention curricula[214]. This is based however on US only middle-school programs.

Advertising bans for alcohol

There is a need for more high quality studies on the impact of banning alcohol advertising[7].

Long-term outcomes

Need for evidence on longer-term outcomes[214,226], in particular the effect of interventions in adolescence over the life course due to the possibility that such interventions only serve to delay the onset of substance use (especially alcohol)[228].

Brief alcohol interventions

There is a need to explore whether the motivational and personalised benefits associated with individually delivered interventions can be scaled up to group delivery mode[221].

Family-based interventions

Given the promising evidence on the contribution of parental involvement to the effectiveness of interventions, more research is required on whether and how this can be inclusive of diverse family types[226].

Illicit drug use

More research is required to identify effective strategies for the prevention of illicit drug use amongst young people[7], and there is little evidence on the benefits of primary care-relevant interventions to reduce illicit drug use amongst adolescents[225].

Inconsistencies in approach

Despite the large amount of research available, there is significant inconsistency between study designs, process and outcome measures which limits opportunities to compare evidence and therefore makes clear recommendations challenging. There are inconsistencies across the evidence base in terms of study design, the age of participants which limits opportunities for meta-analysis[9] and there is a lack of details on interventions and implementation processes[221,228].

Sexual and reproductive health

Key findings

- There is strong evidence that multi-component interventions (educational, skills building, motivational training and contraception promotion) aimed at improving sexual health and preventing pregnancy can be effective in school and community settings.
- Interactive computer-based interventions are moderately effective in increasing knowledge about sexual health, have a small effect on self-efficacy, safer-sex intentions and have a small effect on sexual behaviour.
- Social marketing interventions can be effective across a range of outcome areas and effectiveness is higher for longer-term programs. Brief counselling interventions, outreach contraceptive services, abstinence plus are also amongst interventions shown to be effective.
- Overall there is little convincing evidence that interventions led by peers contribute to improved sexual health outcomes for adolescents.
- There is a general lack of implementation process and long-term impact data, the use of sexual wellbeing as an outcome and a lack of consideration across the reviews of the socio-economic status of participants in universal interventions that aim to improve sexual and reproductive health.
- To increase engagement school-based interventions should be designed with young people taking account of their self-reported needs and delivered with enthusiasm, expertise and in a supportive school culture
- There may be limited transferability of much of this evidence because of the focus on US populations.

Context

The sexual and reproductive health of adolescents is a well-recognised problem area. Although declining overall, some of the highest teenage pregnancy rates in are in the UK and US[233] and are most prevalent in more deprived areas[322]. Teenage pregnancy is clearly linked to social disadvantage, dislike of school, (bullying, loneliness, lack of relevance) whilst teenagers with better social, educational, economic and employment circumstances are more likely to avoid early pregnancy[323,324].Developing a positive sexual identity and being able to make informed and responsible choices about relationships and sex is an important part of transitioning well into adulthood[325]. The consequences of unintended pregnancies or sexually transmitted infection can be costly to individuals and their families' wellbeing and financially to the state[326].

The sexual health of adolescents sits within a wider context of work to address gender- based inequalities in Scotland. In 2016, the Scottish Government published its pregnancy and parenthood in Young People Strategy which describes the actions needed to tackle the cycle of deprivation associated with many cases of pregnancy in young people and provides extra support for young parents[327]. It aims to help young people develop the appropriate knowledge, skills and confidence in making decisions around pregnancy and parenthood through a partnership approach between professionals and young people[327]. Additionally Equally Safe,[328] Scotland's strategy for eradicating violence against women and girls aims (amongst other things) to promote positive gender roles and enable children to develop an understanding of safe, healthy and positive relationships from an early age.

Summary of included reviews

Thirteen reviews were selected for inclusion in the sexual health and reproduction category [231-243]. These reviews consider interventions aimed at achieving a range of key outcomes including unintended pregnancy, prevention of sexually transmitted infections (STIs), general sexual health behaviour and contraception use, with some overlap between studies.

The reviews also focus on a range of distinct interventions including:

- peer led interventions[236]
- contraception promotion[232,233,237,238]
- social marketing interventions[243]
- brief sexuality communication[234]
- infant simulators[232]
- interactive computer-based interventions[232]
- HIV risk reduction[235]
- schools-based interventions[240]
- Abstinence[241,242]
- multi-component interventions in mixed settings[239]

The results are presented by intervention type. Table 4 (Appendix 4) provides details of the interventions within each of the included reviews. There are also links between the evidence reported here and the violence and abuse section below.

Evidence of interventions that have promise in supporting successful (healthy and happy) transition to adult- hood

Brief sexuality communication

Brief counselling interventions include communication and counselling on sexual health issues, usually in a primary care relevant setting and can last between 10 and 60 minutes. There is evidence to suggest that such interventions can reduce and

prevent sexually transmitted infection and HIV, reduce high risk sexual behaviour, improve knowledge, attitudes and behaviours in universal and high-risk populations[234]. These findings are supported by evidence that relatively brief behavioural interventions (1 hour) can increase condom use[235].

Outreach to existing contraceptive services

Outreach contraceptive services made available to all teenagers are effective in engaging young people with contraception services and their continued attendance, pregnancy reduction and contraceptive use[233].

Advanced supply of contraception

There is strong evidence that the advanced supply of emergency hormonal contraception to adolescents leads to increased use and speed of use whilst not promoting risky behaviour such as partner numbers or non-use of condoms[233].

Promotion of condom provision and advice on use

There is moderate evidence of increased condom usage and continued engagement with clinics as a result of interventions that combine discussion and demonstration of condom use and encouragement to attend clinics. However there was not data on the impact of this on pregnancy rates[233].

Lopez et al, (2013)[238] reviewed interventions that had a group-based educational or counselling component to encourage or improve condom use (male or female condoms) with the aim of preventing both unintended pregnancy and STIs. The study was limited by the need to include studies that measured biological outcomes and only 7 interventions were assessed. There was some evidence that these interventions prevented STIs (Also see also section below on what doesn't work so well below)[238].

There was also evidence that behavioural interventions aimed at reducing sexual risk behaviour which include skills and motivational training can result in increased condom use [235].

Interventions to improve oral contraceptive use

The evidence on the effectiveness of interventions that promote the use of oral contraceptives is mixed with some early indication that computer-based decision aids and nurse-led interventions may be effective[233].

Case management and peer interventions to promote dual-method contraceptive use

There is very little evidence on interventions to promote dual-method contraceptive use[238]. There is weak evidence to support the effectiveness of an intensive intervention that combined case-management with peer-leadership activities in

increasing dual-method use. However the authors warn against the strong possibility of desirability bias as a result of the intensive nature of the intervention[238].

Peer led interventions

In a review of 13 papers Kim et al (2008)[236] examined the impact of peer led interventions delivered in school and community settings. They found strong evidence of increased knowledge, improved attitudes and intentions. There was also evidence for a reduction in the risk of testing positive for chlamydia (1 study) and increased odds of females reporting that they had never had sex (1 study). However, given the lack of consistency in study design, the authors urge caution in the interpretation of these results[236] (Also see section on what doesn't work below).

Interactive computer-based interventions

One review (Bailey et al, 2010)[231] examined the impact of interactive computer-based interventions delivered via computer and the internet usually to individuals (one intervention was delivered to groups). These interventions aimed to achieve a range of outcomes including HIV prevention, STI prevention, unintended pregnancy, responsible sexual behaviour and preventing sexual assault. All of the interventions delivered personally relevant material usually based the participants experience, needs, knowledge and achievement. The review provides evidence that interactive computer-based interventions are moderately effective in increasing knowledge about sexual health, have a small effect on self-efficacy, safer-sex intentions which are all mediators of behaviour change and a small effect on sexual behaviour. There was insufficient evidence to measure effects for longer than six months[231].

Social marketing

Wakhisi et al (2011)[243] conducted a review to examine the impact of 12 social marketing interventions primarily on unintended pregnancies in schools or community or both. Social marketing aimed at achieving health behavioural change utilises marketing principles and techniques to a target group to influence them to accept, reject, modify or abandon behaviours for their and others health and wellbeing[329]. They included interventions that included an element of social marketing with a specific behaviour change goal in mind (here to delay sexual activity and effective contraceptive use), were targeted to adolescents, and addressed competing influences e.g. peers[243].

All of the interventions included aspects of sexual health education and skills training. Some involved parents, community and peer groups in the intervention design and provided tangible incentives for engagement (e.g. t-shirts, monetary rewards). They found evidence to suggest that these social marketing interventions were effective across a range of outcomes [243]. They reported mixed significant effects for most of these interventions across the different interventions as follows:

reductions in unintended pregnancy (4 interventions were effective, 3 were not), delayed sexual initiation particularly for females (4 interventions effective, 6 not), contraceptive use (4 interventions effective, 5 not), knowledge (7 interventions effective, 1 not) and self-efficacy to refuse unwanted sex (1 intervention effective, 4 not). The evidence suggested that longer- term social marketing interventions were more effective than short-term interventions however it was noted that there were limitations in the practical implementation of a long-term approach [243].

Interventions in educational-settings

A review by Blank et al (2010)[232] offered some insights into effective interventions within educational settings. Interventions that combine classroom sexual health lessons with community volunteering or a computer element are effective in reducing pregnancies and risky sexual behaviour. School-based contraceptive services are most effective when contraceptives are available on site rather than services that offer only assessment and advice. The evidence in this review by Blank et al (2010)[232] also supports the use of motivational interviewing and workshops in college-based to encourage contraceptive use amongst college students[232]. There is strong evidence that multi-component interventions 'Safer Choices' and 'Stand' aimed at improving sexual health and preventing pregnancy can be effective in the school-setting [232].

In a review of schools-based skills building behavioural interventions to encourage safer sex and prevent STIs, Shepherd et al, (2010)[240] found that although there were few significant benefits for sexual behaviour outcomes there was some evidence of increased knowledge and self-efficacy. The short-term measurement of outcomes may have limited the ability of studies to capture behavioural change that might have occurred in the longer term. Shepherd et al (2010) [240] make recommendations for schools-based interventions to promote safer sexual behaviour including: relevance to the self-defined cultural and contextual needs of the adolescents targeted, a whole-schools approach to sexual health, involving adolescents in the design, delivery by enthusiastic and credible facilitators with experience in classroom management and skills building and an awareness of perceptions of socio-cultural norms, including interactive learning elements that are empowering to young people to practice safer sex and finally a supportive school culture[240].

Multi-component interventions to prevent unintended pregnancies

Interventions to prevent unintended pregnancies are often multi-faceted (for example, education about risks and consequences, skills and contraception promotion combined) in response to evidence that it is a problem with multiple determinants. These are known as multi-component interventions involving components aimed at developing broad life skills and personal development as well as sexual health specific components and are sometimes combined with aims to

reduce other associated factors such as substance misuse. Oringanje et al, (2010) conducted a review of multi-component interventions the majority of which were based in schools. It was found that there was some evidence that multiple interventions (educational, skills building and contraception promotion) are effective in reducing adolescent pregnancy rates[239].

Abstinence only

Abstinence only interventions are broadly shown to be ineffective [242]

Abstinence plus

Abstinence-plus interventions aim to prevent, stop, or decrease sexual activity as well as promote condom use and other safer-sex strategies and are delivered primarily community and school settings and less often in home and healthcare settings. In a review of such interventions[241] found there was promising evidence that abstinence plus interventions increase HIV knowledge and reduce HIV risk behaviours in the short term and at 12 months. There was also evidence that some abstinence plus programs led to reduced pregnancy rates. However, the interventions were limited to those based in the US, different intervention models varied in effectiveness and there were serious methodological weaknesses in the included studies which limited the potential for generalisability[241].

What doesn't work so well or at all?

Peer led

No benefit was found for peer led interventions in reducing number of partners, unintended pregnancy or increased condom use[236]. Overall there is little convincing evidence that interventions led by peers contribute to improved sexual health outcomes for adolescents.

New adolescent contraception services

There is weak evidence to suggest that new adolescent services have an effect on attendance or pregnancy rates.

- Bespoke services targeted at young people in healthcare settings[233]
- New adolescent contraception services [233]

Stand-alone contraceptive interventions

Promoting the use of contraceptive measures alone is not effective in reducing pregnancy rates [233,238,239] or preventing HIV [237].

Social marketing for males

Social marketing has minimal impact on male behaviour[243].

Infant simulators

The evidence on infant simulators is inconclusive and suggests that they have no effect on the reduction of unintended pregnancy[232].

Evidence to support theoretical models under-pinning interventions

There are a range of theoretical models under-pinning the design of many of the interventions in this topic area including the Health Belief Model; however the evidence base does not yet provide the necessary insight into effectiveness to help those designing interventions to be clear about which theory to pick over another. Further research directly comparing interventions based on different models is required.

Computer-based interventions to promote dual-method contraceptive use

Computer delivered and counselling-based interventions for dual contraception use were found to have no effect[238].

Abstinence only programs

Abstinence only programmes promote abstinence as the exclusive means of HIV prevention without encouraging safer sex. Available evidence suggests that abstinence only interventions are not effective in reducing HIV risk, abstinence, pregnancy or STIs[242].

Adverse effects

Some interventions may have adverse impacts. For example, one study reported in Blank et al., (2010) reported that an additional 29% of students attending a school based health centre having sex at follow-up and fewer using contraception than national rates [232]. One study of 'STAND' showed 13 males were involved with pregnancies compared to 2 in the control group and a condom promotion study indicated higher prevalence of an STI (gonorrhoea) in the intervention group than the control[238].

What are the key gaps in evidence in this area?

Long term impact

There is a general lack of long-term impact data for example for brief sexuality interventions, social media interventions, interactive computer-based interventions, contraceptive use.

Transferability

Much of the evidence in the reviews on sexual and reproductive health is focused on participants from lower income backgrounds; ethnic minorities and most studies have been conducted in the United States. This may indicate limited transferability

to Scotland and a need to ensure that interventions are culturally relevant is highlighted. Some evidence supports cultural matching of the delivery team in contributing to effectiveness [232].

Inequity

There is a lack of consideration across the reviews of the socio-economic status of participants in universal interventions that aim to improve sexual and reproductive health [232,240]. The above leads us to question whether those young people most in need are being reached by the interventions and what this means for the impact on different socio-economic and cultural groups[232].

Contraceptive service impact

There is little reliable data on the impact of different models of contraceptive services as many studies are process evaluations focused on short-term behaviours and without data on impact, particularly on pregnancy rates[232].

Abstinence plus

Abstinence-plus interventions models differ with variations in effectiveness, and further research is required into why these different intervention approaches are more or less effective[241].

Sexual well-being

A number of reviews highlighted the lack of attention to sexual wellbeing as an outcome. This may be due to a focus on reducing risk of and actual harmful behaviours as well as the lack of consensus on what constitutes sexual wellbeing for different ages and groups and how to measure it effectively[234].

Cost-effectiveness

Many reviews, particularly Cochrane reviews were unable to report on cost-effectiveness as this evidence was not reported in studies. However Lopez et al. (2013)[237,238] hint that the longer term multi-component, complex, interventions they looked at on promoting condom use for dual outcomes would be expensive to implement and called for interventions that are suitable for resource-limited settings. A number of reviews identified that it was not possible to determine whether multiple component interventions were more effective as a whole or whether single components contributed more, and so this needs more attention as multiple component interventions are more costly to implement.

Consistency in outcome measure

There are clear inconsistencies in study design and the outcomes measured and a lack of reporting of the needs and views of those involved[236] making it difficult for reviewers to robustly synthesise evidence and draw conclusions. There is a need to standardise future research and include a process evaluation element alongside

quantitative impact data. Across the reviews there is a lack of consistency in how pregnancy is measured as an outcome. This tends to be either self-report or based on local healthcare data and biological healthcare data is rarely utilised. Not enough attention is paid to measuring whether pregnancies were intended or not, especially when healthcare monitoring data is used. There was also a lack of consistent measuring of outcomes in terms of timing of recall and periods of follow-up.

Violence and abuse free living

Key findings

- School-based educational interventions have a positive impact on knowledge and attitudes regarding bullying and abuse prevention.
- Interventions that are school-based but reach out to parents, peers and the school community appear to be more effective in creating the right environment for behaviour change.
- Reviews differed in the extent to which they provided good descriptions of the interventions but the content and pedagogy of interventions are likely to have an impact on outcomes.
- The intensity and dosage of interventions are important.
- A common theme in papers was the gap between knowledge, attitude and behaviour and the need to address this in terms of building interpersonal and conflict resolution skills among young people.
- Some studies may be limited in transferability because of the focus on populations in the USA. There is a need for UK and specifically Scottish studies in this area.
- Research has fallen behind social changes in internet usage and engagement in social media among adolescents. School-based interventions are able to have an influence on behaviours in schools (school-based bullying) but may not reach behaviour in broader social and virtual communities or reach older adolescents who are outside of formal education.
- Further primary research is required to establish the most appropriate and effective way to develop video and online materials in interventions for young people in the transition to adulthood when they may not be in formal education.

Context

The issue of violence and abuse perpetuated towards or among adolescents is a well-recognised problem area cross-nationally with substantial research effort and publication. Safety is a key area of GIRFEC and is a recognised child's right (Article 19 of the UN Convention of the Rights of the Child). The current Scottish Child Abuse Enquiry (https://www.childabuseinquiry.scot) and UK-wide contemporary concern about bullying and internet safety place these issues as central in relation to positive transitions into adulthood.

Additionally the Scottish Government has recently introduced a Domestic Abuse bill to parliament, which aims to make domestic abuse a specific criminal offense. In parts of Glasgow the level of adolescent gang engagement and its connections with delinquency, drug abuse and violence has been recently referred to as of national concern for Scotland's public health[330]. Violence and abuse takes different forms

including sexual violence and abuse, direct and indirect bullying, and physical violence associated with delinquency and gang culture.

Summary of included reviews

Eleven reviews[15] were selected for inclusion in the theme of interventions to reduce or prevent violence and abuse. Table 5 (Appendix 4) provides details of the interventions within each of the included reviews.

These were under four core themes:

- Bullying and cyber-bullying[245,252]
- Gang involvement prevention[249-251]
- Child sexual abuse [253,254]
- Teen dating and violence [244,246-248]

The reviews synthesised here present the methodologically most robust evidence on prevention of violence and abuse currently available because most focus on robust intervention design (e.g. randomised control trials and other forms of controlled trials) and some used quality of research as part of exclusion criteria so only high quality research was included in their reviews. This led to no reviews being included in systematic reviews relating to gang involvement.

The most mature research area included in this synthesis is school-based bullying prevention, with very limited evidence on gang involvement prevention and little on cyberbullying prevention. The most recent reviews included are those for school-based prevention of child sexual abuse and dating violence prevention.

The evidence base has emerged primarily from the USA, and with the exception of bullying interventions does not include research from the UK. However, the findings are of relevance to Scotland because although the contexts differ the issues are those of international concern, and core elements of interventions may resonate well within a Scottish context. Most interventions reviewed are universal and school-based but focus on individual level change in terms of knowledge, attitudes and

[15] Multiple publications were identified for the following reviews: Fellmeth (n=3 publications [205-207]); Fisher (n=3 reviews[199-201]) and Walsh (n=2 reviews [202-203]).

behaviour. The research is interdisciplinary with a strong emphasis on psychological and social processes and contexts. Some of the interventions reviewed include interpersonal and family level change and community factors in the context of educational policy and practice. Table 5 (Appendix 4) provides details of the interventions delivered within each of the included reviews.

Bullying Prevention

Farrington et al (2009) [245] review 89 reports of 53 school-based bullying prevention studies highlighting the level of activity in this area of adolescent health and wellbeing. The review included an international sample with interventions from a range of Western countries and South Africa. A meta-analysis was performed on 44 studies revealing that school-based anti-bullying programmes are effective in reducing bullying (by 20-13%) and victimisation (by between 17-20%) [245].

Common 20 elements of the anti-bullying programmes were:

- Whole school approaches including school rules for pupils to follow
- School conferences/assemblies – informing students about bullying
- Bullying prevention curriculum materials for use in classrooms
- Individualised professional work with pupils around bullying or victimisation
- Work with peers, including peer mediation and peer mentoring
- Work with teachers (information)
- Work with parents (information)
- Improved playground supervision and identification of 'hot-spots' and 'hot-times'
- School discipline methods
- Non-punitive approaches including restorative justice
- School tribunals or bully courts, although these were rarely used
- Teacher training
- Parent training/meetings
- Videos and virtual reality games, used to a lesser degree

Examination of effect sizes by programme content revealed decreased bullying was associated with: Parent training and meetings, Improved playground supervision and monitoring, discipline methods classroom management, teacher training, classroom rules, whole-school anti-bullying policy, school conferences, information for parents, and cooperative group work. The total number of elements and the duration and intensity of the prevention program for teachers and children were significantly associated with a decrease in bullying[245].

Decreased victimization was associated with: disciplinary methods, parent training/meetings, videos, and cooperative group work. In addition, the duration and intensity of the program for children and teachers were significantly associated with a decrease in victimization.

"The most important program elements that were associated with a decrease in both bullying and victimization were parent training/meetings, disciplinary methods, the duration of the program for children and teachers and the intensity of the program for children and teachers." (p. 70)[245].

Misha et al., (2009)[252], by contrast, reviewed only interventions to prevent cyberbullying. Ten articles were excluded on the basis of low methodological quality, for example failing to include a control group. All three studies included in the review were conducted in the USA, highlighting the need for further research in other nations[252]. As a growing area of concern and research it is surprising that a more recent review including recent articles was not identified; this points to a need for further systematic review.

The findings suggest "that participation in cyber abuse prevention interventions may not be significantly related to Internet risk attitudes and behaviour." (Misha et al, 2009, p. 36)[252]. Many changes in intervention groups in terms of internet safely knowledge and awareness or risk were in a positive direction, but did not always reach statistical significance, or lead to measurable gains in safe internet behaviour. There was evidence that school-based prevention of bullying did not impact cyberbullying in this review, suggesting a need to move beyond school-based bullying prevention interventions to tackle the risk of cyber abuse. Findings were programme specific but key themes in the content across programmes were difficult to discern due to the limited number of programmes/papers reviewed[252].

These reviews highlight the need for bullying prevention programmes to move beyond increasing knowledge and risk of cyberbullying to enhancing positive online behavior; and the need to educate parents/caregivers and teachers. Most of the intervention research has focused on school-based bullying behavior and Mishna et al., (2009)[252] conclude that further primary research on cyberbullying prevention is essential.

Gang Involvement Prevention

Fisher et al (2008) have produced two reviews of research on gang prevention[249-251]. The first review[249,251] examined the utility of cognitive-behavioural interventions, found to be effective in reducing recidivism and psychological disorders, for the prevention of gang involvement. The search identified 3520 citations but after exclusions based on methodological inclusion criteria (randomisation and inclusion of controls), no studies were suitable for inclusion in the review. Four excluded studies evaluating Gang Resistance Education and Training (GREAT) indicated there only a marginal potential positive impact of such a cognitive-behavioural intervention. Methodological weaknesses highlight the need for further research of a higher methodological quality[249,251].

Fisher et al (2008b)[250] also reviewed the opportunities provision for prevention of gang involvement. Opportunities provision is a key community approach to prevent gang involvement at a community level. However, having identified 2,676 potentially relevant studies this review found no randomized controlled studies of this prevention approach. Only studies that addressed opportunities provision as a gang prevention strategy, a case study and a qualitative study, were identified but both were deemed to have substantial methodological limitations[250]. The quality of evidence on gang prevention is weak and there is a need for high quality randomized controlled trials of prevention strategies.

Sexual Abuse Prevention Interventions

Walsh et al (2015)[253,254] provide a systematic review of school-based child sexual abuse prevention interventions primarily aimed at primary school children. Their review includes 24 randomised controlled trials (RCTs), cluster-RCTs, and quasi-RCTs of school-based education interventions for the prevention of child sexual abuse compared with another intervention or no intervention. Studies included were from a range of nations, mainly Western but also China.

Programme content covered themes such as body ownership; distinguishing types of touches; identifying potential abuse situations; avoiding, resisting, or escaping such situations; secrecy; and how and whom to tell if abuse has occurred [253,254]. There is considerable variability in programme delivery formats and teaching methods. Most programmes included films and video footage but other formats such as books, comics, dramatic plays, puppet shows, lectures, and discussions were used. No programmes were delivered electronically or online. School-based sexual abuse prevention programmes focus on children and adolescents as prevention targets. They seek to prevent child sexual abuse by providing students with knowledge and skills to recognise and avoid potentially sexually abusive situations, and with strategies to physically and verbally repel sexual approaches by offenders[253,254].

A range of meta-analyses revealed individual level change including improvements in protective behaviours and knowledge regardless of type of programme. There was no evidence of increased harm, fear, among children participating in the programmes. Child and parental anxiety were not always measured and where they were evidence suggested that they were not consistently influenced by the intervention. The need for further research was highlighted. The review was not able to assess specific content or pedagogies that influenced change[253,254].

Dating Violence Intervention Prevention

De La Rue et al (2014)[244] reviewed 23 USA and Canadian studies of school-based prevention programmes for adolescent dating violence, including sexual violence.

The review focused on randomised controlled trials (RCTs), cluster-RCTs, and quasi-RCTs of school-based education interventions.

The interventions were carried out by female teachers, teachers trained in substance abuse interventions or intervention specialists, or professionals working in the areas of sexual trauma (rape counsellor and attorney). A range of programmes was included in the review but the review did not identify core themes in the content of interventions [244].

A range of meta-analyses revealed that the education programmes had a significant impact on knowledge and accepting attitudes towards dating violence and rape myth acceptance and conflict tactic skills. However, the smaller number of studies examining behavioural measures such as dating violence perpetration and victimisation showed less promising effects.

The authors conclude "programs will need to be refined so that they support behavior change, with future research focusing on program development that explicitly seeks to incorporate skill-building components in an effort to impart behavior change." (p.8) [244]

Fellmeth et al (2014; 2015)[246-248] provide a systematic review of educational and skills-based prevention of relationship violence in young people. The review included RCTs, cluster-RCTs or quasi-RCTs; included participants aged 12–25 years conducted in any setting. All studies apart from one were carried out in the USA, the other study was carried out in the Republic of Korea. Following systematic searches, 38 studies were reviewed and 33 studies included in meta-analyses of intervention effects.

The majority of interventions were carried out in educational settings (25 in Universities and 10 in schools), 3 were in community settings (health centres, prison, community centres), and 5 targeted high-risk individuals or couples[246-248].

This review found evidence of an improvement in knowledge of relationship violence. However, for all other measures there was no significant impact of the interventions. There was no effect on episodes of relationship violence experienced, behaviors, attitudes, and protective skills attained[246-248].

Evidence of interventions that have promise

- The majority of reviews highlighted that school-based interventions have a positive impact on outcome variables measured. Each review included more than one intervention programme, but these were not always described in detail, with the exception of the bullying intervention[245]

- The main impact of educational interventions was on knowledge and attitudes. This was true in relation to bullying, cyberbullying, abuse prevention and prevention of teen dating violence.
- Bullying interventions had a demonstrable impact on school-based bullying and victimisation rates but interventions for dating violence and cyberbullying were less successful in changing behaviour.
- The bullying prevention reviews helpfully synthesise common elements of interventions and examined the effect sizes related to different elements. Key variables were:
    - Whole school approaches
    - parent training/meetings
    - disciplinary methods
    - the duration of the program for children and teachers and the intensity of the program for children and teachers

What doesn't work so well or at all?

- School-based bullying prevention education appears to have less impact on cyberbullying which can occur outside of the school context and be perpetrated by a wider range of individuals than traditional direct and indirect bullying experienced in school contexts.
- There is a gap between knowledge and attitude change and behavior change in relation to teen dating violence and child abuse. The issue here may be the maturity of the interventions and the duration and intensity of the programmes (see bullying review findings). There are also challenges linking behavioral data of abuse to school-based prevention studies for a variety of ethical and practical reasons.
- While this evidence shows promising results in many reviews no studies reviewed are based in Scotland and there is a need for careful consideration of which elements of interventions would be appropriate and effective in the Scottish context.

What are the key gaps in evidence in this area?

Most of the studies reviewed were large-scale RCTs or similar designs and small-scale qualitative work was not included in the reviews. This limited the opportunity for the voices of young people to be heard. However, the bullying intervention review did highlight that many interventions included peer activities such as peer mentoring and peer mediation, which were part of the whole school approach adopted by many interventions.

- There is no current methodologically excellent evidence on the effectiveness of gang involvement prevention programmes.

- The evidence on the prevention of cyberbullying is weak and Mishna et al (2009)[252] only included three studies in their review. Further primary research and systematic review is required for the prevention of cyberbullying.
- The connections between cyberbullying, adolescent sexual abuse and inappropriate use of digital sexual images require consideration. Current research on sexting within teenage relationships highlights this is a growing area of concern with implications for adolescent mental health and an individual's academic and career prospects[331].

Active living

Key findings

- Physical activity interventions have been relatively extensively explored and evaluated. The evidence base includes a heterogeneous range of interventions, which have been measured with a variety of outcome measures.
- Interventions to improve low physical activity (particularly those in the school setting) can have positive effects on some outcomes; however, these effects may be small, and when measured objectively, there may be only limited effect.
- The evidence does not support community wide interventions (aimed at the general population) for increasing physical activity levels.
- There is evidence that active video games (AVGs) can improve "light to moderate" physical activity or energy expenditure, but there is less impact on more intense physical activity and the available evidence is of limited quality.
- There is comparatively less evidence for sedentary behaviour interventions but the evidence suggests they can lead to small changes in sedentary behaviour.
- The potentially negative effectives of physical activity interventions have not been studied.
- There is a lack of evidence on the impact of interventions intended to improve active living on inequalities, and little evidence in relation to gender differences.
- There is less evidence on interventions with adolescents compared to children, and transition to adulthood is not considered specifically.
- Specific interventions require more research (e.g. school environment interventions and active travel) and there is a lack of research on sports participation.
- A range of practical and methodological issues need to be addressed including (but not limited to) the measurement of outcome, study design, and longer term follow up.

Context

The Scottish Government recommends that children and adolescents aged 5 to 18 years get 60 minutes of "moderate to intense" physical activity per day[332]. However less than a fifth of young people (18%) in Scotland meet these guidelines, and activity levels appear to decline during transition from late childhood into early adolescence[20]. Furthermore, the most recent Health Behaviour in School Aged Children survey showed that 64% of young people surveyed (aged 11, 13 and 15 years) spent more than 2 hours per day watching television on school days[20]. The main policy driver in Scotland is the Scottish Government's 2003 'Let's Make Scotland More Active' 20-year strategy for improving activity levels in the Scottish

population[333]. As physical activity is a key component of obesity prevention, Scotland's obesity strategy, 'The Obesity Route Map' is also of relevance[334]. However, despite policy initiatives, the most recent Active Healthy Kids Report Card for Scotland showed that in terms of physical activity and sedentary behaviour, most children and young people are not meeting national guidelines[335].

Summary of included reviews

We identified 22 systematic reviews which met the inclusion criteria [146,255-272,336-338]. Ten systematic reviews were assessed as low risk of bias[146,256,258,260,264,267,268,270-272], whilst the remaining 12 were judged as having an unclear risk of bias[255,257,259,261-263,265,266,269,336-338].

Nineteen reviews primarily focused on interventions to improve low physical activity. These included 5 systematic reviews focused on physical activity interventions in general [146,260,266,267,272], 8 systematic reviews focused on interventions delivered in the school context [256,257,261,264,268,269,271,338], 5 systematic reviews on the use of active video games [258,259,263,336] or technology[262] and 1 review focused on active travel[337].

Two systematic reviews focused on sedentary behaviour [255,265]. One review considered interventions delivered through sports organisations in relation to people of all ages[270]. Table 6 (Appendix 4) provides details of the interventions delivered within each of the included reviews.

The included systematic reviews evaluated a wide range of interventions including modifying school environment, physical activity promotion and behavioural interventions in the school context, Physical Education classes and school sports, the use of technology such as Active Video Games, community based interventions, and active travel. A variety of outcome measures were employed, including physical activity levels, energy expenditure, fitness, fundamental movement skills and a variety of measures of general health outcomes.

In terms of participant characteristics, the included reviews included primary studies with participants who were both male and female, but some studies included only females, or only males, and some studies did not report on gender. The ages of study participants typically ranged from 2 years to 19 years; however one study included participants of all ages [270], and some interventions involved parents [337] (Table 6, Appendix 4).

Evidence of interventions that have promise in supporting successful (healthy and happy) transition to adulthood

Interventions to improve low physical activity

Physical activity interventions in general

Two systematic reviews found supportive evidence for physical activity interventions in general. With a specific focus on adolescents in Europe, de Meester et al (2009) [266] found that in general, physical activity interventions led to positive impacts on physical activity levels, (particularly school based interventions); however it was highlighted that many studies were short term, and it was not clear whether these interventions led to increased physical activity in other settings [266]. It was also recognised that there were significant methodological limitations of the available evidence [266]. A second review found some support for multi-component interventions or those that include both the school and home in improving the physical activity levels of adolescents; however again this is based on a limited and low quality evidence base [272]. Evidence, which conflicts with these findings, is considered further below.

School based interventions

Several systematic reviews considered the impact of school-based interventions on a wide range of outcomes. For example, Demetriou & Honer (2012)[338] examined effectiveness in relation to three categories of outcome; psychological factors (e.g. self-esteem and attitudes), physical activity levels, and health outcomes (e.g. BMI and motor skills). They found evidence for impact on motor skills, physical activity and knowledge of physical activity and to a lesser degree on self-concept and attitudes[338]. The quality of studies was assessed as "moderate" overall (Demetriou & Honer 2012, p.101)[338]; however there were a range of methodological limitations and lower quality studies were more likely to report significant outcomes. Secondly, Dobbins et al (2013)[256] found evidence for positive impact of school based physical interventions for several outcomes: VO2 max, physical activity duration and rates, and on television viewing. Overall the evidence was considered "moderate" risk of bias and therefore careful conclusions are required (Dobbins et al 2013, p. 2)[256]. Thirdly, Sun et al (2013)[271] considered the impact on cardio-metabolic outcomes and considered intervention intensity. In line with Dobbins et al (2013)[256] "moderate" evidence was found that interventions delivered in schools increased fitness levels (Sun et al 2013, p.831)[271]. There was also "strong" evidence for impact on skinfold thickness and high-density lipoprotein (HDL) cholesterol (Sun et al 2013, p.831)[271]. However a lack of evidence for impact on other outcome measures was also observed, and shall be considered below.

One systematic review considered whether school-based physical activity interventions had continued impact (defined as 6 months or longer), and it was found that there was some evidence to support continued impact on physical activity, and some limited evidence for Fundamental Movement Skills[261]. However the quality of the evidence and a small number of studies may limit conclusions[261].

Three studies focused on curriculum based interventions. Morgan et al (2013)[268] showed "Fundamental movement skills" (FMS) interventions, which targeted skills such as running, jumping, throwing and catching, could improve motor skills[268]. Some differences in outcome were noted between boys and girls; however the authors note that gender differences have not been fully explored. Furthermore only one study included adolescents (these skills are primarily developed in childhood), and the included studies were considered high risk of bias, so the results must be evaluated with caution[268].

Interventions in P.E. lessons such as "fitness infusion" (including bursts of high energy physical activity) were found to increase the amount of moderate to vigorous physical activity time in P.E. lessons (Lonsdale et al 2013, p.158)[264]. However this is based on just a few studies, which were considered high or moderate risk of bias[264]. Furthermore, there was also evidence that physical education and school sports can increase physical activity and fundamental movement skills[257]. However, as above, studies were of varying methodological quality, and the only study with longer term follow up did not show a statistically significant effect[257].

Finally, one study provided evidence for the school environment in improving physical activity in adolescents specifically[269]. It was found that both the physical environment (e.g. spaces and equipment), and the social environment (e.g. school "climate", support from teaching staff, opportunities for sporting activities within school), can improve the physical activity of adolescents[269]. However few studies actually modified the school environment and the majority were cross-sectional[269].

Active video games and the use of technology

Five systematic reviews considered the use of active video games (AVGs) or technology. For example, AVGs were found to increase "light-to-moderate" physical activity (LeBlanc et al 2013, p.1)[263] and to increase energy expenditure[336]. However, for both these findings it was not known whether the effects were sustained or impacted on "habitual" physical activity levels, and the quality of evidence was considered low[263,336]. It was also found that AVGs could lead to better health outcomes when compared to sedentary behaviour, and therefore they may be a good option to replace sedentary time[259]. However, the available evidence is at "moderate" risk of bias (Gao et al 2015, p.791) [259]. Finally, there was tentative

evidence for the use of ICT (Email, internet or text messages) in physical activity interventions leading to positive psychosocial or behavioural outcomes[262]. However this is based on limited evidence and there was lack of complete control groups due to mixed studies[262].

Interventions to support active travel

Finally, one systematic review evaluated interventions to promote active travel [337]. There was some evidence that interventions for small effects on active travel[337]. However there was wide variety in the types of interventions, and most of evidence was with primary school children[337]. Furthermore the quality of the current evidence base was considered methodologically weak[337].

Sedentary behaviour

There appeared to be some support for "small but significant" effects of interventions intended to reduce sedentary behaviour[255] . However this is based on a small number of studies and most were with children rather than adolescents (Biddle et al 2011, p.939)[255]. Marsh and colleagues focused specifically on family input to sedentary behaviour interventions, and found that there was "inconsistent" evidence, which was of "low-to-moderate" risk of bias (Marsh et al 2014, p.117)[265]. These results were linked to the variety in the aims of the studies, diverse interventions (from TV locking devices to behavioural interventions), differences in populations, and settings (the study included interventions in a variety of contexts including home, school, community and primary care) (Table 6, Appendix 4)[265]. Nevertheless the involvement of family and parents was considered an important component[265].

What if any intervention components appear to be contributing to effectiveness/what works?

There is some suggestion that the active involvement of parents in physical activity interventions may be an important factor in improving effectiveness[255,266,272,337]. It has been recognised that there is conflicting evidence on whether multicomponent (and which components) are most effective. Indeed de Meester et al (2009)[266] were not able to conclude that multi-component interventions were effective, yet van Sluijs et al (2007)[272] suggest that there is evidence to support multi-component interventions with adolescents. Therefore it appears there is a need for further consideration of effective intervention components in future research.

What doesn't work so well or at all?

Physical activity interventions in general

In contrast to some of the reviews outlined above, two of the systematic reviews on physical activity interventions provide evidence that such interventions do not lead to positive outcomes. Baker et al (2015) found that there was no evidence to support multi-component community wide interventions for increasing physical activity levels (conducted in the general population, not specifically young people)[146]. A second systematic review considered physical activity interventions where outcomes were measured objectively (e.g. with accelerometers)[267]. Crucially, although statistically significant differences were observed, meta-analysis showed only small effects on total physical activity time and on moderate to vigorous physical activity, which were arguably not clinically significant[267]. This is an important finding given the wide variety outcome measures (including many self-report) employed to evaluate physical activity interventions (Table 6, Appendix 4).

School-based interventions

Although the positive impact of school based interventions is outlined above for some outcomes, there also mixed findings for a range of other measures. For example, there was a lack of conclusive evidence for the impact of school based interventions on several physical measures such as body fat, BMI, waist circumference, blood pressure or total cholesterol[271] or on BMI, blood pressure and pulse[256]. Indeed, Demetriou & Honer (2012)[338] showed that 28% of studies evidenced significant effects on BMI compared to 69.3% showing no effect[338].

There was also evidence that school-based physical interventions can lead to *decreases* in physical activity possibly due to "aversion towards physical activity" (Demetriou & Honer, 2012, p.194)[338]. Longer term and higher intensity physical activity interventions were shown to have negative effects on BMI, and attitudes about physical activity[338].

Active video games and the use of technology

In terms of AVGs, there was less evidence that AVGs can increase vigorous physical activity [263,336] and AVGs do not show bigger impact on health compared to exercise in a laboratory or field based games[259]. Furthermore, "Exergames" (AVGs) delivered in schools or at home do not yet have supportive evidence[258], but are suggested as a "promising" intervention, potentially for reducing sedentary behaviour (Gao & Chen 2014, p.689)[258].

What are the key gaps in evidence in this area?

Overall, there appeared to more evidence on physical activity interventions (19 systematic reviews), and comparatively less evidence on tackling sedentary behaviour (2 systematic reviews). There was also only one systematic review on sports participation[270] and crucially, this identified no studies which met the inclusion criteria. Therefore there is a clear lack of good quality evidence focused on improving participation in sports[270]. These appear to be relevant gaps which could be addressed.

Several reviews highlighted that the majority of the included studies were focused on children, and there was relatively less evidence for adolescents[255-257,272,337,338]. The possible negative impact of school-based physical activity interventions is recognised (e.g. stigma or reduced motivation), and some studies have shown that interventions can lead to reductions in physical activity[338]. However few studies have evaluated this[256], and this may be worthy of greater consideration.

There may be a need for more research on environmental interventions. For example, future studies could consider evaluating the effects of changing the school environment to promote physical activity and also to reduce sedentary behaviour[269]. Furthermore van Sluijs and colleagues stated that of the 24 studies they included focused on adolescents, 17 were educational interventions, 6 were multi-component and only 1 involved an environmental intervention[272]. Similarly, more research on interventions to promote active travel to school in adolescents may be required[337].

It is striking that none of the systematic reviews specifically focused on whether interventions impacted on inequalities. Several systematic reviews highlighted the need for consideration of subgroup analysis by socioeconomic group, but identified that this was not often undertaken by the primary studies[146,266,269]. It was recognised that some studies conducted physical activity interventions with more disadvantaged groups; however this does not necessarily address inequalities[146,266,272]. Furthermore, some of the systematic reviews did not give any consideration to the links between physical activity interventions and health inequalities[256,271]. This may be a priority for further research.

Whilst the importance of gender was recognised by some systematic reviews[256,268,338], and some of the included primary studies focused on males or females, it is highlighted the differential impact of interventions by gender has not yet been fully explored [256,259,268,269,338].

Although many of the studies include self-report measures, the quantitative nature of most studies means that they do not include direct accounts of the perspectives

of participants. Furthermore, it was suggested that there was a lack of research on the psychological components associated with physical activity[338].

Only one systematic review considered health economic evaluations of physical activity interventions[260], which highlights that despite the fact that there is a significant amount of research focused on evaluating physical activity interventions with children and young people, there is a relative lack of evidence looking at cost-effectiveness.

Finally, clear gaps in the evidence base relate to a number of methodological limitations, which were consistently highlighted, including complexities regarding study design, difficulties with blinding, heterogeneity in the measurement of outcome [256,262,263,266,268,272,336-338], issues regarding the "dose" of the intervention" [258,271], lack of research on longer term follow up[258,271], and the general need for higher quality studies[258,264].

Healthy eating

Key findings

- For improving nutritional intake in general, there is evidence for policies and interventions to improve the food environment, for direct economic incentives i.e. price changes and for educational or combined (educational and environmental) interventions in school settings.
- For improving fruit and vegetable intake, there is evidence that school based policies can be effective in improving fruit and vegetable accessibility. There is evidence for multi-component, educational and behavioural school-based interventions with children; however there is currently less available evidence for adolescents.
- The available evidence does not yet support menu calorie labelling or 'indirect' economic incentives to improve nutritional intake, and family based interventions do not appear to improve fruit and vegetable accessibility.
- The available research provides very little evidence on the impact of healthy eating interventions on inequalities.
- There is much less evidence for adolescents compared to children, and no consideration of transition to adulthood specifically.
- Given relatively less evidence on this topic area in general, further research is warranted, especially in relation to environmental and combined (educational plus environmental) interventions to improve nutritional intake in adolescents, economic incentives, and policies to increase fruit and vegetable accessibility.
- A range of methodological limitations in the evidence must be addressed, particularly the measurement of outcome.

Context

Poor quality diets are a serious and pervasive global public health issue[339]. The recent Global Nutrition Report highlighted that malnutrition can take many forms, affects countries all over the world, and is the primary risk factor in the global burden of disease[339]. In Scotland there is a longstanding problem with poor diets and nutrition, particularly in relation to the intake of energy-dense (high fat and high sugar) foods, with severe consequences for the health of the population[340].

In the most recent 'Health Behaviour in School Aged Children' Survey in Scotland, just 38% of young people reported eating both fruit and vegetables every day; however there has been a trend towards increased consumption between 2002 and 2014[20]. It is recognised by Scottish Government that healthy eating and access to cheap nutritious food is a national priority. Relevant policy drivers in Scotland include the Revised Scottish Dietary Goals, which outline guidance on nutritional intake[341] such as intake of 5 pieces of fruit and vegetables per day, and a diet low in

salt, sugar and fat. Furthermore, the Schools (Health Promotion and Nutrition)(Scotland) Act 2007, covers the responsibilities of local authorities to ensure that schools provide food and drink of appropriate nutritional standards[342].

The recently formed Scottish Food Commission has been convened to provide (evidence based) advice on those measures which will contribute the most to making Scotland a Good Food Nation, addressing the existing, and potential future, challenges facing Scotland's food culture. It builds on existing programmes such as Better Eating Better Learning which support schools, local authorities, caterers, procurement departments, parents, children and young people to work in partnership to make further improvements in school food and food education. Nevertheless co-ordinated action to specifically address issues food poverty, particularly where it affects children and young people, is still absent at a national policy level.

Summary of included reviews

We identified eight systematic reviews[273-280] which met the inclusion criteria and which were judged as either low or unclear risk of bias based on the ROBIS tool. Table 7 (Appendix 4) provides details of the interventions within each of the included reviews. Five reviews were focused on general diet and three systematic reviews on fruit and vegetable consumption specifically. Two studies included meta-analysis[274,280], and the remaining six studies provided narrative syntheses[273,275-279]. Most of the reviews included children and adolescents aged between 2 and 18 years; however one review was focused on the general population (and included only 5 studies with children)[280], and another review included studies with the general population, parents or teachers[277]. All reviews included studies with participants of both genders; although for some reviews gender was not reported. None of the included systematic reviews were funded by the food and beverage industry. Two systematic reviews were judged as low risk of bias [275,277], and for the remaining six reviews the risk of bias was unclear [274,276-280].

In addition, one paper was identified which was described as "a systematic overview"; however this was an overview of legislation and legal regulations for preventing obesity rather than an overview of systematic reviews[176]. It has not been included in the synthesis below, but is briefly mentioned here as it provides evidence that across the United States and Europe regulatory and legislative approaches to tackling obesity have so far been "limited in reach and scope" (Sisnowski et al 2015, p.720)[176]. This is important context for considering interventions intended to improve the nutritional intake of children and young people.

Five systematic reviews considered interventions intended to improve nutritional intake in general[273,275,276,278,280]. Interventions included educational, environmental or combined interventions in schools [273], changes to the food environment specifically[275] menu calorie labelling[280], economic incentives[278], and interventions intended to impact on educational outcomes, (which included breakfast interventions, supplementation with fish oils or vitamins/minerals, and exposure to sugars).

Three systematic reviews considered interventions intended to improve fruit and vegetable consumption[274,277,279]. One focused on food environment interventions to change the accessibility of fruit and vegetables[277], and two reviews considered behavioural or health promotion interventions[279], including one review specifically focused on extent to which behavioural theory improved interventions[274].

Therefore it is clear there is considerable heterogeneity in the types of interventions considered in the promotion of healthy eating in children and adolescents. The systematic reviews considered here also included studies which employed a wide range of different outcome measures including: self-reported nutritional intake, fruit and vegetable consumption, the accessibility of fruit and vegetables in different settings, educational outcomes, and anthropometric outcomes (e.g. Body Mass Index).

Evidence of interventions that have promise in supporting successful (healthy and happy) transition to adulthood

Interventions to improve nutritional intake

There appeared to be evidence that interventions in the school context can improve nutritional intake including educational and curriculum based interventions, interventions focused on the food environment (e.g. changes to the lunches provided in schools or increased availability of healthy foods), or a combination of educational and environmental interventions[273]. Van Cauwenberghe et al (2010) reported a systematic review of European studies which considered interventions in schools settings for both children and adolescents[273]. Only the evidence in relation to adolescents (13-18 year olds) is considered here (13 of 42 papers). There was "moderate" evidence for educational interventions in improving nutritional behaviours of adolescents (van Cauwenberghe et al 2010, p.789) [273], and of the five studies which considered combined interventions, four showed positive impact and one showed mixed findings. However there was evidence to support combined interventions with children, which was based on a bigger evidence base. Overall most of the studies were considered "weak" and the evidence base "limited" (van Cauwenberghe et al 2010, p.791) [273].

A systematic review which considered interventions to change the food environment showed that the majority (17 out of 18 studies), showed state-level and school focused policies could positively impact on the sale and consumption of healthy food, and on weight outcomes[275]. However it was recognised that study designs (only three studies included a control group) and study quality (only 2 studies were considered "strong", 5 "moderate" and 11 "weak") limits conclusions (Driessen et al 2014, p.978)[275]. Nevertheless the authors concluded "improving the school food environment has the potential to be an important strategy for obesity prevention in children" (Driessen et al, 2013, p. 978)[275]. It was also found that direct "economic incentives" (i.e. price changes in school provision or relative differences in the prices of healthy and unhealthy foods) can impact on consumption. However the authors highlighted that this is based on a relatively small and "limited" evidence base (Jensen et al 2011, p.670)[278]. Interventions to improve fruit and vegetable consumption

In terms of access to fruit and vegetables, "the most promising" interventions were focused on local policies in which schools adapted their food provision, and thus changed the school food environments. Indeed the majority of the evidence (4 of 6 studies) on local school policies (e.g. cafeterias, vending machines) demonstrated positive impacts on food environments, specifically access to fruit and vegetables[277]. There was also some evidence that interventions focused in community settings could improve access to fruit and vegetables[277]. However, the overall the methodological quality of studies was considered "weak" (Gannan et al 2014, p.11 of 13)[277].

Whilst there was evidence to support "multi-component" educational and behavioural interventions (mostly school based) to improve fruit and vegetable intake in children, there was much less evidence (Knai et al 2006, p.85)[279]. Indeed, whilst the majority of studies in children reported positive impacts, only one of the four studies with adolescents reported positive outcomes (though none of the included studies had negative impacts)[279]. The strength of the evidence is not explicitly reported, although the authors acknowledge that very few studies have examined this area[279].

Finally, there was evidence to support the effectiveness of "dietary change interventions" (i.e. behavioural interventions) to improve fruit and vegetable consumption and study quality was found to be more important than the influence of theory (Diep et al 2014, p.506) [274].

What if any intervention components appear to be contributing to effectiveness/what works?

Overall, there appears to have been little consideration of the active components of interventions designed to improve nutritional intake. The possibility that parental involvement might be an important facet is recognised[273]. However there may be insufficient evidence at present to draw firm conclusions, as one review suggested less than 40% of the studies with adolescents involved some level of parental involvement[273]. Driessen et al (2014) argued that the positive impact associated with interventions on the school food environment may be linked with "comprehensiveness" which ensures that "compensatory behaviour" is not possible (p.978)[275]. However, the extent to which the interventions were comprehensive was not systematically assessed. Knai et al (2006) consider the different components of fruit and vegetable interventions which might be most successful, including intervention intensity, the direct involvement of staff and parents, and a focus on fruit and vegetables specifically rather than diet more generally. However this was not a formal analysis[279]. As outlined above, Diep et al (2014) considered whether the theoretical basis of an intervention makes a difference to effectiveness; however it was shown that once study quality was taken into consideration there appeared to be little measurable impact of theory[274].

What doesn't work so well or at all?

The available evidence at present does not appear to support menu calorie labelling to reduce calorie intake. Although a small but statistically significant effect was found (18 fewer kcal per meal), when only on studies that included controls or were conducted in restaurants (compared to laboratory settings) were considered, there were not significant effects[280]. However methodological difficulties regarding external and internal validity were recognised, and the authors suggested that even small changes in reducing calorie intake may be important[280]. When analyses were stratified by age there was a pattern of bigger decreases in caloric intake for children and adolescents; however the authors acknowledge that this is based on just 3 studies, and was not statistically significant[280] .

There was "limited and inconclusive" evidence for nutritional interventions (breakfast interventions, exposure to sugar, and supplementation with fish oils, vitamins or minerals) on *educational* outcomes specifically (Ells et al 2008, p.933)[276]. The vast majority of studies (two-thirds) were focused on children rather than adolescents making it difficult to assess the impact of these interventions on educational outcomes in adolescence. The authors argued that there were a range of quality issues (such as power, randomisation, and adjustment for confounding) which limited conclusions (Ells et al 2008, p.933)[276].

There was only weak evidence for "indirect" economic incentives (indirect support to improve nutrition in schools)[278]. However it was acknowledged that there are difficulties with evaluating the impact of such indirect interventions, as these can involve a combination of different types of changes i.e. mixed interventions which included an incentive component[278].

There appeared to be conflicting evidence on the effectiveness of state-level policies, as they were considered to have a positive impact on nutritional intake[275], but there was less evidence to support state-level policies on improving fruit and vegetable accessibility[277].

Finally, the evidence does not support school-based or family-based interventions to improve fruit and vegetable accessibility[277].

What are the key gaps in evidence in this area?

Compared to the other topic areas considered in this systematic overview, there was relatively less systematic review literature (only 8 systematic reviews) focused on healthy eating. There is therefore a gap in the evidence on adolescent health in relation to improving nutritional intake.

Across the included systematic reviews there was little consideration of the impact of interventions on inequalities[273,277,278]. Van Cauwenberghe et al (2010) considered studies which had targeted adolescents with low socioeconomic status, and argued that there was "inconclusive" evidence for nutritional interventions with this group (van Cauwenberghe et al 2010, p.792) [273]. However, there was no consideration of whether the intervention *reduced* health inequalities[273]. Similarly Long et al (2015)[280] reported that there were no clear patterns in analyses of ethnicity, BMI, or socioeconomic status, and Ganann et al (2014) reported that the studies they included did not report analyses according to socioeconomic status, gender or ethnicity[277]. Jensen et al (2011) recognise that financial incentives for nutrition may impact differently on children depending on their socio-economic background; however there is no formal analysis of this issue[278]. Finally, several studies did not consider either socioeconomic status in general or inequalities specifically[274-276,279]. Thus there is a striking lack of evidence on the impact of interventions designed to improve nutritional intake on inequalities.

In general, there was less and lower quality evidence on nutritional interventions with adolescents in comparison to evidence on children[273,276,279]. For example, there was much less evidence on interventions designed to improve fruit and vegetable intake with adolescents as compared to children[279]. For school-based interventions there was more evidence, and higher quality evidence for children in comparison with adolescents[273]. Although several of the studies used self-report data for measuring outcomes, the quantitative focus of many of the studies means that the

accounts of young people themselves were not captured. Crucially, none of the studies considered implications for transition to adulthood specifically.

A range of interventions appear to require more robust evidence, particularly in relation to adolescents. For example, there was limited evidence for multi-component interventions with adolescents i.e. education plus some modification of the food environment (although this is supported with children, where there is considerably more evidence)[273]. There was also less evidence for environmental interventions on nutritional behaviour in adolescents (only 2 studies)[273]. There is also need for more research on economic incentive instruments (Jensen et al 2011, p.670)[278], and on the cost effectiveness of interventions in general[275].

Further research on interventions to promote fruit and vegetable consumption appear indicated, particularly in relation to adolescents[279], and on the influence of theory on effectiveness[274]. It was also suggested that there was a need for controlled evaluations of policies to increase availability of fruit and vegetables[277].

Concerns regarding methodological limitations of the evidence base were consistently reported. It was frequently stated that there was a need for improved research designs and higher quality studies[273]. In particular, the limitations of using outcome measures of self-reported nutritional intake were repeatedly identified[273]. Furthermore a lack of evidence of anthropometric outcomes[273,275] was highlighted.

Obesity prevention

Key findings

- Lifestyle Interventions appear to be effective for obesity prevention. However, the results seem clearer for stand-alone health behaviour interventions, including sedentary behaviour interventions or nutrition education, than combined interventions.
- The results do not appear to support the effectiveness of lifestyle interventions in adolescents and young adults, the dearth of studies focusing on this age group may have contributed to this finding.
- Use of appropriate outcome measures, BMI alone may not give a full understanding of weight status in a healthy weight population.
- Targeted health behaviours and key components should be explicitly stated and further investigation of individual components undertaken.
- Adolescents and young people should be a focus of future studies and reviews in order to understand more fully interventions which are effective for this age group.
- Physical activity interventions are not effective in obesity prevention,
- Sedentary behaviour should be considered as a stand-alone effective intervention for obesity prevention
- Lifestyle/ health behaviour change is only one aspect of obesity prevention equal importance, in terms of intervention and outcome, should be given to other contextual or psychosocial factors

Context

Obesity and overweight are endemic within our society and have become a major public health challenge. Worldwide, figures show that obesity has more than doubled since 1980 [343]. Scotland has one of the highest levels of obesity in OECD countries with over a million adults and over 150,000 children obese meaning almost 30% of the child population are overweight[344]. As a chronic health condition obesity affects individuals across the lifespan and transitions from childhood to adulthood.

The costs of obesity are far-reaching. Not only is obesity a risk factor and potential cause of numerous chronic conditions, such as high blood pressure, diabetes and cardiovascular disease[345] it has wider social and economic consequences. The combined medical costs associated with treatment are estimated to increase by £1.9-2 billion in the UK by 2030 [346]. Tackling obesity and increasing the numbers of healthy weight children within Scotland is a key Scottish Government target and national indicator[347]. However, the impact of policy and guidance does not appear to

have had the desired result as numbers of children who are an unhealthy weight has remained stubbornly stable [348].

The interventions of interest in this overview were universal obesity programmes, those interventions whose focus is prevention or intervention i.e. those programmes that seek to prevent children who are not overweight becoming overweight or obese[300].

Summary of included reviews

Twenty-three reviews, judged as either low or unclear risk of bias based on ROBIS, were eligible for inclusion in this review[281-303]. Two publications[281,295] reported overlapping data from a larger systematic review [300] and were counted as one review. One overview of school-based interventions [177] that considered obesity and overweight prevention was identified. Seven reviews included only randomised controlled trials, two included any study design and the remaining thirteen included both randomised and non-randomised controlled trials. The number of studies included within each of these reviews ranged from 8 to 124. Table 8 provides details of the characteristics within each of the included reviews. Six reviews were judged as having a low risk of bias[281,286,289,297,301,302] and the remaining 17 reviews were assessed to have an unclear risk of bias (Table 8, Appendix 4).

Setting

Studies included in the reviews were carried out across North America, Australasia and Europe including the UK. Sample sizes ranged from 5,812 to 144,706 participants, however not all study sample sizes were reported. The majority of studies included schools as at least one of the main settings and were generally carried out in more than one location. Two reviews specified they were community-based, [281,302] and one focussed on interventions delivered in the home[295].

Population

All of the reviews included both boys and girls, however not all of the studies reported gender and some individual studies within the reviews targeted either female or male samples. The majority of participants were under 18 years old, however two studies included community or general population samples[293,302], therefore age was not specified. Only one study extended the age range to include young people up to the age of 22 years old [298]. Many of the reviews included studies where the population was mainly younger children, out-with the age range of this overview (10-24 years). Nine reviews specified the predominance of younger children, in particular those under 12 years old within their results [282,285,286,290,292,296,298,299,301].

Outcomes

Objective measures of weight status were reported as the primary outcome for almost all of the reviews. Body Mass Index (BMI) was the outcome used most often however other measures of adiposity included skinfold thickness, percentage of body fat and obesity or overweight prevalence. Three reviews used change in lifestyle behaviours such as sedentary behaviour, dietary behaviours or physical activity as their primary outcomes as opposed to a weight-related outcome[289,294,303].

Interventions

All interventions reported within the reviews were primarily lifestyle interventions. These interventions targeted behaviour change related to lifestyle. Specifically, they sought to prevent weight gain or reduce weight status by (a) increasing physical activity and/ or decreasing sedentary behaviours; (b) improving eating behaviour by increasing healthy eating habits or decreasing unhealthy eating habits or (c) employing a combination of these approaches.

The majority of reviews included both targeted and universal intervention studies; therefore, healthy weight children and those who were overweight or obese or had chronic conditions were often included within the analysis. Six reviews solely considered universal population-based interventions [287,293,296,299,301,302].

Three types of interventions were identified within the included reviews (Table 8), these are:

- Reviews focused on stand-alone lifestyle interventions (i.e. Single Health Behaviours or Single Intervention Components) (8 reviews) [286,288,290-292,294,296,299]
- Reviews focused on Combined Lifestyle Interventions (i.e. interventions targeting Physical Activity (with or without Sedentary Behaviour) and Dietary Behaviour) (5 reviews) [283-285,302,303]
- Reviews focused on Mixed Lifestyle Interventions (i.e. a mix of combined and stand-alone lifestyle interventions (8 reviews) [281,282,287,289,293,297,298,300,301]

In the following section, a brief overview of the interventions that were delivered as reported within the included reviews in the three category interventions is provided.

Stand-Alone Lifestyle Interventions

Eight reviews primarily focused on stand-alone interventions for obesity prevention (Table 8, Appendix 4). Three considered physical activity interventions, [286,290,291] two emphasised sedentary behaviour interventions [292,299] and one concentrated upon nutrition education interventions [296]. In addition two reviews explored parental support interventions, [288] and interactive electronic interventions [294].

The evidence for physical activity interventions for obesity prevention was not conclusive. In one meta-analysis, [286] the difference in BMI and other measures of body composition between intervention and control group was not statistically significant. In two reviews, [290,291] only around half of the studies showed a statistically significant change in weight status. Those interventions that included environmental components at a wider social or community level had greater potential for preventing excess weight gain than those targeting one or two levels of a socio-ecological model [290]. Several key components were identified including parental involvement, support for implementation; activity as part of the curriculum and access to activities.

Sedentary behaviour interventions [292,299] showed a significant reduction on BMI. The difference shown was not enhanced by the addition of multiple health behaviours, demonstrating that sedentary behaviour interventions could be as effective as those incorporating other health behaviours. Similar to the results shown by Wang et al (2013) [300] a meta-analysis demonstrated that nutrition education was effective in reducing BMI [296] .

In one review several types of parental support interventions were explored, individual counselling, group education and telephone counselling, on both health behaviours and weight [288]. There were mixed results for the effectiveness of parental support. A positive impact was found in weight outcomes but not in all studies. There was a positive change on dietary behaviour but there was less evidence for the effectiveness of parental support on physical activity. Group education appeared to be the most effective method employed for weight change whereas face-to-face counselling and telephone contacts were more effective for dietary behaviour change. Interactive Electronic Interventions were shown to have significant positive effects on weight, physical activity and dietary behaviours within adolescents [294] .

Combined Lifestyle (Physical Activity and Dietary Behaviour) Interventions

Five reviews considered specific combined physical activity and dietary behaviour interventions. Four of these were school-based [283-285,303] and one community-based [302]. These interventions shared similar components incorporating mainly classroom-based education and activity components.

Only the community-based [302] interventions showed a small statistically significant improvement on measures of adiposity. However, where there were no significant reductions in BMI a change was demonstrated in terms of the prevalence of obesity or overweight [284] and in smaller increases in levels of obesity within the intervention group [283]. In addition combining physical activity and nutritional interventions did appear to have a positive impact on target behaviours [303].

Mixed Lifestyle Interventions (Combined and Stand-Alone)

One overview [177] reporting on obesity prevention programmes was identified and included eight of the reviews reported in this synthesis, [283,284,286,289,293,297,298,303] and one additional review which was included within the theme of healthy eating [273]. Overall school-based interventions were not found to have a positive effect on weight status measured by BMI. The results were inconclusive in relation to gender, some reviews included found boys benefited more and in others interventions were only effective for girls. In addition, they found that younger children were less likely to benefit from obesity prevention interventions. Although there was no impact on BMI multi-component interventions, which mainly included combined approaches were considered to have potential health benefits.

A total of 8 reviews focused on mixed lifestyle interventions. These included 7 meta-analyses, 3 were judged as low risk of bias [289,297,301]; and 4 judged as having an unclear risk of bias [287,293,298,300]. Almost all were conducted in various settings although two reviews were considered school-based [287,297], one community-based [281] and one home-based [295].

Four reviews with meta-analyses indicated that lifestyle interventions had a statistically significant positive effect on BMI, although effect sizes were small [293,297,300,301]. Two meta-analyses found no evidence for an effect on BMI [287,289] and one review [298] indicated that only 21% of programmes had a positive impact on obesity prevention, although this was considered comparable with other prevention programs for public health problems. .Several reviews reported on other health behaviours in addition to weight-related outcomes, some but not all had a significant positive effect on all of their target behaviours [289,300,301]. Home-based interventions [295] did not demonstrate any significant effects on measures of adiposity. Where there was no impact on BMI however, there were some improvements in health behaviours such as fruit and vegetable intake and sedentary behaviour [295]. Community-based interventions demonstrated some effectiveness in reducing BMI, as well as in behavioural outcomes such as increasing vegetable intake and physical activity [281].

The individual components of interventions were not well reported therefore it was difficult to ascertain the key elements of successful interventions. Wang et al (2013) showed that dietary behaviour-only interventions had overall more positive impact on weight outcomes whereas physical activity interventions and combined interventions had more mixed results [300]. Some components identified as having a greater impact were education/ Information behaviour change and the environment in addition to cognitive approaches and parental support [293,297].

Participant Characteristics

Several reviews highlighted the importance of gender as a potential moderating factor in obesity prevention programmes. However the direction of effect is not conclusive. In some reviews it appeared that girls received the most benefit from interventions [283,296,298], although in some cases this appeared to be associated with the focus of the intervention e.g. dietary fat [303] and another suggested that gender had no moderating effect [286]. As previously noted a number of reviews focused mainly on children under 12 years old. Where subgroup comparisons were made it would appear that younger children achieved greater change in weight status than adolescents [281,282,288,289,297,301,302]. However, where adolescents were a focus[294] significant effects were found. In a further two reviews [293,298], suggested preadolescents gained less benefit and the impact on obesity prevention was actually greater in adolescents or in younger children. Other reviews found age had no moderating effect [287,299] or there were mixed results [303]. Three reviews analysed demographic characteristics beyond age and gender. Using the PROGRESS framework[349] one review found a more positive impact of interventions on groups of lower socioeconomic status [301] although this was not found in another review[303]. Two reviews which reported on ethnicity were unable to find conclusive moderating effects[298,303].

Intervention Components

Several components were highlighted throughout the reviews as having particular importance. A number of reviews suggested that interventions with an environmental focus could have a greater impact on obesity prevention[283,289,290,298]. Family or parental involvement was highlighted as a key positive factor in several reviews [282,288,297,303]. Although not all reviews supported this view [294,298]. The use of electronic media, although difficult to extract from other intervention components, appeared to show promise in particular with older children and adolescents[294]. There was some disagreement over whether single component interventions are as effective as multi-component interventions. Some reviews have suggested that there is no further benefit of adding additional components [291,292] and that single component interventions have greater effect than multi-component interventions [287].

Gaps

The transition period between childhood and adulthood was underrepresented within studies of obesity prevention programmes. A greater focus on older children from 12 years onwards is necessary in order to identify the programmes, which work best for this age group and the key components.

Lifestyle interventions were not always successful in reducing obesity and overweight. In addition, several studies showed changes in target behaviours but not

in weight status. This may illustrate that the association between behaviour change and weight is not yet clearly understood. Overweight and obesity are complex issues where context in terms of the environment, family and wider community are of paramount importance[350]. The problem of obesity defined by energy balance model, which focuses on the individual's energy intake and expenditure as the primary cause of obesity, may detract from the multi-faceted nature of this condition and ignore other important psycho-social considerations. For young people in the discussion groups healthy transition to adulthood included being 'comfortable with who they are and what they look like'. Obesity prevention research has yet to address the more psychosocial aspects of obesity in terms of interventional components or outcomes.

Concepts such as body image, self-esteem, self-efficacy, motivation, family influences and environmental factors also have the potential to inform effective initiatives to address obesity but are not well-researched or well-reported as individual components in this population. To be successful obesity prevention programmes should be seen conceptually different from health behaviour interventions and not just as an adjunct. Lifestyle or health behaviours should become the intervention and weight the primary outcome in order to ensure relevant changes are identified[302].

In most studies weight status was measured by BMI. However BMI did not always demonstrate change, whereas other adiposity markers were positively impacted. This may indicate that BMI alone is not an appropriate measure for prevention studies where the population are predominantly healthy weight children. Use of a number of different adiposity measures in addition to BMI may provide a more accurate picture of weight status.

Further consideration is needed of the difference between single component and multiple component interventions. Targeting single health behaviours appeared to have greater consistency in terms of positive impact on obesity prevention. Stand-alone interventions including nutrition education and sedentary behaviour were particularly beneficial whereas physical activity interventions, without a compulsory[299] or environmental component[285], had less impact. There is a need for clarity about the components involved and the specific health behaviours targeted. There was no explicit use of activity or nutritional guidelines, aside from one review[283] and the individual components were not always reported in detail. Without detail it is difficult to understand which elements are most successful, the intervention dose or duration required or if guidelines are having the intended impact on health behaviours and on weight. The application of a guiding framework such as the socio-ecological model applied could help with consistent categorisation of interventions and their components within future studies.

The evidence appears to support sedentary behaviour interventions as stand-alone approaches to obesity prevention as opposed to being integrated within physical activity interventions. Fewer reviews focused on stand-alone interventions which may have influenced these results however these along with parental interventions and computerised interactive interventions do appear to show promise.

General health

Key findings

- School-based universal interventions have potential to improve or exacerbate inequalities amongst adolescents.
- Digital interventions show promise for improving health behaviours of adolescents but the evidence base is in its infancy.
- Supportive school environments can have a positive effect on young people's health and wellbeing and may contribute to reducing inequalities.
- Recreational dance may have a positive impact on physical health and psychosocial wellbeing.
- Reducing the size, availability and appeal of larger-sized portions, packages and tableware has potential to reduce the amount of food selected and consumed.
- Whole school interventions are evidenced to be effective in preventing bullying, smoking and teenage pregnancy.
- Health Promoting Schools can improve health in a range of areas but more evidence is required to assess impact on some health areas and school attainment.
- Community volunteering may be beneficial for young people in relation to personal, social and academic outcomes.

Summary of included reviews

Nineteen reviews were allocated to the category of General Health. Two publications[314,315] reported overlapping data from a larger systematic review[313] and were treated as one review. One overview of school-based interventions that target "more than heath education to promote adolescent wellbeing" was also identified and used to inform the key gaps in this section [178]. Table 9 (Appendix 4) provides details of the interventions within each of the included reviews.

These fall into the following sub-categories:

- School-based interventions including the socio-economic gradients impact of school-based health behaviour interventions[351], the WHO health promoting school framework[352], school-based interventions that go beyond health education, school environment[313-315], and drop-out prevention[353].
- Digital interventions including social media[354,355,356] and social marketing[357]
- Infectious diseases[358]
- Mind and body including recreational dance[359] and yoga[360]
- Community service[361]
- Portion, package and tableware[362]

- Policy interventions via sporting organisations[363]
- Oral health[364,365]
- Built environment[366]

Given the priorities identified by young people consulted in the review, primary attention is given to reporting evidence on the socio-economic gradients impact of school-based interventions and digital interventions.

Socio-economic gradients impact of school-based health behaviour interventions

In a review of the effects of universal school-based health behaviour interventions on socioeconomic gradients, Moore et al, (2015)[351] attempted to raise awareness of and develop evidence-informed insights into this poorly attended outcome area. Of the 90 completed studies they identified which focussed on smoking, alcohol, diet and/or physical activity, only 20 reported on socioeconomic inequalities. Of note was their finding that only one of the 23 North American studies and 15 out of the European studies tested for differential effects. The interventions were usually multi-level and two thirds were informed by theories including Social Cognitive Theory, Theory of Planned behaviour and Self-efficacy Theory, none were related to theories on inequality. There were inconsistencies in the way that inequalities were measured and the justification of measures[351].

Those studies reporting a negative effect on inequalities (10 studies) concentrated on diet, physical activity and obesity and one on smoking. Half of these and those where there was a neutral effect (6 studies) were of weak quality. Interventions that used education alone were associated with no or a negative effect; the authors note that education only interventions were rarely tested for inequality impact perhaps due to the widely held assumption that education can worsen inequalities. Where a positive effect was found (4 studies) one was interventions on diet and physical activity, one on diet or physical activity, one on tobacco and alcohol and one on tobacco or alcohol. These studies were of moderate quality. Mixed results were found for interventions combining education with environmental change and/or family involvement (5 negative, 3 positive and 4 neutral)[351].

The authors found that few studies used an inequality-based argument for the need for the intervention[351]. A number of assumptions were found within the literature including that universal interventions would have universal effects (challenged by the results above), that removal of structural barriers and improving access to healthy options would ensure access for those from disadvantaged backgrounds and that universal interventions work best for those from poorer backgrounds who essentially have more to gain than those from more affluent backgrounds. Process evaluation data revealed that pupils from more socially disadvantaged areas were

more likely to engage with intervention materials; however this positive finding was not associated with actual impacts on inequalities[351].

School environment

Based on the assumption that disparities in health outcomes between schools may be due in part to variation in school environments two reviews have been conducted to assess evidence of the impact of school environment on health[313-315].

There is evidence based on US and UK secondary schools that schools with higher attainment and attendance than would be expected from the social profile of the student intake have lower levels of substance use and lower levels of violence. Some of the studies in Bonell et al. (2013) review[313-315] suggest that authoritative schools are more likely to contribute to reducing risk behaviours such as smoking. They found however that evidence from other studies in their review would not support this conclusion because they show other factors including strong leadership, student involvement, high expectations, frequent evaluation and praise as explaining school attainment differences [313-315]. The evidence of the impact of restrictive school policies such as smoking bans or alcohol consumption policies was mixed and suggests a ceiling effect. Evidence also suggests that attractive school environments may have an impact on reducing risk behaviours that occur within schools but not outside them. Bonell et al (2013) [313-315] and Moore et al (2015) found that positive school environment change was associated with reductions in inequalities.

WHO Health Promoting School Framework

In a review to assess the effectiveness of Health Promoting Schools (HPS) Langford et al (2014)[352] examined impact on health and wellbeing of students as well as their academic achievement. Schools using the HPS approach were shown to reduce body mass index; increase activity and fitness levels, improve fruit and vegetable intake, decrease cigarette use and reports of bullying. No influence was found for mental health, alcohol and drug use, fat intake, violence and bulling of others. However the authors urge caution due to the low quality of many studies they reviewed.

Digital interventions

Three reviews examining the impact of digital interventions on health and wellbeing met the criteria for inclusion in this review.

Only one review looked exclusively at the use and effectiveness of social media tools targeted at children, youth, their families or caregivers (Hamm et al, 2014)[356]. The majority of the studies included focussed on adolescents. The interventions aimed at adolescent's covered healthy diet, exercise, sexual health, smoking

cessation and parenting. Similarly to the other two reviews Hamm et al found that social media formed part of multi-component interventions. The evidence suggested that the facilitation of peer communication and network building was a key attribute of social media interventions for adolescents. None of the studies that used a discussion forum to effect change reported significant results [356].

Maher et al, (2014)[355] focussed on interventions aimed at modifying the specific health behaviours of tobacco and alcohol consumption, dietary intake, physical activity and sedentary behaviour and delivered via online social networking sites. The interventions included commercial online health sites, research health social network websites and multi-component interventions delivered via Facebook and Twitter. Small effects of health behaviour change were found within 9 of the 10 included studies however engagement levels were found to be very low[355].

Laranjo et al, (2015)[354] conducted a review of the effectiveness of interventions using social networking sites to change health behaviours. This review differed from Maher et al (2014) [355] in that it looked across all health domains included grey literature and only included prospective studies based on the rationale that this was the most effective way to capture health behaviours and their consequences. Of the 12 studies included, 5 involved adolescent participants, the other studies were unclear about age the other studies did not report details of participant characteristics. Facebook was the most common platform, on its own or combined with other components; Twitter was used in one study. The platforms were used to convey mainly education, social support, self-management and tailoring focused primarily on fitness related topics. They were often combined with other components such as a website. Health behaviour theory underpinned 5 of the interventions. The use of the data provided in the interventions was not well reported. A slight but statistically significant positive effect of social networking site interventions on behaviour change was found indicating promise and value in further research [354].

Hamm et al, (2014)[356] point to the importance of the maintenance of online activity to attract return visits and minimising potential barriers such as passwords. The authors highlight that social networking sites form only a small part of overall social media where through a range of routes including blogs, discussion boards and wikis that aggregate content and facts[356].

Infectious diseases

Bieri et al (2012)[358] reviewed 11 studies that explored the impact of videos in improving the knowledge, attitudes and behaviour of schoolchildren in regard to

infectious diseases. They concluded that while the majority of the studies concluded that there is promising evidence that videos can be effective in improving knowledge and understanding of infectious diseases and are well received by schools, children and teachers, there is still a need for more high-quality, standardised studies before evidence-based conclusions can be drawn[358].

Mind and body

Burkhardt and Brennan (2012)[359] found that evidence from 14 studies of recreational dance activity targeted at 5-21 year olds suggests that taking part in recreational dance may have a positive impact on physical health and psychosocial wellbeing. Ferreira-Vorkapic et al., (2015)[360] in their review of 9 RCTs of yoga teaching in schools, found that no consensus could be drawn from the evidence on the effect of yoga in a school setting on psychosocial and cognitive functions due to variations in method, outcome measures and type of intervention.

Community service

Van Goethem at el (2014)[361] undertook a meta-analysis of the role of reflection in the effects of community service (or unpaid volunteering) on adolescent volunteering. Forty-nine studies were included in the review. The meta-analysis found that community service / volunteering had a positive impact on personal, social, civic and academic outcomes. They report that the inclusion of a process of reflection was essential to obtaining these outcomes as without reflection there was "negligible benefits" [361].

Portion, package and tableware size

Hollands et al (2015)[362] reviewed evidence on whether the amounts of food, alcohol or tobacco selected or consumed changed if larger or smaller sized portions or packages were presented. They found that when offered larger portions or packaging participants consistently drank more alcohol or ate more food. There was no influence of size on consumption of cigarettes. The authors found that reducing the size, availability and appeal of larger-sized portions, packages and tableware has potential to reduce the amount of food selected and consumed[362].

Policy interventions via sporting organisations

Priest et al (2008)[363] conducted a review of controlled studies that assessed the effectiveness of policy interventions implemented through sporting organisations in promoting health behaviour change. This review was an update of a review originally conducted in 2004. As with the previous review, the authors found no controlled studies meeting their selection criteria, and made a recommendation that rigorous evaluation techniques should be implemented in this field [363].

Oral health

Alves-Antunes et al (2013) carried out a systematic review of studies that looked at the changes of quality of life for those under the age of 14 following oral health interventions[365]. Nine articles were selected for analysis which used a variety of different methods for recording quality of life. From these articles they concluded that the even though there was a moderate level of evidence that changes in the quality of life of those under the age of 14 could be detected after oral health interventions, these findings should be treated with caution due to the variety of methodologies used and lack of methodological information shared[365].

Marinho et al (2015) found that the use of fluoride gel results in the reduction of tooth decay in both children and adolescents[364]. Further research is required on whether swallowing fluoride gel has any harmful effects on children and adolescents as little information exists in current studies.

Built environment

Audrey and Batista-Ferrer (2015)[366] reviewed 33 studies of interventions which incorporated changes to the urban environment and used measures of health outcomes for young people. Conclusions regarding the effectiveness of these interventions could not be drawn given the weakness of evidence, issues with methodology and use of varied or subjective outcome measures.

What are the key gaps in evidence in this area?

- Further research is needed to assess the socio-economic gradients impact of school-based health behaviour interventions.
- More experimental research is needed to determine the effectiveness of digital interventions in improving health and wellbeing amongst adolescents. Although promising, there is not yet sufficient evidence on whether digital health interventions delivered via social networking sites are effective in improving health outcomes for adolescents. Inequalities were not considered in any of the reviews on digital interventions. Further research should include the evaluation of interventions delivered via existing popular social networking sites, and single component evaluations and factorial design interventions to provide insight into which components work for whom and why. Data on engagement metrics and mechanisms is required; this is often not reported in research and limits insight into how to achieve optimal engagement levels.
- Long-term evaluation is required to enable behaviour change impacts to be assessed fully[354,355]. As with other health areas, where multi-component interventions [178] are commonly used, it is difficult to determine the isolated impact of single components (such as the platforms like social networking sites

or intervention components such as education or tailoring); this was identified in all three social networking site reviews as a limitation.

- There is limited and mixed evidence of the impact of school environment on health behaviours of adolescents[313-315,351]. In particular research is required that explores broader health behaviours than the current focus on substance use, the effectiveness of increasing school attainment and attendance with health outcomes and how this might differ by factors such as school types, different school years, teacher-student ratios for example [178].
- Further research is also required to assess the effectiveness of Health Promoting Schools on attainment [352].

AYASG and EAG: consultation findings

At the outset of this study the first meeting of the Adolescent and Young Adult Stakeholder Group (AYASG) was held with the aim of involving young people to identify and prioritise the factors that were most important to them in supporting the transition to happy and healthy adulthood.

The factors to which the young people assigned greatest importance for ensuring a successful transition to happy and health adulthood were:

- Adolescents are comfortable in who they are and what they look like
- Adolescents had supportive friend(s) / network
- Services were available to offer support to them over the age of 16
- Adolescents have access to helpful and supportive teacher or tutor in school / college who understands you and notices your needs

Additional factors to which they assigned importance included:

- Knowing how to get help if they have a problem
- Feeling in control
- Being able to overcome difficulties (e.g. resilience)
- Having a positive mental attitude
- Having a life plan or goals
- Part time job / working
- Confidence
- Living in nice place
- Financial support for education
- Success in exams or success by another route
- Balanced diet

Factors that were not prioritised but were considered to be important included having supportive parents (whether together or divorced), being able to get out of the house and socialise, financial control and stability and having a pet. This information was used to support the review team in the design of the search protocol and consequent identification of gaps.

Towards the end of the study, the emerging results of the overview were presented to the EAG and AYASG. They were then invited to discuss what was most helpful, where the key gaps were, what further knowledge is needed and what should be done in response to the overview. The findings of the consultation are summarised below.

What is most helpful about the overview?

Participants reported that the topic focus across the overview was strong. Key themes emerged in terms of new learning including what is meant by universalism, what works, the importance of school as a setting for the delivery of interventions and that mental health is a central issue upon which other topic areas can impact. Participants highlighted that many of the interventions in the overview did not occur in Scottish schools. The involvement of young people in this overview was identified as a positive attribute of the process. Some of these themes are explored in more detail below.

Is universalism for everyone?

Participants felt that happiness, health and wellbeing can be different for everyone and priorities differ with age, socio-economic circumstances and time. They expressed concern that universal interventions might not adequately take participants' backgrounds, experiences and personalities into account. They also expressed concerns that some universal interventions had the potential to cause harm, for example calorie labelling which may be harmful for those who experience eating disorders.

To have impact more than information is needed

During their discussions, the young people suggested that the vast quantity of information available on this topic was not sufficient in itself to promote behaviour change and should be complemented by skills training.

School is key

The importance of school as a setting to deliver effective interventions aimed at improving health, happiness and wellbeing was noted. However it was also noted that the school-based focus was limited and could not adequately address issues such as 'cyber' bullying. The young participants agreed that the kinds of interventions reported in the overview were not common in Scottish schools, particularly interventions around mental health, sexual and reproductive health, and alcohol and drugs prevention.

A chance to debate the evidence and influence change

The young people on the group reported that the opportunity to discuss how this evidence related to them and could be used to inform policy and practice was in itself a helpful step.

What are the most important gaps in the evidence?

The participants found many gaps in the evidence, although it was noted that this may have been due to the high-level review quality of the evidence. In particular

they stressed the following key gaps: inequalities, peer involvement, positive mental health, a focus on transition and its determinants, social media, suicide, LGBT issues and detailed evidence explaining why interventions may or may not be successful.

Inequalities

The participants were struck by how little is known about health inequalities and how to prevent them and felt that there was not enough detail for specific communities. This was highlighted as surprising given the common understanding that such knowledge would impact on the efficacy of interventions. They felt that this made the body of evidence less robust and less useful.

Peer involvement and leadership in interventions

In the opinion of participants, peer education, involvement and leadership was not focussed on enough and there was a comparative lack of evidence on community–based youth work or young people led programs and their impact.

Addressing mental health more broadly

An important gap for participants was positive mental health and wellbeing.

The participants felt that a greater focus was needed on mental health more broadly besides anxiety and depression. It was also noted that prevention may not always be right for mental health – for some the reality is more about good self-management.

Focus on transition and wider health determinants

Participants felt that transition itself was not addressed well enough yet by research. They also felt that sufficient attention had not been given to other determinants of happiness, health and wellbeing which are crucial to transition such as employment, housing. There was a strong feeling that the research, which is heavily focussed on results of RCTs, does not capture how young people live their lives. They also noted that developmental and emotional ages should be considered as opposed to chronological ages which may better capture the fluidity of adolescence and transition to adult-hood. There was a feeling that the focus on age groups was influenced by service transitions and that moving to adulthood might be better understood as a pathway to change that is actually lived day to day.

Social media based interventions

Participants felt that the evidence in the overview was behind the times because of the lack of focus on social media as a vehicle for interventions and lack of recognition that the popularity of social media platforms is subject to rapid change.

They felt that using social media could help with engagement and transfer of knowledge and skills:

"That's where it's at!" (AYASG participant)

LGBT

There was a strong theme across the participants' discussions that interventions for adolescents were not progressive enough and that Lesbian, Gay, Bisexual, Transgender and Queer/Questioning were not addressed well enough in sexual health interventions or the evidence.

Details on why interventions work – how to make them engaging

Finally participants found the lack of evidence on what makes interventions work frustrating. There was an awareness that everyone is different and not everything that works will work for everyone but felt that this was more reason to identify aspects of interventions that make them appealing and effective for adolescents and why they don't work for some e.g. males in some sexual health interventions. For example they felt that who delivers it interventions and the extent to which they are informed and engaging was not captured well enough.

What further knowledge is needed?

Based on the gaps identified the participants felt more knowledge is required on inequalities, how current practice contributes to and utilises evidence.

Inequalities

The participants identified a gap in the evidence on how a personalised approach, which much evidence reports is more effective, can be applied to a universal approach. They felt that this would vary across Scotland and each person, and that where there are large student populations this may affect the type and extent of problem and priorities.

Learning from current practice

The focus on RCTs and high level research in this overview inevitably meant that some evidence is missing. Some felt that there needed to be an awareness that information and evaluation evidence from practice does exist and needs to be promoted more. They highlighted the need to explore other types of evidence, research and practice and how these would help to answer the overview question.

What needs to be done now?

The participants made many insightful contributions when thinking about what needs to be done now. Their priorities were to ensure there is collaborative translation of the evidence into action and that more holistic interventions are developed with a direct focus on transition. They called for interventions to be school-based, peer-involving, family involving, social media-based, more inclusive and focussed on relationships. Finally they called for the need to map current practice in Scotland and the associated evidence of what is working. Some of these are explored further below.

Transfer of evidence to action

The participants felt that there was enough evidence to compel and enable many interventions to be developed based on what works. Some felt that teachers were out of touch with issues important to young people and how to deal with the various health topics covered. In particular they felt that young people should be empowered to be involved in the process of disseminating the results and seeking joint action from a range of groups including schools, local children's service planners, councillors, Health Scotland, schools, education departments, parents, police, GP's, teachers, media, specialist providers, young people's charities and mental health policy makers. Specific projects were also mentioned such as B-EAT. Participants felt that it would be useful to track how the overview was being used to inform change.

There was a perception that the American programmes in the overview was inspiring but may not be directly transferrable to Scotland and that the launch of programmes from other countries should consider the Scottish context and what needs to be adapted to maximise transferability.

More holistic, preventative, positive and inclusive interventions

The participants felt that the evidence suggested the need for broader, cross-topic themed interventions that could be adapted for age / role / audience and monitored for longer-term impact. They also called for interventions that promote wellbeing; simple things like doing something you enjoy, for example walking or pampering. Interventions that encourage early help-seeking and intervention were called for as well as those that are more inclusive.

School-based interventions

Participants wanted to build on schools-based programmes that are shown to work such as Health Promoting Schools and explore the possibility of extending these to other settings. Participants felt that more could be made of personal, social and health education which in their opinion is not currently comprehensive enough. Some participants felt that the importance given to literacy and numeracy over emotional, social personal wellbeing was an imbalance in terms of supporting their transition to adulthood.

'If young people couldn't read or write adults would be outraged' (AYASG participant)

The emotional and stress impact of exams was highlighted as a priority with many young people being overwhelmed by exams and experiencing anxiety. The fact that there is no universal approach to supporting students with this was highlighted; some schools offer stress management whereas in others they only provide leaflets.

Participants felt that anonymity, confidentiality, stigma and taboo were barriers to progressive interventions.

Focus on digital-based / social media interventions

Participants acknowledged that the way young people communicate is evolving and that this needs to be accepted and adapted to in intervention planning. They called for a focus on digital and social media interventions as they know through feedback from young people that social and digital media has a daily impact on health, wellbeing, can give instant support but also carried risks; therefore such interventions need to be managed properly. Participants suggested that social media could be an excellent delivery mechanism for those no longer at school.

Family based interventions

There was a call from participants for more exploration and open discussion about family attitudes to sexual health, mental health, stigma and discrimination, mental ill health in the family, religion, diet and obesity.

Invest in peer-led innovation

More innovation in peer led peer support, involving peers in intervention development and how new technology can be used to support this was a key priority for participants. They felt that there is real positive potential here, especially for mental health that is not captured in the current evidence base. Participants also felt that there was a need to adapt methods of research to involve peers more too. They suggested the Scottish Youth Parliament and Young Edinburgh Action (young people do surveys/research and feedback to practice / policy makers and review progress) should be included in this.

More attention to providing supportive relationship's through transition

Participants highlighted the need to ask young people what they know works for them to enable other people help them and be there for them. The idea of enabling constant supportive relationships from adults and peers during transition was a key theme. One focus was the need for teachers to be trained to have more insight into what young people need and how to support them; however, the concern that teachers have to do everything also arose. Participants felt that the whole problem of the approachability of adults should be addressed as this is a barrier to help-seeking. Also participants called for more research into adults and adult professionals and their understanding of and attitudes to young people with the aim of improving two-way communication between the generations.

Gather grey evidence and map what's currently available

Finally, participants felt that grey evidence may be helpful in terms of 'local/Scottish' knowledge of what works and that it will be important to review the

resources already available, see what works, what's implemented, what is missing and what needs to be developed.

Discussion

Summary

The aim of this systematic overview was to identify what works in population interventions designed to improve health happiness and wellbeing or reduce inequalities for young people undergoing the transition to adulthood. This report provides a systematic and comprehensive narrative meta-synthesis of available evidence on this topic. To do this it has been necessary to set out the territory in terms of what interventions have been implemented and tested, what appears to work and what does not. The evidence, informed by the perspective of the adolescents and young adults consulted during the review process, provides a clear indication of gaps in the evidence and what might be done to address these.

In setting out the territory, the evidence base included is vast and highly heterogeneous. To make the evidence user-friendly for its intended wide ranging audience (including the study commissioners, policy makers, providers, academics, research funders and very importantly young people who want to be involved in the development of interventions that support wellbeing) the content and structure was designed to convey key messages from the research evidence in a way that was both accessible and scientifically robust.

In this systematic overview a number of key learning points have emerged. Here, the key findings from each health and wellbeing category areas are summarised. Then, more general learning points from across the whole overview are considered with a particular focus on inequalities and gaps in knowledge relating to the research question. Finally, conclusions are outlined in relation to implications for the Foundation, for policy and practice and for future research.

Key findings specific to wellbeing categories

Several interventions were identified that were intended to improve health, happiness and wellbeing across a diverse range of wellbeing areas relevant to adolescent transition to adulthood. The key findings from each wellbeing category are summarised below.

Mental health and wellbeing

Mental wellbeing and prevention programmes can have positive effects on young people and show potential for reducing wellbeing inequities amongst them. The majority of the evidence addresses prevention of clinical conditions such as depression and anxiety and much less is available for interventions promoting positive mental health and wellbeing. Depression and anxiety prevention programmes do reduce symptoms but are more effective when targeting indicated or selected populations. Online interventions and mindfulness-based interventions

showed promise but more rigorous, higher quality evaluations, conducted with more diverse samples of youth are still required. School-based interventions and intervention that increase contact between youth and trained professionals may reduce suicide attempts and suicidal ideation. Issues of gender and ethnicity need more attention when addressing problems such as self-harm and suicide.

Tobacco free living

The evidence suggests that a combination of school-based, community-based and home-based interventions that focus on social competence alongside targeted mass media campaigns and wider public policy interventions to increase tax/price and restrict access would be the most effective approach for achieving sustained reductions in smoking amongst young people. There is promising evidence of the impact of price/tax policies on reducing smoking inequalities amongst young people whilst other smoking prevention interventions can exacerbate and increase smoking inequalities. A strong theme emerging from the evidence is the importance of parent and family-based interventions. State level policies to increase cigarette taxation and pricing combined with mass media campaigns targeted towards lower socio-economic groups of young people could be an effective way to reduce smoking amongst young people as well as smoking inequalities.

Preventing drug abuse and excessive drinking

As with tobacco, the evidence suggests that a combination of structural interventions such as taxation, pricing and availability combined with social competence based interventions that include active parental involvement and a peer element would be most effective in preventing alcohol use. It is important to consider the cognitive needs and capacities of adolescents when designing interventions given that different intervention types have been found to be more or less effective at different ages. The impacts of mass media and advertising bans and the long-term effects of interventions to prevent alcohol and drug use are less clear. More research is required on the potential for computer and mobile phone-based intervention delivery, effective strategies for the prevention of illicit drug use, and whether and how family involvement in interventions can be inclusive of diverse family types.

Sexual and reproductive health

There is strong evidence that multi-component interventions (educational, skills building, motivational training and contraception promotion) aimed at improving sexual health and preventing pregnancy can be effective in school and community settings. Interactive computer-based interventions are moderately effective in increasing knowledge about sexual health, have a small effect on self-efficacy, safer-sex intentions and on sexual behaviour. Social marketing interventions can be effective across a range of outcome areas and effectiveness is higher for longer-

term programs. Brief counselling interventions, outreach contraceptive services, abstinence plus are also amongst interventions shown to be effective. Overall, there is little convincing evidence that interventions led by peers contribute to improved sexual health outcomes for adolescents. There is a general lack of implementation process and long-term impact data, limited use of sexual wellbeing as an outcome measure, and a lack of consideration across the reviews of the socio-economic status of participants in universal interventions. To increase engagement school-based interventions should be designed with young people, taking account of their self-reported needs, and delivered with enthusiasm, expertise within a supportive school culture. However there may be limited transferability of much of this evidence due to the focus on populations from the United States.

Violence and abuse free living

School-based educational interventions have a positive impact on knowledge and attitudes regarding bullying and abuse prevention. Interventions that are school-based but reach out to parents, peers and the school community appear to be more effective in creating the right environment for behaviour change. Reviews differed in the extent to which they provided good descriptions of the interventions but the content and pedagogy of interventions are likely to have an impact on outcomes. A common theme in papers was the gap between knowledge, attitude and behaviour and the need to address this in terms of building interpersonal and conflict resolution skills among young people. School-based interventions are able to have an influence on behaviours in schools (school-based bullying) but may not reach behaviour in broader social and virtual communities or reach older adolescents who are outside of formal education. Some studies may be limited in transferability because of the focus on populations in the USA and there is a need for UK and specifically Scottish studies in this area. Research has fallen behind social changes in internet usage and engagement in social media among adolescents, with limited research on interventions for cyberbullying.

Active living

Interventions to improve low physical activity (particularly in the school setting) can have positive effects on some outcomes. However, when physical activity interventions are measured objectively there may only be limited effect. There is evidence that active video games (AVGs) can improve light to moderate physical activity or energy expenditure, but there is less impact on more intense physical activity and the available evidence is of low quality. There is less evidence for sedentary behaviour interventions (compared to physical activity interventions) but the evidence suggests they can lead to small changes in sedentary behaviour (though this is based on limited evidence and mostly with children). The potentially negative effect of physical activity interventions has not been studied. There is a

striking lack of evidence on the impact of active living interventions on inequalities. There is less evidence on interventions with adolescents compared to children, and transition to adulthood is not considered specifically. Specific interventions require more research including environmental changes to schools, active travel and increasing sports participation. A range of practical and methodological issues need to be addressed including (but not limited to) the measurement of outcomes, study design and longer term follow up.

Healthy eating

For improving nutritional intake, there is evidence for policies and interventions to improve the food environment, and for direct economic incentives and for educational or combined (educational and environmental) interventions in school settings. For improving fruit and vegetable intake, there is evidence that school based policies can be effective in improving fruit and vegetable accessibility. There is evidence for multi-component educational and behavioural school-based interventions for children; there is currently less available evidence for adolescents. The available evidence does not yet support menu calorie labelling or indirect economic incentives to improve nutritional intake, and family based interventions do not appear to improve fruit and vegetable accessibility. There is very little evidence on the impact of healthy eating interventions on inequalities, much less evidence for adolescents compared to children, and no consideration of transition to adulthood specifically. Further research is warranted, especially in relation to environmental and combined (educational plus environmental) interventions to improve nutritional intake in adolescents, economic incentives specifically, and policies to increase fruit and vegetable accessibility. A range of methodological limitations in the evidence must be addressed, particularly the measurement of outcome.

Obesity

Lifestyle interventions appear to be effective for obesity prevention. However, the results seem clearer for stand-alone health behaviour interventions, including sedentary behaviour interventions or nutrition education, than combined interventions. The results do not appear to support the effectiveness of lifestyle interventions in adolescents and young adults. Indeed, the dearth of studies focusing on this age group may have contributed to this finding. The use of appropriate outcome measures requires attention as BMI alone may not give a full understanding of weight status in a healthy weight population. It is recommended that targeted health behaviours and key components should be explicitly stated and further investigation of individual components undertaken. Adolescents and young people should be a focus of future studies and reviews to understand more fully interventions which are effective for this age group. It was found that physical

activity interventions are not effective in obesity prevention. Furthermore, sedentary behaviour should be considered as a stand-alone effective intervention for obesity prevention. Lifestyle or health behaviour change is only one aspect of obesity prevention. Equal importance, in terms of intervention and outcome, should be given to other contextual or psychosocial factors.

General health

School-based universal interventions have potential to either improve or exacerbate inequalities amongst adolescents. Digital interventions show promise for improving health behaviours of adolescents but the evidence base is in its infancy. Supportive school environments can have a positive effect on young people's health and wellbeing and may contribute to reducing inequalities. Health Promoting Schools can improve health in a range of areas but more evidence is required to assess impact on some health areas and school attainment. Whole school interventions are evidenced to be effective in preventing bullying, smoking and teenage pregnancy. Recreational dance may have a positive impact on physical health and psychosocial wellbeing. Reducing the size, availability and appeal of larger-sized portions, packages and tableware has potential to reduce the amount of food selected and consumed. Community volunteering may be beneficial for young people in relation to personal, social and academic outcomes.

Common features of successful interventions

This overview highlights some common intervention features within and across different wellbeing areas that have been evidenced as contributing to effectiveness or that show promise. These may help to inform the underlying principles of the design and delivery components of future population interventions.

Appropriate, relevant and engaging

Given that universal interventions will not always work for everyone there is an imperative to identify aspects of interventions that make them relevant, accessible and appealing and effective for adolescents. Some reviewers identified key factors that may increase engagement in interventions, including:

- delivered by enthusiastic, informed and credible facilitators, and when in school settings classroom management skills are important;
- ensuring relevance to the self-defined cultural and contextual needs of the adolescents targeted - facilitators should have an awareness of perceptions of socio-cultural norms;
- involve personalised and interactive learning opportunities with feedback that identifies the strengths of participants and enables them to set goals;
- use of multi-media in internet-based programs;

- empower healthy choice making by encouraging participants to balance the positives and negatives of behavioural choices;
- including the target group in design, implementation and evaluation;
- in the school setting to be part of a whole-schools approach and a supportive school culture which fosters social norms for positive behaviour change.

Evidence on the effectiveness of digital interventions identifies sustained engagement as a key problem in interventions such as those based on social media and is highlighted as a key priority for future research. It is equally important to try to understand why some interventions are less engaging and/or impactful for particular groups such as males in some sexual health interventions or suicide prevention programs.

Intensity and duration of interventions

There was mixed evidence on the effects of intensity and duration of interventions but broadly interventions with longer duration and higher intensity were associated with more effect (for example, mass media and social marketing campaigns, depression prevention interventions, community interventions to reduce smoking, school-based interventions to reduce bullying and victimisation). In contrast, brief alcohol interventions and brief sexuality communication (lasting an hour or less) have been shown to be effective. However, duration was shown to have no influence on the effect of settings-based substance misuse interventions and the influence of duration and intensity on obesity prevention interventions is unclear, requiring further research.

Digital interventions

Social networking has become a global phenomenon; however, the evidence base on digital interventions is in its infancy. Emerging evidence suggests that digital interventions offer promise as a public health tool for young people that is low cost, has extensive reach potential and can capitalise on the potential behaviour change facilitation of homophily to maximise positive social support and influence. The massive growth in online learning and popularity of free Massive Online Open Access Courses (MOOCs) offers great promise for delivering interventions to adolescents online and out of school contexts, although the materials could also be used within schools.

Skills building and personal development

General skills building and adolescent development-based interventions have potential to produce positive impacts across a range of specific outcomes. A number of the included reviews point to the advantages of interventions that are social competence-based and include general life skills and personal development aspects combined with education and other topic outcome specific components.

Building personal capacity within adolescents that empowers them to make healthy choices can have an effect on their general approach to managing their wellbeing. In the school-setting generic outcome-based interventions appear to be as effective in preventing specific problem behaviours as those focusing on single outcome areas. Bullying prevention interventions were similarly holistic aiming to prevent bullying and victimisation and impacting knowledge, attitudes and behaviour.

Impacts at individual, community and societal levels

The evidence from the included reviews reveals an imbalance in the extent to which different determinants of health and wellbeing are addressed by universal population interventions. The evidence in this overview is largely focused on proximal causes of health and wellbeing and primarily based on interventions that aim to achieve change at the individual level. Evidence on distal causes and structural level interventions is much less available. Key social determinants of health and wellbeing relevant to young people growing up in Scotland today such as poverty, employment, training and education opportunities, housing availability and ethnicity were largely unaddressed. Some reviews do provide evidence on interventions that combine structural policy level interventions with settings-based interventions, such as in tobacco prevention. However, these are often evaluated in isolation from other individual level interventions or contexts, which may have a synergistic or adverse effect on the impact of a policy.

The evidence in this overview provides varying levels of insight into the impact at individual, community and societal levels. These are explored below through the key themes of inequalities, family and parental involvement, peer leadership and involvement, school and community settings.

Inequalities in health, happiness and wellbeing

Addressing inequalities in health and wellbeing outcomes for adolescents is a key policy and practice problem in Scotland where socio-economic disadvantage is strongly correlated with poorer health and poorer life opportunities. Social inequalities have been identified as a central area of enquiry for this overview. However, across all topic areas, the impact of interventions on inequalities was rarely analysed. Where inequalities were considered there was little consistency across systematic reviews or the primary studies they considered. Often examination of social inequalities in the effectiveness of interventions was limited to subgroup analysis by gender or socioeconomic status.

In mental health and wellbeing one systematic review[22] included a specific focus on inequalities finding a lack of attention to inequity but promising evidence that prevention programmes show potential for reduce wellbeing inequities amongst young people. In tobacco free living two systematic reviews [199, 209] specifically

considered inequalities. Price increases or taxation of cigarettes were found to have the most evidence in positively impacting on inequalities, however the evidence was limited. For healthy eating, one systematic review[273] highlighted sub-group analyses by socioeconomic status and similarly in obesity prevention, two reviews[301, 303] considered analyses by socioeconomic group, however there were conflicting findings. For sexual and reproductive health, active living and violence and abuse free living, the included systematic reviews did not focus on the impact of interventions on inequalities. Finally, for general health, one review [351] evaluated the impact of school-based health behaviour interventions on socioeconomic inequalities, and found that the majority of studies did not report on the impact on inequalities. Therefore, whilst there is very little evidence on equity impact, this overview provides a small amount of evidence that might appear to support the view[351,367]that universal structural change interventions (such as price increases) might have a positive impact on the social gradient of health.

Proportionate universalism defines goals for everyone, identifies obstacles faced by specific groups, tailors strategies to address the barriers in those situations and is recommended for achieving health equity [19,24]. This systematic overview has found that few of the studies considered here, across a very wide range of areas of health, made a case for the need to address inequalities through proportionate universalism or evaluated the impact of interventions on health inequity. This is perhaps not surprising given that universal interventions by nature are aimed at the whole population regardless of level of risk and as such tend to capture whole population data. Selective and indicated interventions are broadly considered to be most appropriate to tackle inequality despite evidence that targeted interventions can have little or no impact on the unequal health gradient relative to socioeconomic status[23]. There are assumptions within the literature, but these are not supported by the evidence, that universal interventions will have universal effects, that removal of structural barriers and improving access to healthy options would ensure access for those from disadvantaged backgrounds leading to behavioural change, or that universal interventions work best for those from poorer backgrounds, who essentially have more to gain.

As a key policy and practice problem, the evidence base provides us with insufficient insight into how population level interventions can be employed to effectively reduce health inequality. The lack of comprehensive evidence makes it more challenging to design and invest in universal interventions that we know will have the desired impact on health inequalities. There is a need to focus debate on this issue, to explore whether and how potential equity impact can be considered in the design, delivery and evaluation of universal interventions, including structural policy. Equally, more consensus is required on appropriate outcome measures and

analysis techniques that could be deployed to assess the effects of universal interventions on inequalities. This might include the way in which inequity is conceptualised more broadly. The focus of interventions and theory of health inequities is largely on material resources whereas inequity in social relationships, care and support is not well understood [22].

Parental / family involvement

The inclusion of parents and the family setting was a key theme across the overview, and having supportive parents was identified by the AYASG as a priority factor for their wellbeing during transition to adulthood. Parental behaviour is a key influence for some health behaviours in adolescence such as smoking. Parental involvement in interventions was often associated with effectiveness and was a component in many multi-component interventions. Parental involvement in interventions was found by reviewers to be an effective substance misuse prevention strategy and was a strong feature in school-based interventions to reduce bullying. Interventions within the family setting and those that promote positive parenting were associated with improved mental wellbeing. The evidence suggests that promoting active parental involvement, rather than only providing information to parents, is more effective. Furthermore, models such as authoritative parenting and those which enhance parenting skills and foster positive parent-adolescent relationships are associated with effectiveness. In the prevention of obesity, active living and healthy eating parental involvement can contribute to effectiveness, but there were mixed results. Family involvement combined with education interventions in schools has been found to have mixed effects on inequalities. Although there is substantial evidence of the positive effect of involving parents and family in universal interventions, there is little exploration of diverse family types or the quality of family relationships and how that might influence intervention effectiveness.

Peer-leadership and involvement

This overview provides mixed and complex evidence on the effectiveness of peer-led interventions. There is evidence that peer-led interventions make an effective contribution to interventions that prevent harmful behaviours in adolescence [368] including reducing tobacco, cannabis, alcohol consumption. However, there is also evidence that peer-led interventions are ineffective or have an iatrogenic effect when adolescents have a social network where the harmful behaviour is normalised (e.g. smoking or cannabis use). Peer education programs were also found to be ineffective for those in middle adolescence (when adolescents are most likely to model their values mainly on their peers) would support the embedding of social norms-based components within peer-led interventions to overcome the negative influence of perceived peer beliefs and behaviours. The evidence on digital interventions suggests that social reinforcement is important for the adoption of

new health behaviours but more evidence is required on how this might apply to more complex health behaviours (e.g. diet, smoking, exercising).

Harden et al (1999)[368] make a number of recommendations for the implementation of peer-led interventions for young people including:

- health needs of participants are assessed;
- boundaries of partnerships with young people are established;
- beneficiaries include the peer educators themselves;
- describe how peers are recruited;
- young people's views of the intervention be fully reported;
- young people should actively participate in meeting their own health needs and do not have uniform needs;
- peer-led health promotion is best delivered in the context of wider socio-cultural and economic strategies.

Schools

The AYASG highlighted the importance of school as a setting for the delivery of interventions but that many of the types of interventions described in the overview did not occur in Scottish schools.

Across most of the topic areas schools were a key context for delivering population interventions to improve the health and wellbeing for adolescents. This has understandable advantages in terms of having the potential to reach almost all children of school age and of diverse ethnic and socio-economic groups. For example, school-based interventions were the focus of interventions in the topic area 'violence and abuse free living' and revealed a range of beneficial effects. However, this access may decline as children enter adolescence, and a limitation of school-based interventions is that they may not reach those young people most at risk and who are exposed to health inequalities because of low attendance or early leaving.

Role of community in achieving behavioural change

Many of the population interventions identified aimed to achieve changes in adolescent health related lifestyle behaviours such as interventions aiming to create changes in alcohol and tobacco use, eating behaviour, physical activity, bullying and violence. In some cases, such as dating violence, abuse and cyber bullying and schools based alcohol and substance misuse, interventions were successful in creating attitude and knowledge changes but these were not always translated into behaviour change. This may be due to some extent to the short-term nature of the studies that did not allow the capture of behaviour change as much as the limitations of the intervention in effecting it. The review evidence points to the importance of attitudes in shaping behaviour, especially amongst peers. Peer-led

interventions can have an adverse effect on smoking behaviour when pro-smoking attitudes are present or friends who smoke, alternately peer-led interventions to promote sexual health are effective in improving attitudes. The review evidence suggests that behaviour change may be facilitated where community level changes have been fostered, such as whole school anti-bullying environments, where positive social norms are established and individual knowledge and attitude changes more readily lead to behaviour change. Therefore it is important that, in addition to aiming to achieve individual changes in attitudes and knowledge, interventions work to create community and societal level supportive cultures and social norms. This will support the achievement of individual behavioural change and help to develop the skills required to maintain those changes against negative social pressures.

Adolescents and transition

An important finding was that school-based substance misuse programmes can differ in their effectiveness at different developmental stages including childhood, early, middle or late adolescence. Social competence-based interventions were effective for all stages of adolescence, social norms-based intervention components are most effective for early-adolescents and refusal-skills training based on a social influences approach can be effective in preventing substance use only in late adolescence when adolescents are less susceptible to peer-pressure.

It was evident from the literature that there was a lack of specific focus on the transition from adolescence to adulthood. Although this overview used selection criteria focusing on the adolescent age group, in some topic areas, such as physical activity, healthy eating and sexual abuse prevention, there was more evidence available about children than adolescents. Although early childhood and the pre-adolescent context play roles in shaping adolescence and therefore may influence the transition to adulthood, it was not within the remit of this overview to consider such evidence. Furthermore, none of the interventions were explicitly aimed at supporting a process of transition from adolescence to adulthood. Therefore, it has been necessary to make the assumption that if an intervention has a positive effect on the health and wellbeing of an adolescent this will provide a foundation that will strengthen successful transition to adulthood. Another possible reason for the lack of focus on transition is that this overview included only population level interventions and much of the transition literature is focussed on key risk groups such as young people living in care.

Gender

While the interventions in this overview were universal, gender is still a relevant factor for a number of reasons. Firstly, there are gender variations in lifestyle factors and adolescent risks that are relevant for interventions. For example, most dating violence is perpetuated against females, there are gender patterns in psychological

difficulties experienced by adolescents and suicidal behaviour and gendered patterns of lifestyle. While some reviews considered gender this was not consistent.

Key gaps in the evidence

It is clear that in attempting to answer the overview question a large number of gaps in the evidence base have emerged. These have been described throughout the overview and have been identified both as generically across the full overview and specifically in relation to the nine health and wellbeing categories. Key gaps in relation to the research question are summarised below.

Inequalities

The evidence suggests that little attention is paid to the issue of inequity (including issues of material deprivation, gender, ethnicity and sexual identity for example) in the design, delivery and evaluation of universal interventions for the health and wellbeing of adolescents. Whether those most in need are being reached by universal interventions and what this means for the impact on different socio-economic groups is under-researched.

Resilience

For the adolescents and young adults we consulted with, being able to cope with and recover from the inevitable challenges and upsets of life was a central importance to successfully transitioning to adulthood. Population level universal interventions have their strength in targeting everyone, not just select groups. However, the systematic reviews did not consider how individual factors such as resilience interact with the intervention to lead to differential outcomes for adolescents.

Digital interventions

The potential for computer and mobile phone-based intervention delivery, which is low cost and has universal application, whilst being interactive and offering tailored feedback, is under-evidenced. It was highlighted by the AYASG that the evidence in the overview is to some extent behind the times because of the lack of focus on social media as a vehicle for interventions. To date, evaluation of these types of interventions has generally been of poor quality.

Understanding on why interventions work

Many reviews considered evidence from complex, multi-component interventions and many had a positive effect but in most cases the authors were unable to identify clear patterns in intervention components that contributed to success. Although, in general, multi-component interventions seemed to be more effective than single-component interventions, none of the reviews found data of sufficient detail to enable the un-packing of the effect, that is, an understanding of which of the

components contributed most to the effect. Therefore, it was not possible to identify whether it was the combination of intervention components in itself that made the difference (whether the components were inter-dependent) or whether one or more components were most effective. This was highlighted as a concern by the AYASG and EAG as a limiting factor in translating the evidence into action.

Long-term impact data

Much of the evidence in this overview is based on relatively short-term follow-up and indeed many interventions are of short duration with minimal tracking through adolescence and none over the life course. This limits the potential of research to capture the effect in terms of actual behavioural change. The lack of longer term outcome measurement may also provide a misleading picture of effectiveness in which positive impact is not sustained, or some interventions may serve only to delay the onset of unhealthy behaviours, or psychological difficulties.

Involving young people

The research in this overview, and our consultation, demonstrates that the perspectives and priorities of young people are not always taken into account. In the opinion of the AYASG participants, peer education, involvement and leadership was not focussed on enough and there was a lack of evidence on community–based youth work or young people led programs and their impact. Another key gap in the evidence base is community-based interventions targeted at adolescents and young adults who are no longer in school or in higher education.

Wider health determinants

A key gap in the evidence was research on important determinants of happiness, health and wellbeing which are crucial to transition, such as employment and housing; this is explored in more detail above.

Cost-effectiveness

Most of the included reviews were unable to report on cost-effectiveness as this evidence was not reported in studies. As noted above, a number of reviews identified that it was not possible to determine whether multiple component interventions were more effective as a whole or whether single components contributed more; this needs more attention as multiple component interventions are more costly to implement than single.

Wellbeing

There was a lack of attention to positive mental health and sexual wellbeing as outcomes. This may be due to a traditional focus on reducing risk and harmful behaviours, the lack of consensus on what constitutes wellbeing for different ages and groups and complexities regarding how to measure this effectively.

Mental health

Related to the above point, an important gap for AYASG participants was a focus on developing positive mental health and wellbeing and mental health self-management. The evidence from reviews also highlights a need for further research on mindfulness based interventions, the prevention of depression, anxiety, stress and eating disorders, youth suicide programs and the impact of physical activity programmes to reduce depressive symptoms and increase self-esteem in children and adolescents. More broadly, a better understanding of whether universal or targeted approaches work best to improve mental health and wellbeing is required.

The role of theory underpinning interventions

There is a growing evidence base that interventions underpinned by health behaviour change theories have stronger impact[369,370]. However, the evidence base does not provide the necessary insight of effectiveness to help those designing interventions to be clear about which behaviour change model to base interventions on, and which model best suits which area of health, happiness and wellbeing.

Psychosocial aspects of obesity

A key priority for healthy transition to adulthood for the AYASG participants was being comfortable with who they are and what they look like. Obesity prevention research has yet to address the more psychosocial aspects of obesity in terms of interventional components or outcomes.

Schools

There is a need for further research on modifying the school environment to promote physical activity and on interventions to promote active travel to school in adolescents. Modification of the food environment in schools and environmental interventions also require further research, particularly in relation to adolescents.

Other key gaps

Other important areas where further research is required include: gang involvement prevention, cyberbullying, illicit drug use, sedentary behaviour, sports participation, the impact of physical activity on mental health, and healthy eating and obesity prevention interventions on older adolescents.

Future Directions for Participatory Intervention Research

In addition to the gaps in evidence highlighted above, the young people involved in this overview highlighted the need to take an adolescent-focused approach to intervention, policy and research. They expressed a wish to be involved and have their voices heard. They highlighted a number of issues that need to be considered in future research in this area including: mental health, sexual health and relationships, drug and alcohol use, and bullying. The areas they highlight are congruent with the areas revealed in this overview.

Young people not only have ideas about what should be the main focus of interventions aimed at their age group, but also ideas about what approaches interventions should take. The discussion above highlights that research shows a potentially positive impact of peer-led activities and this corresponds with the views of the young people involved in our stakeholder group.

The AYASG also highlighted the importance of their digital worlds and the opportunities and challenges of social media and eLearning. In this regard there is disconnection between the young people's views and the evidence reviewed in this report. One of the key gaps in evidence in this overview is on digital interventions. Although promising, there is not yet sufficient evidence on whether digital health interventions delivered via social networking sites are effective in improving health outcomes for adolescents. The prevention of cyber-bulling was also identified as an important gap in understanding.

Alongside a paucity of high quality evidence, we lack a strong theoretical framework with which to understand and contextualise digital technology and its place in universal interventions for adolescents. In the short-term, to adequately inform on what works for adolescents in digital interventions, the development of digital interventions might need to be progressed without the traditional high quality evidence base. A participatory approach, working with young people to create adolescent-oriented interventions, which could be trialled prior to general release, could provide a potential next step in research.

A range of UK-based online learning resources have been created and could serve as models for intervention development, including:

- MindEd (https://www.minded.org.uk/) (covering a range of child mental health topics for people working with children)
- Mindroom (http://www.mindroom.org/) (an eLearning resource on learning disability for parents, teachers and young people)
- Massive open online courses (MOOCs) (https://www.mooc-list.com) including Introduction to Clinical Psychology of Children and Young People designed for lay adults, including parents.
- Ayemind (http://ayemind.com/toolkit/), (a collaborative project which has been developed as part of a programme to build NHS Greater Glasgow and Clyde's capacity to use digital tools to support young people's mental health). AyeMind has developed a range of prototype tools and constructed a toolkit to enable adult supporters of young people to better understand and engage with their digital lives and thereby promote healthy digital citizenship in relation to health.

In the longer-term initiatives such as National Institute for Health Research (NIHR) Mindtech (http://www.mindtech.org.uk/) and the new INTERREG North West Europe Project eMen (http://www.nweurope.eu/projects/project-search/e-mental-health-innovation-and-transnational-implementation-platform-north-west-europe-emen/) may offer potential for innovation in methodologies for evidencing impact of digital interventions. Thus, we have the electronic learning environments, platforms, tools and expertise to create online resources that can be made readily available to young people through computers and mobile devices.

Strengths and limitations

Strengths

A key strength of this overview is its comprehensive coverage of a wide range of areas relevant to adolescent health and wellbeing. Synthesising the evidence in this way provides a summary of up-to-date empirical evidence, cross-cutting traditional boundaries between topic areas. Furthermore, the overview has been conducted with careful attention to robust systematic review methodology, including quality assessments and reliability checks during search and data extraction procedures. The exclusion of evidence considered at high risk of bias means that this overview provides a review of only the most robust systematic reviews. Where possible, attempts have been made to highlight gaps in review level data and where there is established evidence which should prove valuable for future prioritising of more focussed systematic reviews in this field.

Limitations

In providing such breadth, the overview has been compromised in the extent to which it has been possible to cover each topic area in depth both in terms of intervention descriptions and detailed reporting of the strength of evidence. Furthermore, whilst the systematic reviews included are themselves of either low or unclear risk of bias, the evidence contained within these reviews was often of varying methodological quality. Many reviews highlighted significant methodological limitations of the evidence base for their particular topic area. Within the papers included in this overview there was a lack of consistency in the reporting of intervention outcomes and effect sizes with most reviews providing narrative synthesis. In addition, the decision to focus on a review of systematic reviews and not to proceed further through the stepwise process means that high quality primary research and grey literature is not represented.

Conclusions

This overview brings together a wide-range of current knowledge that contributes to current understanding of what works in population interventions designed to improve health happiness and wellbeing or reduce inequalities for young people undergoing the transition to adulthood. The incorporation of the views of adolescents and young adults living in Scotland has meant that the overview is cognisant of what matters for successful transition into adulthood from the perspective of some young people in Scotland today, as well as established evidence in relevant international literature.

The overview has a number of implications for the commissioning Foundation, policy and practice more generally, and for future research priorities. These are set out in this final section.

Implications for the Foundation

The findings of this overview are wide-ranging and offer the Foundation many potential routes to take their programme of work in relation to adolescent transition to adulthood. The implications for policy, practice and future research identified below should help to provide some direction.

A strong theme throughout the overview has been the need to empower young people to be involved in decisions affecting their wellbeing. The Foundation should consider this as a central guiding principle in their future work. It will be important to seek ways to involve young people in the process of disseminating the results of this overview and in discussions regarding priority setting for action. The Foundation should also consider facilitating joint action in response to the findings with young people and a range of professionals, organisations and groups including education departments, schools, local children's service planners, councillors, Health Scotland, parents, police, GP's, teachers, media, specialist providers, young people's charities and policy makers. One way to do this could be to hold innovation labs using the evidence reviews as a basis for generating ideas for new, evidence informed, innovative solutions appropriate for Scotland where possible led by and directly involving young people. Given that this overview did not include grey literature and there appeared to be less evidence from the Scottish context the Foundation may also wish to consider ways in which its future work can be informed by current practice in Scotland by for example, mapping current practice in Scotland and the associated evidence of what is working.

Implications for policy

The findings presented in this overview provide valuable evidence to support policy making across a range of areas relevant to the Scottish Government, including; mental health, wellbeing, food and violence prevention. With a new Programme for Government published in September 2016, this report has been produced at a time when there is real opportunity to inform current policy making across the next parliamentary term.

In some cases, the evidence appears to support current government strategy, such as investing in interventions to support the wellbeing of children and young people. Findings in this case should be used to help reinforce Scottish Government policy relating to GIRFEC and the Children and Young People (Scotland) Act 2014, and support its effective implementation and rollout. It is recommended that the findings are shared with the Children and Families Directorate.

In other cases, where national policy is not so well established, or is at a point of transition, there is clearly a role for sharing these findings to help inform and shape future policy directions. This would be particularly relevant with regards to the findings on healthy eating, where national bodies, such as the Food Commission are still developing their programme of work. It would also be the case for mental health evidence, where there is currently an opportunity to inform the next mental health strategy and its 10-year vision.

There are however, some obvious gaps in the evidence base, particularly relating to the social determinants of positive transitions to adulthood. The Scottish Government has, in this programme for government, introduced a Child Poverty Bill with the ambitious aim to eradicate child poverty in Scotland. It is disappointing therefore, that this overview has not found any strong review level evidence to indicate how best to support young people to overcome the detrimental effects of growing up in poverty as they transition into adult life. Indeed the area of financial security, arguably an important determinant of a successful transition into adulthood, is remarkably absent from the review evidence.

Implications for practice

Those involved in designing interventions should take note of the evidence on intervention components that are demonstrated to contribute to effectiveness as outlined in the main discussion. In addition, the evidence suggests a number of other priorities for future practice.

Addressing inequity

The evidence in this overview suggests that little attention is paid to the issue of inequity in the design, delivery and evaluation of universal interventions for the health and wellbeing of adolescents. Although many policies exist that recognise the

social determinants of the health and wellbeing of young people, they provide little direction on intervention design and implementation and no interventions specifically tackling the challenge of designing a universal approach that focusses on the social gradient were reported. Issues of gender, ethnicity and sexual identity need to be considered when designing universal interventions. In some areas, such as mental health and wellbeing, and sexual and reproductive health, interventions are required that have relevance specifically to the male population as existing interventions are less effective in this population.

Harnessing the digital revolution

Our consultation with young people highlighted the importance of social media communication in the lives of young people; they see the development of social media platforms for interventions that support them to live healthy and happy lives as crucial. It is vital to ensure that adolescents of different ages are fully engaged in the development of digital interventions alongside those interventions being informed by the best available evidence. The evidence suggests that digital interventions need to make more use of health behaviour change theories and models such as Diffusion of Innovations for peer-led interventions, where positive messages are diffused informally through social networks and RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance)[371] may have value here [354].

Involvement of adolescents

Understanding and responding to the challenges of the transition to adulthood in the design of interventions is of growing importance to ensure that interventions are appropriate, engaging and empowering for young people today and that they go some way to tackling health inequalities. In Scotland there are some efforts to involve young people in determining what services and interventions need to look like to meet their needs, such as the Scottish Youth Parliament. This type of representation should be expanded locally and across key population groups of young adults. Investment in peer-led innovation should be a key priority in the development of new interventions.

Focus on transition

The development of more holistic interventions with a direct focus on the needs of adolescents at times of transition is required.

Focus on schools

The AYASG felt the evidence suggested a need build on schools-based programmes such as Health Promoting Schools that are shown to work. Participants felt that more could be made of personal, social and health education which in their opinion is not currently comprehensive enough or delivered in an engaging way. The emotional and stressful impact of exams should also be a priority for universal

intervention development in Scotland. The need for teachers to be trained to have more insight into what young people need and how best to support them, should also be considered.

Focus on whole person and wellbeing

The evidence suggests the need for broader, cross-topic themed interventions that focus on skills building and personal development to empower and enable young people to make their own healthy life choices. There is also a need for interventions that promote wellbeing rather than risk mitigation.

Implications for future research

In the discussion section, a large number of gaps in the evidence base are highlighted; this should be useful in informing future research priorities. Key research priorities that arise from the overview are summarised below.

Inequality

This overview would support the newly established mandate by the National Institute for Health Research (NIHR) which calls for research and evaluation to include analysis of social gradient and inequality impact within evaluations of universal interventions. High-level guidance on how best to undertake such analysis is required. Smoking inequity is a fundamental policy problem in Scotland and therefore the impact of interventions on smoking inequalities should be a future research priority.

Focus on understanding why interventions work or not

To support the replication of interventions and development of more effective interventions, the collection of process evaluation data is required alongside impact data to gain more insight into why some interventions work and others do not. Investment in the production of high quality real-time process evaluations that can be reported in a way that is helpful to policy makers and those commissioning and designing interventions may also help. This may be particularly relevant for digital interventions. It will be important to gain useful insights into implementation issues such as fidelity, reach and setting and particularly the views and perceptions of the adolescents in receipt of the intervention.

Digital innovations

More experimental research is needed to determine the effectiveness of digital interventions delivered via existing social networking sites in improving health and wellbeing amongst adolescents with a focus on how to achieve optimal engagement levels. With positive social relationships central to the wellbeing of adolescents, understanding the impact of supporting positive digital citizenship, and mediators for positive social connections should be a priority.

Responding to changing influences on health and wellbeing

As essentially a review of reviews, inevitably the evidence presented here is to some extent out of step with new and constantly changing influences on health, happiness and wellbeing such as e-cigarettes, social media, or food insecurity. It is too soon to have review level evidence on these topics but as issues affecting young people today they should be addressed by future research.

Social relationships and family involvement

Given the promising evidence on the contribution of parental involvement to the effectiveness of interventions, more research is required on this as an intervention component specifically, and in combination as part of multi-component interventions, including how this can be inclusive of diverse family types. Research professionals' and other adults' understandings of, and attitudes to young people, is required with the aim of improving two-way communication between the generations.

School environment

There is limited and mixed evidence of the impact of school environment on health behaviours of adolescents and this requires further attention across the broad spectrum of health and wellbeing areas.

Psychosocial aspects of obesity

Further research on how body image, self-esteem, self-efficacy, motivation, family influences and environmental factors can inform effective interventions to prevent obesity is required.

Focus on transition

Research that focuses on key adolescent transition points and resilience is needed.

Focus on structural factors

Finally, there is a need shift the emphasis of enquiry from individual behaviour factors to structural factors such as employment and poverty, and consider the complex interactions between health determinants at different levels.

Appendix 1: Advisors to the overview

The young people who contributed to the Adolescent and Young Adult Stakeholder Group were:

Sophie Bailey, Katherine Bayne, Alexander Brown, Emma Hewitt, Zoe Mason, Fiona Mcmillan, Alice Murphy, Rosie Pollock, Gaelle Speight, Caitlin-Jay Wyllie-Quinn, Ballari Mukhopadhyay, Emma Lindsay, Sophie McCorry, Alex Robertson, Mahnoor Shah, Robbie Nicoll, Lara Grady, Lynn Fox, Zoe Mason, Katherine Bayne, Laura Thompson.

The Expert Advisory Group included:

Prof Kate Pickett (University of York), Prof Matthias Schwannauer (University of Edinburgh), Katherine Hetherington, Organisational Lead Community Child Health (NHS Health Scotland), Jacki Brock, Chief Executive Officer (Children in Scotland), Dr Daniela Sime, (University of Strathclyde), John Watson, (Ash Scotland), Rachel King, (NHS Lothian), Laura Sharpe (See Me Scotland).

Appendix 2: Example search string used in Medline (Ovid)

The project team agreed at a meeting on the 21 January 2016 to adopt a broad approach to this initial database searching, given the nature and complexity of the overview, and the wide variation in the age range, which meant that it was likely that the references would be indexed differently across the databases. An example search string is shown below. This was adapted for different databases as required and supplemented by multiple free text searches.

1. meta-analysis.pt.
2. meta-analysis/ or systematic review/ or meta-analysis as topic/ or "meta analysis (topic)"/ or "systematic review (topic)"/ or exp technology assessment, biomedical/
3. ((systematic$ adj3 (review$ or overview$)) or (methodologic$ adj3 (review$ or overview$))).ti,ab.
4. ((quantitative adj3 (review$ or overview$ or synthes$)) or (research adj3 (integrati$ or overview$))).ti,ab.
5. ((integrative adj3 (review$ or overview$)) or (collaborative adj3 (review$ or overview$)) or (pool$ adj3 analy$)).ti,ab.
6. (data synthes$ or data extraction$ or data abstraction$).ti,ab.
7. (handsearch$ or hand search$).ti,ab.
8. (mantel haenszel or peto or der simonian or dersimonian or fixed effect$ or latin square$).ti,ab.
9. (met analy$ or metanaly$ or technology assessment$ or HTA or HTAs or technology overview$ or technology appraisal$).ti,ab.
10. (meta regression$ or metaregression$).ti,ab.
11. (meta-analy$ or metaanaly$ or systematic review$ or biomedical technology assessment$ or bio-medical technology assessment$).mp,hw.
12. (medline or cochrane or pubmed or medlars or embase or cinahl).ti,ab,hw.
13. (cochrane or (health adj2 technology assessment) or evidence report).jw.
14. (meta-analysis or systematic review).mp.
15. (comparative adj3 (efficacy or effectiveness)).ti,ab.
16. (outcomes research or relative effectiveness).ti,ab.
17. ((indirect or indirect treatment or mixed-treatment) adj comparison$).ti,ab.
18. (meta-ethnograph$ or metaethnograph$ or meta ethnograph or meta-study or metastudy or meta study).ti,ab.
19. ((qualitative adj3 (review$ or overview$ or synthes$)) or (research adj3 (integrati$ or overview$))).ti,ab.
20. (evidence or realist adj3 (review$ or overview$ or synthes$))
21. or/1-20
22. exp adult children/
23. exp child/
24. exp adolescence/
25. (child or children$ or childhood or juvenile$ or boy$ or girl$ or adolescen$ or kid$ or teen$, pube$ or young person or young adult$ or young people or young female$ or young male$ or young women, or young men or youngster$ or youth$ or pupil$ or student$ or school$).tw.

26. or/22-25
27. exp child, preschool/
28. exp infant/
29. (pediatric or paediatric or infant or infants or neonat$ or toddler$).ti.
30. exp aged/
31. (aged or senior$ or elder$ or older adult$).tw.
32. or/27-31
33. 26 not 32
34. 21 and 33

Appendix 3: Data extraction fields

The data extraction database consisted of the following fields:

- Review question
- Types of studies included
- Search dates, whether grey literature had been included in the search strategy and/ or experts consulted
- Participants included including sex, age and other relevant demographic information
- Interventions investigated; including whether interventions were universal or targeted.
- Details of the control groups / comparator
- Outcomes assessed. Details of any quantitative health and wellbeing outcomes were documented
- Number of studies and participants included in the review
- Geographical regions
- Settings
- Summary of findings
- Whether views of participants had been included (e.g. whether self-reported outcomes or qualitative outcomes were reported
- Implications for practice
- Research implications
- Policy implications
- Applicability to UK/ Scotland
- Whether there was a focus on transition or inequalities
- Any details about economic impact
- Funders details

Appendix 4: Evidence tables

Abbreviations used throughout the evidence tables: AVG: active video games**; BAI:** brief alcohol interventions; **BMI:** body mass index **CBT:** cognitive behavioral therapy; **CBA:** controlled before and after trials; **CCT:** clinical controlled trials; **cRCTs:** cluster randomised controlled trials; **DD:** depressive disorder; **ED:** eating disorder; **EconE:** Economic Evaluations; **EE:** energy expenditure; **ETS:** environmental tobacco smoke; F: female; **FMS:** fundamental movement skill; FV: fruit and vegetable; HIV: human immunodeficiency virus; ; ICBI: Interactive Computer-Based Interventions; **ICT:** Information and Communication Technology; **ITS:** Interrupted Time Series Studies; **M:** male **MA:** meta-analysis; **MBI:** mindfulness-based interventions; **MSM:** men who have sex with men; **MVPA:** moderate-to-vigorous physical activity **N:** no; **NR:** not reported; **PA**: physical activity; **PE:** physical education; **QoL:** quality of life; **RCT:** randomised controlled trials; **SB:** sedentary behaviour; **SD:** standard deviation; **SFC:** smoke free class competition; **SHS:** second-hand smoke; **SR:** systematic review; **STI:** sexually transmitted infection(s); **TAU:** treatment as usual **Y:** yes; **YEP:** youth empowerment programmes; **WHO:** World Health Organisation

Table 1. Mental Health and Wellbeing

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
EATING DISORDERS									
Newton and Ciliska (2006)[191]	To compare the results of studies of internet-based ED prevention programs.	Included studies: Experimental or quasi-experimental design (e.g., prospective design with control group) Searches: 1985 – 2004 Grey literature: Y Experts consulted: N Performed MA	USA	Any population from either gender and any age group Mean age range: 15-20 years Gender: female only studies identified (although the review selection criteria included both sexes)	Internet-based Prevention programmes "Could be a guided or non-guided program, synchronous or asynchronous (or both), and conducted in an individual or group format, including e-mail/listserv interventions". Targeted interventions only Comparator: Wait-list control Intervention delivered in school and university settings	ED attitudes and behaviours, or body satisfaction (primarily shape and weight concerns) Participant views included? Y (self-reported outcomes)	5 (n=356 participants)	"A meta-analysis of the study results indicated no statistical significance for pooled study outcome data.... No robust evidence exists on the impact of Internet-based prevention strategies on ED symptomatology and on putative factors that contribute to ED development" (Applicability: D)	UNCLEAR
INTERNALISING AND/OR EXTERNALISING DISORDERS									
Christensen et al. (2010)[180]	To identify and review the efficacy or effectiveness of community-based prevention programs for young adults and	Included studies: RCTs, CCTs Searches: from inception - 2008 Grey literature: N	USA; South Korea; Iran; Canada; Australia	Youth (11–25 years) Approximate Mean Age Range: 14.8-24.2 years (not all mean	Community-Based Prevention Programmes "Interventions were categorized as primarily based on CBT, exercise, stress management, or other.".	Anxiety or depression outcomes: Reduction in incident cases of the disorder; Symptom levels	44 Participants No.: NR	"Anxiety and depression symptoms were reduced in ~60% of the programs. CBT programs were more common than other interventions and were consistently found to lower	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	adolescents, which are not delivered in standard school environments	Experts consulted: N Narrative synthesis		ages reported) Gender: mixed (NB: 2 female only studies; 1 male only study; 1 NR)	Universal and targeted interventions Comparator: Control group drawn from a population equivalent to the intervention group Intervention delivered in multiple settings	Participant views included? Y (self-reported outcomes)		symptoms or prevent depression or anxiety. Automated or computerized interventions showed promise, with 60% of anxiety programs and 83% of depression programs yielding successful outcomes on at least one measure". (Applicability: D)	
Teubert and Pinquart (2011)[195]	Investigates studies targeting the prevention of symptoms of anxiety in children and adolescents as a primary or a secondary goal	Included studies: Prospective design; RCTs Searches: NR Grey literature: Y Experts consulted: N Performed MA	Spain; Norway; Australia; USA; Canada; Turkey; Scotland; Italy; UK; Netherlands	Children or adolescents (mean age range: 3-18 years) Age range: 3.9 – 17.05 years Gender: mixed	Anxiety prevention programmes Universal and targeted interventions Comparator: Waitlist control groups or active control groups such as attention control and/or placebo interventions Intervention setting: NR	Anxious symptoms and/or diagnostic criteria of an anxiety disorder Participant views included? Y (self-reported outcomes)	65 (n=15713 participants)	"This meta-analysis reveals that anxiety prevention programs for children and adolescents result in significant and desirable mean effects for anxiety (in term of anxiety diagnosis as well as anxious symptoms) at post-test and follow-up (on average 8.2 months after the end of the prevention program)". (Applicability: C)	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Brown et al. (2013)[179]	The aim of this article is to assess the impact of PA interventions on depression in children and adolescents using meta-analysis.	Included studies: Primary studies; review papers Searches: inception - 2011 Grey literature: N Experts consulted: N Performed MA	USA; UK; Chile	Children and/or adolescents aged 5–19 years Age Range: 8-19 years Gender: mixed (NB: 2 male only studies)	Interventions to promote or increase Physical Activity (PA)/ Physical Activity Interventions Universal and targeted interventions Comparator: A non-physical control or comparison group Intervention delivered in multiple settings	Any quantitative measure of depression Participant views included? Y (self-reported outcomes)	9 (n=581 participants)	"Small but significant treatment effect suggests that PA may play a role in the prevention and treatment of depression in young people". (Applicability: C)	UNCLEAR
Merry et al. (2011)[188]	To determine whether psychological or educational interventions, or both, are effective in preventing the onset of DD in children and adolescents	Included studies: RCT Searches: inception – 2010 Grey literature: Y Experts consulted: N Performed MA	USA; Canada; Australia; Europe; UK; Bosnia; China; South Korea; Taiwan; Indonesia; Mauritius; Puerto Rico; Sri Lanka; Uganda; New Zealand	Children and adolescents (5 to 19 years) who did not currently meet the criteria for a clinical diagnosis of depressive illness, although they may have had sub-clinical symptoms of depression.	Depression Prevention: Psychological or Educational Interventions "Defined psychological interventions broadly as those that target psychological processes thought to be involved in the development of depression and educational interventions are those that provide education about depression, its causes and what could be done about it in a broad sense, for example lifestyle interventions such as advice to take Omega-3 oil".	Prevalence of DD; depressive symptoms Participant views included? Y (self-reported outcomes)	68 Sample size range: 21 – 6634 participants	"Some evidence.... that targeted and universal depression prevention programmes may prevent the onset of DD compared with no intervention. However, allocation concealment is unclear in most studies, and there is heterogeneity in the findings. The persistence of findings suggests that this is real and not a placebo effect." (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
				Age range: 4.7-19 years Gender: mixed	Universal and targeted interventions Comparator: Placebo, any comparison intervention, or no intervention Intervention delivered in primary and secondary school settings				
Smedler et al. (2015)[193]	To systematically review mental health prevention programmes with > 6 month follow-up period	Included studies: Controlled studies Searches: NR – 2013 Grey literature: N Experts consulted: N Performed MA	USA; Canada; Australia; England; Germany; Switzerland; Netherlands	Children aged 2–19 years, i.e. from the early preschool years through adolescence Approximate Age Range: 2-18 years Gender: mixed (NB: 5 male only studies)	Programs aiming at preventing externalizing mental ill-health Universal and targeted interventions Comparator: Care as usual or alternative preventive interventions Intervention delivered in multiple settings	Mental health (no less than 6 months post intervention) Participant views included? Y (self-reported outcomes)	38 Sample Sizes ranged from 100 to 998 participants	"Only five programs were supported by scientific evidence, representing selective parent training (Incredible Years and Triple-P), indicated family support (Family Check-Up), and school-based programs (Good Behaviour Game, universally delivered, and Coping Power, as an indicated intervention). With few exceptions, effects after 6–12 months were small. Long-term trials showed small and inconsistent effects". (Applicability: C)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Stice et al. (2009)[194]	To systematically review the effects of depression prevention programs for youth	Included studies: RCTs, quasi-experimental design Searches: 1980 – 2008 Grey literature: Y Experts consulted: Y Performed MA	NR	Children and adolescents (mean age up to 22 years) Mean age range: 10 – 19 years Gender: mixed (NB: 7 female only studies)	Depression prevention programmes Universal and targeted interventions Comparator: Attention control condition, an assessment-only control condition, or a waitlist control condition Intervention delivered in school and university settings	Depressive symptoms or assessed criteria for major depression Participant views included? Y (self-reported outcomes)	46 (Participant no. NR)	"The average effect for depressive symptoms from pre-to-post (r = .15) and pre-to-follow-up (r = .11) were small, but 13 (41%) prevention programs produced significant reductions in depressive symptoms and 4 (13%) produced significant reductions in risk for future depressive disorder onset relative to control groups". (Applicability: NR)	UNCLEAR
Montgomery and Maunders (2015)[189]	This systematic review assesses the efficacy and effectiveness of creative bibliotherapy for the prevention and treatment of internalizing and externalizing behaviours,	Included studies: RCTs and cRCTs with a controlled concurrently enrolled comparison condition Searches: NR Grey literature: N	USA; England; Israel; Italy	Children aged 5 to 16 years old were included, with the maximum age cut-off at 18 years. Participants were either healthy or had a diagnosis for	Creative Bibliotherapy "Creative bibliotherapy uses fiction, poetry, and film as prevention or treatment for emotional and behavioural maladjustment..". Universal and targeted interventions	"1) Internalizing behaviours: measured subjectively (self-report, clinician-rated) and objectively (heart-rate, skin conductance). 2) Externalizing behaviours: measured subjectively (self-report, a clinical	8 (n= 767 participants)	"Overall results suggest that creative bibliotherapy has small to moderate effect for internalizing behaviour (δ range: 0.48–1.28), externalizing behaviour (δ range: 0.53–1.09), and prosocial behaviour (δ range: 0–1.2)."	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	and the strengthening of prosocial behaviours in children (aged 5–16).	Experts consulted: N Narrative synthesis		low-level internalizing (e.g., anxiety, depression) or externalizing (e.g., ODD or CD) disorders. Age Range: 5-15 years Gender: mixed (NB: 1 male only study; 1 NR)	Comparator: No Treatment; Other Treatments; School As Usual; Wait-List Control Intervention delivered in multiple settings	diagnosis of ODD, CD and ADHD) or objectively (neurotransmitter, physiological measurements). 3) Prosocial behaviours: measured globally (subjective reports) or situationally (manipulated activities)" Participant views included? Y (self-reported outcomes)		(Applicability: C)	
Oliver et al. (2011)[192]	To examine the effects of teacher's universal classroom management practices to reduce disruptive, aggressive, or inappropriate behaviours of children in kindergarten through 12th grade	Included studies: Experimental or quasi-experimental designs with control groups Searches: 1950 – 2009 Grey literature: Y	USA; Netherlands	School-aged subjects, K-12 or the equivalent formal schooling in countries with different grade structures than the U.S., in either general education or special	Classroom management "Defined as a collection of non-instructional classroom procedures implemented by teachers in classroom settings with all students for the purposes of teaching prosocial behaviour and preventing and reducing inappropriate behaviour". Universal interventions only Comparator: No treatment; TAU; or any other similar condition	Problem student behaviour Participant views included? N	13 (Range: <50 – 400+) participants	"Teacher's classroom management practices have a significant, positive effect on decreasing problem behaviour in the classroom. Students in the treatment classrooms in all 12 studies located for the review showed less disruptive, inappropriate, and aggressive	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Experts consulted: N Performed MA		education classrooms during school hours Age range: K-12 Gender: NR	that served as contrast to the treatment condition and was not expected to produce change in the outcomes of interest Intervention delivered in primary and secondary school settings			behaviour in the classroom compared to untreated students in the control classrooms". (Applicability: D)	
GENERAL MENTAL WELLBEING									
Clarke et al. (2015)[181]	To provide a narrative synthesis of the evidence on the effectiveness of online mental health promotion and prevention interventions for youth aged 12-25 years	Included studies: RCT; quasi-experimental studies, and experimental studies without a comparison group Searches: 2000 – 2013 Grey literature: Y Experts consulted: N Narrative synthesis	USA; Australia; Germany; China; Canada; UK; Norway; Ireland; Israel	Youth aged 12–25 years Age range: 10 – 25 years (7 NR) Gender: mixed (NB: 1 female only study; 1 male only study)	Online Mental Health Promotion and Prevention Interventions "Defined as any planned intervention or program that was undertaken with the aim of improving mental health or modifying its determinants". Universal and targeted interventions Comparator: NR Intervention delivered online	Mental health and wellbeing outcomes Participant views included? Y (self-reported outcomes)	28 (n=10850 participants	"Results from the mental health promotion interventions indicate that there is some evidence that skills-based interventions presented in a module-based format can have a significant impact on adolescent mental health, however, an insufficient number of studies limits this finding. The results from the online prevention interventions indicate the significant positive	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								effect of computerized CBT on adolescents' and emerging adults' anxiety and depression symptoms". (Applicability: C)	
Franklin et al. (2012)[183]	To examine the effectiveness of school mental health services, with a specific focus on understanding the extent to which teachers are involved in intervention service delivery	Included studies: RCT Searches: 1999 – 2010 Grey literature: N Experts consulted: N Narrative synthesis	USA	Children Age range: NR Gender: NR	(Teacher Involvement) School Mental Health Interventions "School mental health interventions may be best identified by the purposes for which they are designed and delivered, and that is to assist the mental health functioning of students and to support their social and emotional learning within schools". Universal and targeted interventions Comparator: No treatment; Waitlist control; alternative treatment; and business as usual Intervention delivered in primary and secondary school settings	Primary Outcomes: NR Participant views included? Y (self-reported outcomes)	49 (Participant no. NR)	"The results of this ten-year review suggest that teachers are not only involved in the delivery of school mental health interventions mostly as team members with other school mental health professionals, but also less frequently may serve as the sole providers of these interventions". (Applicability: D)	UNCLEAR
Kallapiran et al. (2015)[184]	To examine the effects of different MBIs on	Included studies: RCT	USA; Australia; Belgium;	Children or adolescents	Mindfulness-Based Interventions	Mental health symptoms; stress,	11	" Mindfulness-based stress reduction/ mindfulness-based cognitive therapy	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	mental health symptoms and QoL in both clinical and nonclinical samples of children and adolescents	Searches: inception – 2010 Grey literature: Y Experts consulted: N Performed MA	Sweden; Sri Lanka	Age range: 4.7-19 years Gender: mixed (NB: 1 male only study)	"The majority of MBIs are brief (around eight sessions), group-based, and involve meditation principles and practice". Universal and targeted interventions Comparator: Wait-list; no intervention; TAU; other intervention Intervention delivered in multiple settings	anxiety or depression Participant views included? Y (self-reported outcomes)	(n=1454 participants)	arm was more effective than non-active control in the nonclinical populations. Acceptance commitment therapy was comparable to active treatments in patients in the clinical range. Other MBIs were also effective improving anxiety and stress but not depression in nonclinical populations compared to non-active control." (Applicability: D)	
Kidger et al. (2012)[186]	To synthesise the evidence for the effect on adolescent emotional health of (1) interventions targeting the school environment and (2) the school environment in cohort studies	Included studies: all controlled intervention studies; cohort studies Searches: from inception – 2011 Grey literature: N	Australia; England; USA; Europe	Participants aged between 11 and 18 years (or the mean age fell within this range) Age range: 9 -21 years	School Environment Interventions "..the school environment that related to structural, pedagogic, or relational features of school life.". Universal interventions only Comparator: NR	Emotional health (positive or negative) or self-harm/ suicidal behaviour Participant views included? Y (self-reported outcomes)	39 Controlled trials range: 48 –8630 participants; Cohort range: 60 – approx. 13 500 participants	"Limited evidence that the school environment has a major influence on adolescent mental health, although student perceptions of teacher support and school connectedness are associated with better emotional health".	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Experts consulted: N Narrative synthesis		Gender: mixed	Intervention delivered in school settings			(Applicability: D)	
Waddell et al. (2007)[196]	Systematic review of the best available research evidence on preventing mental disorders in children in order to inform policy-making.	Included studies: RCTs Searches: from 1981 – 2003 Grey literature: N Experts consulted: N Narrative synthesis	USA; Canada; Australia; UK	Children aged 0-18 years Age range: 0 -16 years Gender: mixed (NB: 1 male only study)	Programs for preventing CD, anxiety and depression "..the school environment that related to structural, pedagogic, or relational features of school life.". Targeted interventions only Comparator: NR Intervention delivered in multiple settings	Symptom measures or at least one diagnostic (or proxy of incidence) measure directly related to the disorders of interest Participant views included? Y (self-reported outcomes)	15 (n=15650 participants)	"Ten RCTs demonstrated significant reductions in child symptom and/or diagnostic measures at follow-up. The most noteworthy programs, for CD, targeted at-risk children in the early years using parent training or child social skills training; for anxiety, employed universal CBT in school-age children; and for depression, targeted at-risk school-age children, also using CBT".	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								(Applicability: C)	
Welsh et al. (2015)[22]	This article presents a scoping review of interventions, which seek to promote mental wellbeing and reduce inequities in children and young people living in high-income countries.	Included studies: no restriction on study design Searches: from inception – 2014 Grey literature: Y Experts consulted: N Narrative synthesis	Australia; USA; UK (High income countries)	Children (aged 3–15 years) and young people (aged 15–25 years) Age range: NR Gender: NR	Interventions which addressed the social determinants of inequities in mental wellbeing "Any programme, policy, intervention or service related to the promotion of equity in mental wellbeing or mental illness prevention in children and young people." Universal interventions only Comparator: NR Intervention delivered in multiple settings	Primary Outcomes: NR Participant views included? NR	No. Studies: NR	"Our results demonstrate that wellbeing promotion can be effective and could have the potential to reduce inequities in children's and young people's wellbeing." (Applicability: C)	UNCLEAR
HELP-SEEKING									
Kauer et al. (2014)[185]	To explore past literature that investigate whether online mental health services facilitate the help-seeking process in young people, specifically focusing on help-seeking behaviours, the barriers and	Included studies: no restriction on study design; qualitative studies also included Searches: from inception – 2013 Grey literature: N Experts consulted: N	Canada; Australia; USA; Germany; UK; Ireland; Norway	Young people between the ages of 14 and 25 years and the average age of the population was <30 years. Young people with mild to moderate	Online Mental Health Services "Help-Seeking Behaviour; Characteristics of young people who sought help; process evaluation of online services." Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Primary Outcomes: NR Participant views included? Y (self-reported outcomes)	18 Sample sizes ranged from 9 to 2700: median 420, mean 762.3 (SD 838.10).	"Overall, these studies did not indicate that online services facilitate mental health help-seeking in young people" (Applicability: C)	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	facilitators influencing online help-seeking, and the experiences of young people who use these services.	Narrative synthesis		mental health problems (n=10) Young athletes at risk of mental health problems (n=1) Young people regardless of mental health status (n=7) Mean Age Range: 16.5-26.2 years Gender: mixed					
SELF-EFFICACY AND/OR SELF- ESTEEM									
Morton and Montgomery (2011)[190]	To report the state of the high quality evidence on the impacts of YEPs on adolescents' (ages 10-19) sense of self-	Included studies: Experimental or quasi-experimental design with a prospectively assigned control group	USA; Jordan	Adolescents Mean age range: 15.2 – 16 years	Youth Empowerment Programmes "YEP aim to develop psychosocial assets among participating youths through a dynamic process that integrates connections with supportive adults, skill-building	Self-efficacy and self-esteem Participant views included? Y (self-reported outcomes)	3 (n=483 participants)	"The MA did not demonstrate intervention effects for self-efficacy. Despite the considerable amount of literature and institutions promoting the	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	efficacy and self-esteem, as well as other social and behavioural outcomes	Searches: NR Grey literature: Y Experts consulted: Y Performed MA		Gender: mixed	opportunities, prosocial environments, and regular involvement in program decision-making." Universal interventions only Comparator: No service provided and/or trials with comparison groups that involved alternative services Intervention delivered in multiple settings			believed impacts of YEPs on positive attitudes and behaviours, this review concludes that there is thus far insufficient empirical evidence to adequately support the claim". (Applicability: D)	
Ekeland et al. (2005)[182,372]	To determine if exercise alone or exercise as part of a comprehensive intervention can improve self-esteem among children and young people.	Included studies: RCTs; quasi-RCT Searches: from inception - 2002 Grey literature: Y Experts consulted: N Performed MA	USA; Canada; Nigeria; Australia	Children aged from 3 years to young people up to 20 years of age Age Range: 3-19.8 years Gender: mixed (NB: 3 female only studies; 4	Exercise Interventions: "Interventions included gross motor, energetic activity, for example, running, swimming, ball games and out-door play of moderate to high intensity, or strength training, in contrast to "ordinary" physical activity (for example, routine physical education (PE) classes, walking to school or play-time activities of low intensity).." Universal interventions only	All measurements of children's self-esteem Participant views included? Y (self-reported outcomes)	23 (Sample Range: 24 to 288 participants)	"Only four provided data sufficient to calculate overall effects, and the results indicate a moderate short-term difference in self-esteem in favour of the intervention [SMD 0.51 (95% CI 0.15 to 0.88)]."."The results indicate that exercise has positive short-term effects on self-esteem in children and young people. Since there are no known	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
				male only studies)	Comparator: Children receiving no intervention or children on a waiting list Intervention delivered in multiple settings			negative effects of exercise and many positive effects on physical health, exercise may be an important measure in improving children's self-esteem. (Applicability: D)	
STRESS									
Kraag et al. (2006)[187]	Meta-analysis evaluates the effect of school programs targeting stress management or coping skills in school children.	Included studies: RCTs; quasi-RCT Searches: from 2003- 2006 Grey literature: Y Experts consulted: N Performed MA	NR	Late children attended 3rd and 4th grade, early adolescents 5th and 6th grade, and middle adolescents 7th and 8th grade. (Age: 8-13) Age Range: 7-14 years; Grade: K-8 Gender: NR	Stress Management Programmes/ Primary Prevention Programmes with class educational interventions "Primary prevention programs were defined as interventions designed specifically to promote mental health and reduce the incidence of adjustment problems in currently normal populations. Studies had to involve a program focusing on promoting mental health, i.e. be directed primarily at children's and adolescents' functioning. It was therefore decided to also include programs that do not directly address stress, but do target adjustment and coping skills."	Symptoms, (social) behaviour, coping and self-efficacy Participant views included? NR	19 (n=4363 participants)	"Overall effect size for the programs was −1.51 [95% confidence interval (CI) −2.29, −0.73], indicating a positive effect. ....Primary prevention programs targeting stress and coping in schools should be promoted, as in controlled studies a positive overall effect was found and positive effects for coping and stress symptoms. Also positive effects for (social) behaviour were found, although the related studies had some	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Universal interventions only Comparator: No intervention, a delayed intervention, a placebo treatment, or 'usual care' Intervention delivered: setting NR			methodological weaknesses." (Applicability: NA)	
SUICIDE									
Wei et al. (2015)[197]	To review of these programs to help determine if the quality of evidence available justifies their wide spread dissemination in schools and in the community as suicide prevention programs.	Included studies: Research studies; published systematic reviews/meta-analyses Searches: from inception - NR Grey literature: N Experts consulted: Y Narrative synthesis	USA	Population: NR Age Range: 7-14 years; Grade: K-8 Gender: NR	Suicide Prevention Programmes (Signs of Suicide (SOS) Prevention Program and the Yellow Ribbon (YR) Suicide Prevention Program) Universal interventions only Comparator: NR Intervention delivered in secondary school settings	Primary Outcomes: NR Participant views included? Y (self-reported outcomes)	5 (n= Approx. 9010 participants) (1 NR)	"We cannot recommend that schools and communities implement either the SOS or YR suicide prevention programs. Purchasers of these programs should be aware that there is no evidence that their use prevents suicide." (Applicability: D)	UNCLEAR

TABLE 2. Tobacco Free Living

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Brinn et al. (2010)[198]	To evaluate the effectiveness of mass media interventions to prevent smoking in young people.	Included studies: RCTs, non-RCTs, CBA, Time series Searches: from 1997 – 2010 Grey literature: N Experts consulted: N Narrative synthesis	USA; Norway	Young people aged < 25 years Age range: 9-18 years Gender: mixed	Mass Media Interventions: "Defined as channels of communication such as television, radio, newspapers, bill boards, posters, leaflets or booklets intended to reach large numbers of people and which are not dependent on person to person contact. The purpose of the mass media campaign must be primarily to prevent the uptake of smoking in young people." Universal interventions only Comparator: No Intervention; Other Intervention (e.g. Schools-based programmes) Intervention delivered in multiple settings	Smoking/ tobacco use status: daily, weekly, monthly, ever, non-smoker, smokeless tobacco user, smoker (frequency/quantity unspecified) Participant views included? Y (self-reported outcome measures)	7 (n=49398 participants)	"Three studies concluded that mass media reduced the smoking behaviour of young people. All of the effective campaigns had a solid theoretical basis, used formative research in designing the campaign messages, and message broadcast was of reasonable intensity over extensive periods of time." (Applicability: D)	LOW
Brown et al. (2014)[199]	To assess the equity impact of interventions/ policies on youth smoking.	Included studies: RCTs, non-RCTs, cohort studies (controlled and uncontrolled), cross-sectional and qualitative studies.	USA; UK; Germany; New Zealand; Australia, Canada; Finland; France; Israel; The Netherlands;	Birth to 25 years Gender: NR	Tobacco control intervention/ policy or other type of policy Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Any smoking-related outcome: intentions/attitudes/ perceptions, exposure to SHS smoking behaviour, sensitivity to price, initiation, relapse and cessation rates,	38 (39 reports) (Range: 86 to over 641000 participants)	"The distribution of equity effects across interventions was: 7 positive, 16 neutral, 12 negative, 4 mixed and 1 unclear. Most of the neutral equity studies were	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Searches: from inception to 2010 Grey literature: Y Experts consulted: N Narrative synthesis	Portugal; Spain; Sweden			smoking prevalence, and morbidity. Participant views included? Y (self-reported outcome measures)		beneficial for all SES groups. There was variation in the equity impact of each type of tobacco control policy/intervention. 7 of the intervention/ policies showed the potential to reduce inequalities in youth smoking and all were US-based: 4 studies of increasing the price/tax of cigarettes, 2 studies of enforcing strong policies on age-of-sale, and 1 study of smoking cessation support through text-messaging" (Applicability: C)	
Carson et al. (2011)[200]	To determine the effectiveness of multi-component community based interventions	Included studies: RCTs, CCTs; CBA Searches: from 2002 – 2010	Europe; England; Brazil; USA; China	Young people aged < 25 years Age range: 8-24 years	Multi-Component Community interventions "Community interventions were defined as coordinated widespread (multi-component) programmes in a particular geographical area (e.g. school	Smoking Behaviour: a) the level of change in smoking behaviour observed, b) the sustainability of the change in behaviour after the intervention ('less than' versus	23 (35 reports) (n= approx. 104000 participants)	"Some evidence to support the effectiveness of community interventions in reducing the uptake of smoking in young people,	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	in influencing smoking behaviour	Grey literature: Y Experts consulted: Y Performed MA		Gender: mixed	districts) or region or in groupings of people who share common interests or needs, which support non-smoking behaviour. Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	'longer than' one year). Participant views included? Y (self-reported outcome measures)		but the evidence is not strong and contains a number of methodological flaws." (Applicability: C)	
Johnston et al. (2012)[201]	To determine whether incentives prevent children and adolescents from starting to smoke	Included studies: RCTs, controlled trials with baseline measures and post-intervention outcomes Searches: from inception – 2012 Grey literature: Y Experts consulted: N Performed MA	Germany; Netherlands; Finland; USA; Canada	Children (aged 5 to 12 years) and adolescents (aged 13 to 18) in any setting; baseline non-smokers Age range: approx. 11-14 years Gender: mixed (NB: 4 NR)	Incentive interventions "An incentive was any tangible benefit externally provided with the explicit intention of preventing smoking. This includes contests, competitions, incentive schemes, lotteries, raffles, and contingent payments to reward not starting to smoke. We included rewards to third parties (e.g. to schools, health-care providers or family members), as well as interventions that directly reward children and adolescents." Universal interventions only Comparator: NR	Smoking status Participant views included? Y (self-reported outcome measures)	7 (19 reports) (n= 6362 participants)	"Incentive programmes 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.	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Intervention delivered in primary and secondary schools			(Applicability: D)	
Moodie et al. (2012)[202]	To assess the impact of plain tobacco packaging	Included studies: Cross-sectional surveys; Qualitative studies; mixed methods studies Searches: from 1980 – 2011 Grey literature: Y Experts consulted: Y Narrative synthesis	Australia; New Zealand; Canada; USA; UK; France; Belgium; Brazil	Human populations: Young people (n=16) Smokers Only (n=8) Age range: 10-65+ years (1 NR) Gender: mixed (NB: 1 NR; 4 female only study)	Plain Tobacco Packaging: "Plain packaging is defined in the review as: the standardisation of pack colour and removal of all branding from packaging, with the exception of brand name which appears in a standardised font, typeface and position on the package." Universal and targeted interventions Comparator: Plain versus branded packs, different types of plain packs, and no comparator Intervention setting: NR	Appeal/attractiveness and perceived behavioural effects (e.g. motivation to quit, deterring uptake) Participant views included? Y (self-reported outcome measures)	37 (Range: 20 – 14270 participants)	"All studies reported that plain packs were rated as less attractive than branded equivalent packs, by both adults and children. Plain packs were perceived to be poorer quality, poorer tasting and cheaper than branded equivalent packs. Positive impressions of smoker identity and personality attributes associated with specific brands were weakened or disappeared with plain packaging. Non-smokers and younger people responded more negatively to plain packs than smokers and older people."	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								(Applicability: C)	
Muller-Riemenschneider et al. (2008)[203]	To evaluate the long-term effectiveness of recent behavioural interventions in the prevention of cigarette use among children and youth and to compare the effectiveness of different school-based, community based and multi-sectorial intervention strategies.	Included studies: RCTs Searches: from 2001 – 2006 Grey literature: N Experts consulted: N Performed MA	UK; Australia; Canada; USA; China; Netherlands; Germany; Ireland; India; Europe	Youth up to 18 years of age Age Range: 6-19 years (2 NR) Gender: NR	School-based; Community-based or Multi-Sectorial Interventions "Interventions were classified as school-based, community-based or multi-sectorial, depending on the main components of the intervention. Any intervention performed outside the school environment was considered community-based; in turn, multi-sectorial interventions were defined as consisting of a school and an out-of-school component." Universal interventions only Comparator: NR Intervention delivered in multiple settings	Smoking behaviour Participant views included? Y (self-reported outcome measures)	35 (45 reports) (n=125224 participants)	"Moderate evidence for the effectiveness of behavioural interventions to prevent smoking. Although evidence for the effectiveness of school-based interventions was inconclusive, evidence for the effectiveness of community-based and multi-sectorial interventions was somewhat stronger. (Applicability: C)	UNCLEAR
Park and Drake (2015)[204]	To review the characteristics and effects of Internet-based youth smoking prevention and cessation programs.	Included studies: NR (studies were included if they were published in a peer-reviewed journal)	USA	Population younger than 24 years Age range: 11 – 23 years Gender: mixed (NB:	Internet-based interventions (as a smoking cessation or prevention tool) Universal and targeted interventions Comparator: No treatment; Traditional health education programs; Non-Internet-based	Smoking behaviour Participant views included? Y (self-reported outcome measures)	12 (n=10016 participants)	"The most common components of effective Internet-based programs are identified as the following: the use of multimedia, tailored approaches,	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Searches: dates NR Grey literature: N Experts consulted: N Narrative analysis		1 female only study)	smoking cessation or prevention programs; brief information about other smoking cessation websites Intervention delivered in multiple settings			personalised feedback, and interactive features." (Applicability: D)	
Patnode et al. (2013)[205]	To review the evidence for the efficacy and harms of primary care–relevant interventions that aim to reduce tobacco use among children and adolescents.	Included studies: Controlled Trials; Observational Studies Searches: unclear (search end date was reported as 2012) Grey literature: N Experts consulted: N Performed MA	USA; Finland; Netherlands; UK	Population group: NR Age: Combined Prevention/ Cessation: 11-17 years Prevention: Mean: 14 years Cessation: Mean: 15.9 years Gender: mixed	Primary-Care Relevant Interventions designed to prevent tobacco use or promote cessation (with or without the use of medication) "We describe these collectively as "primary care–relevant." Referable interventions are those that are not conducted within primary care itself but that patients could enrol in within the larger health care setting or community." Universal and targeted interventions Comparator: minimal or no treatment Intervention delivered in multiple settings	Smoking status Participant views included? Y (self-reported outcome measures)	18 (22 reports) (n= 42956 participants)	"Primary care–relevant interventions may prevent smoking initiation over 12 months in children and adolescents." (Applicability: C)	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Rice et al. (2009)[206]	To examine the impact of price on cigarette smoking in young people aged 25 years or under.	Included studies: all study designs Searches: from inception – 2007 Grey literature: Y Experts consulted: Y Narrative synthesis	USA; Canada; UK; Australia; Sweden	Young people aged 25 years or younger Age range: NR (NB: only reported if specific to young people. Limited age data reported). Gender: mixed	Change in cigarette price and/or tax on cigarettes Universal interventions only Comparator: NR Intervention delivered in multiple settings	Any measure of behaviour related to cigarette smoking was of interest, including smoking initiation, participation and prevalence, cigarette consumption or demand (quantity smoked), and quitting Participant views included? Y (self-reported outcome measures)	45 (Participants: NR)	"Results of the review suggest that price is an effective instrument in reducing cigarette smoking among young people" (Applicability: D)	LOW
Thomas et al. (2015)[207]	To assess the effectiveness of interventions to help families stop children or adolescents starting smoking.	Included studies: RCTs, cRCTs Searches: from 2007 – 2014 Grey literature: Y Experts consulted: Y Narrative synthesis and MA	USA; Australia; India; the Netherlands; Norway	Children (aged 5 to 12) and adolescents (aged 13 to 18) and family members. Approx. age range: 5.7-16 years; Adults approx. range: 18-41 years	Family Based Interventions (and School-based Interventions) "Interventions with children and family members intended to deter starting to use tobacco. The family-based intervention could include any components to change parenting behaviour, parental or sibling smoking behaviour, or family communication and interaction."	Smoking status Participant views included? Y (self-reported outcome measures)	27 (Over 36000 participants)	"Moderate quality evidence to suggest that family-based interventions can have a positive effect on preventing children and adolescents from starting to smoke. The evidence is strongest for high intensity programmes used independently of	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
				Gender: mixed (NB: 6 NR; 1 female only study)	Universal and targeted interventions Comparator: No intervention control (no intervention, usual care, or a very minimal intervention) Intervention delivered in multiple settings			school interventions. Programmes typically addressed family functioning, and were introduced when children were between 11 and 14 years old. Based on this moderate quality evidence a family intervention might reduce uptake or experimentation with smoking by between 16 and 32%" (Applicability: D)	
Thomas et al. (2015)[208]	To assess effectiveness of school-based smoking prevention curricula keeping children never-smokers.	Included studies: RCTs, cRCTs Searches: from inception – 2014 Grey literature: Y Experts consulted: N	Australia; UK; Europe; South Africa; Thailand; USA; Canada; China	Students aged 5–18 years during the intervention phase of the trial Age range: 5.5-17 years Gender: mixed (NB: 1 NR)	School-based Smoking Prevention Curricula: "Information only curricula Interventions that provide information to correct inaccurate perceptions regarding the prevalence of tobacco use and oppose inaccurate beliefs that smoking is social acceptable". Social competence curricula: "Interventions that help adolescents refuse offer to	Tobacco use Participant views included? Y (self-reported outcome measures)	136 (n=431315 participants)	"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	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Performed MA			smoke by improving their general social competence and personal and social skills. Interventions teach problem solving, decision-making, cognitive skills to resist personal or media influences, increase self-control and self-esteem, coping strategies for stress and assertiveness skills". Social influence curricula "Interventions that endeavour to overcome social influences to use tobacco by teaching adolescents to be aware of social influences that encourage substance use, teach skills to resist offers of tobacco, and deal with peer pressure and high-risk situations that might persuade an adolescent directly or indirectly to smoke". Combined social competence and social influences curricula "Multimodal curricula Programmes in schools and the community, involving parents and community members, initiatives to change school or state policies about tobacco sales and taxes, and to prevent sales to minors".			competence/ social influences curricula showed a significant effect at both follow-up periods." (Applicability: C)	

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Other "School antismoking policies, motivations to smoke, classroom good behaviour." Universal interventions only Comparator: No curricula, usual practice or an active non-relevant control Intervention delivered in primary and secondary schools				
Thomas et al. (2008)[209]	To assess the effects of population tobacco control interventions on social inequalities in smoking.	Included studies: Primary Studies. Searches: from inception – 2006 Grey literature: Y Experts consulted: Y Narrative synthesis and Harvest plot	USA; UK; France; Spain; Canada; South Africa; Taiwan; Norway; Finland; New Zealand; Australia; Israel; Scotland; Wales; Netherlands; Hong Kong	Smokers, people at risk of taking up smoking, people at risk of exposure to ETS or the general population. Approx. age range: 0-60+ years (NB: not all ages/ age ranges reported) Gender: mixed	Population-level Tobacco Control Interventions: "Population-level tobacco control interventions as those applied to populations, groups, areas, jurisdictions or institutions with the aim of changing the social, physical, economic or legislative environments to make them less conducive to smoking. These are approaches that mainly rely on state or institutional control, either of a link in the supply chain or of smokers' behaviour in the presence of others". Universal and targeted interventions	Smoking behaviour (such as prevalence or consumption), indirect measures of tobacco consumption (such as illegal sales to minors or quantity of smuggled cigarettes), exposure to ETS, intermediate outcomes (such as changes in knowledge or attitudes), process measures (such as participation rates), implementation measures (such as enforcement of policy changes) and any health outcomes (such as mental health or wellbeing),	SR: 25 (Mapped 581 primary studies) 84 (90 Reports) Approximate sample size range: 221-20,025,000 (Census Data - 1989-1995) (Not all sample sizes reported)	"Population-level tobacco control interventions have the potential to benefit more disadvantaged groups and thereby contribute to reducing health inequalities." (Applicability: C)	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical area	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
				(NB: not all details of sex reported)	Comparator: NR Intervention delivered in multiple settings	as well as adverse or unintended effects. Participant views included? Y (self-reported outcome measures)			

Table 3. Preventing Drug Abuse and Excessive Drinking

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
CANNABIS USE									
Norberg et al. (2013)[224]	To develop a comprehensive understanding of prevention programming by assessing universal, targeted, uni-modal, and multi-modal approaches as well as individual program characteristics	Included studies: RCTs Searches: from 1987 – 2011 Grey literature: N Experts consulted: N Narrative synthesis	USA; Australia; UK; Europe	Young people (children, adolescents, or young adults) aged < 25 years Age range: 11-21 years Gender: mixed (NB: 4 female only studies)	Primary prevention programmes Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Cannabis use Participant views included? Y (Self-reported outcome measures)	25 (Range: 64 – 7079 participants)	"Results indicated that primary prevention programs can be effective in reducing cannabis use in youth populations, with statistically significant effect sizes ranging from trivial (0.07) to extremely large (5.26), with the majority of significant effect sizes being trivial to small" (Applicability: C)	LOW
GENERAL ALCOHOL MISUSE									
Ferri et al. (2013)[213]	To assess the effectiveness of mass media campaigns in preventing or reducing the use of or intention to use illicit drugs amongst young people.	Included studies: RCTs, non-RCTs, CBA, ITS; prospective and retrospective cohort studies Searches: from inception – 2013 Grey literature: Y Experts consulted: Y	USA; Canada; Australia	Young people aged < 26 years Age range: 10-26 years Gender: mixed (NB: 3 female only studies)	Mass Media Campaigns "....defined here as channels of communication such as television, radio, newspapers, billboards, posters, leaflets or booklets intended to reach large numbers of people and which are not dependent on person to person contact. To be included in the review, a study needs to assess a mass media campaign explicitly aimed at influencing people's drug use, intention to	Self reported or biomarker-assessed illicit drug use Participant views included? Y (self-reported outcome measures)	23 (n=188934 participants)	"Overall the available evidence does not allow conclusions about the effect of media campaigns on illicit drug use among young people. We conclude that further studies are needed." (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Narrative synthesis			use or attitude towards illicit drugs use." Universal and targeted interventions Comparator: No intervention; other types of communication interventions such as school-based drug abuse prevention programmes; community-based prevention programmes; lower exposure to intervention; time before exposure to intervention. Intervention delivered in multiple settings				
Foxcroft et al. (2015)[215]	To determine whether social norms interventions reduce alcohol-related negative consequences, alcohol misuse or alcohol consumption among university and college students	Included studies: RCTs Searches: from inception – 2014 Grey literature: Y Experts consulted: N Performed MA	USA; Australia; Brazil; New Zealand; Sweden; UK	University or college students Approx. age range: 17 -54 years Gender: mixed (NB: 3 female only study)	Social Norms Interventions "Personalised feedback or information campaigns...Social norms interventions are predicated on how an individual's perceptions and beliefs about what constitutes 'normal' behaviour in similar people influence their own behaviour. These interventions aim to provide accurate information about prevailing norms for alcohol use, reducing the possibility of inaccurate perceptions" Universal interventions only Comparator: Interventions with no social norms component	Self-reported alcohol consumption Participant views included? Y (self-reported outcome measures)	70 (n=42784 participants)	"The results of this review indicate that no substantive meaningful benefits are associated with social norms interventions for prevention of alcohol misuse among college/university students. Although some significant effects were found, we interpret the effect sizes as too small, given the measurement scales used in the studies included in this review, to be of	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					including no intervention or minimal intervention in the form of a leaflet, or an educational or psychosocial intervention without a social norms component. Intervention delivered in college and university settings			relevance for policy or practice". (Applicability: C)	
Foxcroft and Tsertsvadze (2011)[218]	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	Included studies: RCTs Searches: from 2002 – 2010 Grey literature: Y Experts consulted: N Performed MA	USA; Netherlands	Young people up to 18 years attending school Mean age range: 11 – 15 years Gender: mixed (NB: 4 female only studies)	Universal (Family-based) Alcohol Misuse Prevention Programmes "..any universal family-based psychosocial or educational prevention program." Universal interventions only Comparator: Any alternative prevention programme or no programme. Intervention delivered in home-based settings	Any direct self-reported or objective measures of alcohol consumption or problem drinking Participant views included? Y (self-reported outcome measures)	12 (Range: 202 – 3,496 participants)	"The effects of family-based prevention interventions are small, but generally consistent and also persistent into the medium- to longer-term" (Applicability: D)	LOW
Foxcroft and Tsertsvadze (2011)[217]	To systematically review evidence on the effectiveness of universal multi-component prevention programs in preventing alcohol misuse	Included studies: RCTs Searches: from 2002 – 2010 Grey literature: Y Experts consulted: N Narrative synthesis	USA; India; Netherlands; Australia	Young people up to 18 years attending school Mean age range: 7 – 15.2 years Gender: mixed	Universal multi-component psychosocial or educational prevention program "Multi-component is defined as an intervention that comprises components delivered in different settings, for example both school and family settings; psychosocial intervention is defined as one that specifically aims to develop psychological and social skills in young people	Alcohol consumption or problem drinking Participant views included? Y (self-reported outcome measures)	20 (Range: 361 – 12022 participants)	"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	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	in school-aged children up to 18 years of age				(e.g., peer resistance) so that they are less likely to misuse alcohol; educational intervention is defined as one that specifically aims to raise awareness of the potential dangers of alcohol misuse so that young people are less likely to misuse alcohol." Universal interventions only Comparator: Any alternative prevention program (e.g., school-, family-, office-based, multi-component, other) or no program Intervention delivered in multiple settings			with single components." (Applicability: D)	
Foxcroft and Tsertsvadze (2011)[216]	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.	Included studies: RCTs Searches: from 2002 – 2010 Grey literature: Y Experts consulted: N Narrative synthesis	USA; Europe; Australia; India; Swaziland	Young people up to 18 years attending school Age range: 5-18 years (NR in 9 studies) Gender: mixed (NB: 2 male only studies; 9 studies NR)	Universal school-based psychosocial or educational prevention programmes "Psychosocial intervention is defined as one that specifically aims to develop psychological and social skills in young people (e.g., peer resistance) so that they are less likely to misuse alcohol; educational intervention is defined as one that specifically aims to raise awareness of the potential dangers of alcohol misuse so that young people are less likely to misuse alcohol." Universal interventions only	Any direct self-reported or objective measures of alcohol consumption or problem drinking Participant views included? Y (self-reported outcome measures)	53 (Range: 86 – 19529 participants)	"This review identified studies that showed no effects of preventive interventions, as well as studies that demonstrated statistically significant effects. Most commonly observed positive effects across programs were for drunkenness and binge drinking. Current evidence suggests that certain generic psychosocial and developmental	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Comparator: Any alternative prevention program (e.g., school-, family-, office-based, multi-component, other) or standard curriculum Intervention delivered in school-based settings			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." (Applicability: D)	
Foxcroft and Tsertsvadze (2012)[219]	Our aim was to examine the effectiveness of (1) school-based, (2) family-based and (3) multi-component universal alcohol misuse prevention programmes in children and adolescents.	This review is a summary of the 3 Foxcroft et al., (2011) reviews described above	-	-	-	-	-	-	UNCLEAR
Hennessy and Tanner-Smith (2014)[373]	To conduct a meta-analysis summarizing the effectiveness of school-based BAI among adolescents, and to examine possible	Included studies: RCTs, quasi-RCT Searches: from 1980 – 2012 Grey literature: Y Experts consulted: N	USA; South America; Europe; Asia;	Adolescents enrolled in middle/ high/ secondary school Mean age: 15.58 (SD = 1.29) years	Brief alcohol interventions (BAIs) "...defined as preventive alcohol use interventions shorter than 5 hours in duration, are a low dose intervention option. BAIs can use universal, selective, or indicated prevention strategies, as well as a variety of program modalities. The most common BAI program modalities involve cognitive	Alcohol-consumption related outcomes Participant views included? Y (self-reported outcome measures)	17 (28 reports) (n=2877 participants)	"Some school-based BAIs are effective in reducing adolescent alcohol consumption, but may be ineffective if delivered in group settings. Future research should explore whether group-delivered	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	iatrogenic effects due to deviancy training in group-delivered interventions.	Performed MA		Gender: mixed	behavioral/skills training, motivational enhancement, and/or psycho-educational therapy." Universal and targeted interventions Comparator: No-treatment or treatment-as-usual comparison group Intervention delivered in secondary school settings only			BAIs that use motivational enhancement therapy components may yield beneficial outcomes like those observed in individually-delivered programs." (Applicability: D)	
Strom et al. (2014)[228]	To assess the effectiveness of universal school-based prevention programs on alcohol use among adolescents	Included studies: RCTs Searches: from 1990 – 2014 Grey literature: N Experts consulted: N Performed MA	USA; Australia	Participants with a mean age < 18 years at pre-test Mean age: 13.16 (SD = 1.96) years Gender: mixed (NB: 2 studies NR)	Universal school-based alcohol prevention programmes Universal interventions only Comparator: NR Intervention delivered in secondary school settings only	Alcohol use (weekly drinking (7 days' alcohol use), monthly drinking (30 days' alcohol use), and lifetime alcohol use. Participant views included? Y (self-reported outcome measures)	28 (n=9289 participants)	"Overall, the effects of school-based preventive alcohol interventions on adolescent alcohol use were small but positive among studies reporting the continuous measures, whereas no effect was found among studies reporting the categorical outcomes" (Applicability: D)	LOW
GENERAL DRUG AND ALCOHOL MISUSE									
Lemstra et al. (2010)[222]	The purpose of this systematic review was to determine if school-based	Included studies: RCTs, prospective cohort/longitudinal studies; SR and/or MA.	USA	Youth from ages 10 to 15 years	School-based interventions to prevent marijuana and or alcohol use Knowledge-based or Comprehensive Programmes	Alcohol and marijuana usage were defined as number of days	6 (n=11926 participants)	"Long-term marijuana and alcohol prevention programs that utilized a	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	marijuana and alcohol prevention programs are effective in preventing marijuana and alcohol use in adolescents between the ages of 10–15 years.	Searches: from 1980 – 2007 Grey literature: Y Experts consulted: Y Narrative synthesis		Age range: NR Gender: NR	"Knowledge-based programs were defined as the provision of anti-drug information delivered in a school setting. Comprehensive-based programs were defined as the provision of anti-drug information combined with developing refusal skills, self-management skills and social skills." Universal interventions only Comparator: NR Intervention delivered in primary and secondary school settings	used in past 30 days pre and post intervention Participant views included? Y (self-reported outcome measures)		''comprehensive'' program content resulted in: (a) a mean absolute reduction of 12 days of alcohol usage per month and (b) a mean absolute reduction of 7 days of marijuana usage per month among adolescents aged 10–15 years old. In comparison, school-based marijuana and alcohol prevention programs that utilized ''knowledge only'' program content resulted in a mean absolute decrease of 2 days of alcohol usage per month among adolescents aged 10–15 years old. (Applicability: D)	
Patnode et al. (2014)[225]	To systematically review the benefits and harms of primary care–relevant interventions designed to	Included studies: RCTs, CCTs Searches: from 1992 – 2013 Grey literature: Y	USA; Czech Republic	Children and adolescents (aged <19 years) who were not diagnosed with a substance use disorder	Primary care (primary or tertiary) prevention interventions Universal and targeted interventions Comparator: minimal or no treatment	Drug use or health or social outcomes Participant views included? Y (self-reported outcome measures)	6 (7 reports) (Range: 41 - 2500 participants)	Evidence is inadequate on the benefits of primary care–relevant behavioural interventions in reducing self-reported illicit and pharmaceutical drug	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	prevent or reduce illicit drug use or the nonmedical use of prescription drugs among youths.	Experts consulted: N Narrative synthesis		or seeking treatment for substance misuse Age range: 12-20 years Gender: mixed (NB: 2 female only studies)	Intervention delivered in multiple settings			use among adolescents" (Applicability: D)	
Siegfried et al. (2014)[227]	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.	Included studies: RCTs, CCTs, ITS Searches: from inception – 2014 Grey literature: Y Experts consulted: Y Narrative synthesis	Canada; Netherlands	Adults of any age and adolescents (defined by WHO as aged 10 - 19 years) Age range: 18-29 years (n=1); 15+ years (n=1) (NR in 2 studies but described as adult popn) Gender: mixed (NB: 1 male only study)	Non-alcohol commercials/ Alcohol advertising restrictions "A reduction in or restriction or banning of advertising of alcohol and related products via any format including advertising in the press, on the television, radio, or internet, or via billboards, social media or product placement in films." Universal interventions only Comparator: Alcohol commercials: Advertising of alcohol and related products via any format including counter-advertising Intervention delivered in laboratory settings	Reduction in alcohol consumption Participant views included? Y (self-reported outcome measures)	4 (Participants: NR)	"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 programme to ensure the evaluation over time of all relevant outcomes in order to build the evidence base." (Applicability: D)	LOW
Thomas et al. (2013)[229]	To undertake a systematic	Included studies: RCTs, cRCT	USA; Sweden	Children (age 6 to 12 years)	Mentoring Programmes	Abstinence (never uses	6	"Six RCTs were included in this	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	review of mentoring in preventing/ reducing adolescents' alcohol and drug use.	Searches: from inception – 2013 Grey literature: Y Experts consulted: N Performed MA		or adolescents (age 13 to 18 years) Grade Range: 4-9 (1 study: NR) Gender: NR	"The Mentor Organization provides the simplest and most inclusive definition of youth mentoring: a personal relationship in which a caring individual provides consistent companionship, support, and guidance aimed at developing the competence and character of a child or adolescent." Universal and targeted interventions Comparator: NR Intervention delivered in school and community settings	drugs and/or alcohol); number of individuals using alcohol or drugs at least once monthly; or reductions in alcohol or drug consumption Participant views included? Y (self-reported outcome measures)	(n=2433 participants)	review. Four RCTs provided evidence on mentoring and alcohol use. The 2 that could be pooled showed less alcohol use by mentored youth" (Applicability: D)	
GENERAL DRUG MISUSE									
Faggiano et al. (2014)[212]	To evaluate the effectiveness of universal school-based interventions in reducing drug use compared to usual curricular activities or no intervention.	Included studies: RCTs, CCTs Searches: from inception – 2013 Grey literature: Y Experts consulted: Y Performed MA	USA; Australia; UK; Europe; China; South Africa; Hong Kong; Czech Republic	Primary or secondary school pupils Age range: 6-17 years Gender: mixed	School-based primary prevention interventions "Categorised as: Knowledge-focused curricula; Social competence curricula; Social influence curricula; Combined interventions." Universal interventions only Comparator: Usual curricular activities or another school-based drug prevention programme Intervention delivered in primary and secondary school settings	Use of drugs Participant views included? Y (self-reported outcome measures)	51 (73 reports) (n=127146 participants)	"School programmes based on a combination of social competence and social influence approaches showed, on average, small but consistent protective effects in preventing drug use, even if some outcomes did not show statistical significance. Some programmes based on the social competence approach also showed protective	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								effects for some outcomes." (Applicability: D)	
Flynn et al. (2015)[214]	To identify 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.	Included studies: RCTs Searches: from 1984 – 2015 Grey literature: N Experts consulted: N Narrative synthesis	USA; Norway	Population: NR Age range: 10 – 14 years Gender: mixed	Universal, school-based drug prevention curricula Universal interventions only Comparator: NR Intervention delivered in primary and secondary school settings	Alcohol and/or other drug use outcomes Participant views included? Y (Self-reported outcome measures)	6 (13 reports) (n=19195 participants)	"6 RCTs of 4 distinct school-based curricula were identified for inclusion. Outcomes were reported for 42 single-drug measures in the independent RCTs, with just 3 presenting statistically significant (P < .05) differences between the intervention group and the control group. One program revealed statistically significant positive effects at final follow-up (Lions-Quest Skills for Adolescence)" (Applicability: D)	UNCLEAR
Gates et al. (2006)[220]	To summarise the current evidence about the effects of interventions delivered in	Included studies: RCTs Searches: from inception– 2004 Grey literature: N	USA; UK; China	Young people aged < 25 years, either illicit drug users or non-users (and parents)	Non School-Based Interventions "Categorised as: Education and skills training; Family Interventions; Brief Intervention or Motivational Interviewing;	Drug use or initiation of drug use (for primary prevention studies) or reduction or	17 (Individual: 1230 participants; Clusters: 253 participants)	"There is a lack of evidence of effectiveness of the included interventions. Motivational interviewing and	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	non-school settings intended to prevent or reduce drug use by young people under 25,	Experts consulted: N Narrative synthesis		Age range: 3-24 years (5 NR) Gender: mixed (NB: 1 female only study)	Multi-component Community Interventions." Universal and targeted interventions Comparator: Another intervention or no intervention Intervention delivered in multiple settings	cessation of drug use (for secondary prevention studies); substance dependence; death (all cause and drug related); hospitalisation; treatment for drug-related health problems; criminal activity Participant views included? Y (self-reported outcome measures)		some family interventions may have some benefit. Cost-effectiveness has not yet been addressed in any studies, and further research is needed to determine whether any of these interventions can be recommended." (Applicability: C)	
DRUG, ALCOHOL AND TOBACCO MISUSE									
Champion et al. (2013)[210]	To review current school-based alcohol and other drug prevention programs facilitated by computers or the Internet	Included studies: RCTs Searches: from Inception - 2012 Grey literature: N Experts consulted: N Narrative analysis	Australia; USA; UK; The Netherlands; Canada	"School aged students" Age: range Gender: mixed (NB: 6 female only studies: 1 male only study)	(School-Based) Internet- or Computer-based Prevention Programmes Universal interventions only Comparator: Health education as usual; video component; a web evaluation control task; Alternative intervention Intervention delivered in	Alcohol and drug consumption. Participant views included? Y- (Self-reported outcome measures)	12 (n=21,633 participants)	"Despite the significant harms associated with alcohol and other drug use and the need for effective and practical prevention programs, there are relatively few trials of school-based alcohol and other drug prevention programs	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								facilitated by computers or the Internet. Among those that do exist, it appears that the use of computers and the Internet can be effective in overcoming traditional obstacles to implementation and have the potential to reduce the uptake and use of alcohol and drug use in adolescents. These promising results, together with the numerous implementation advantages and high fidelity associated with new technology, suggest that Internet-facilitated programs offer a promising delivery method for school-based prevention." (Applicability: C)	
Espada et al. (2015)[211]	To analyse the effectiveness of school drug prevention programs in Spain	Included studies: Experimental, or quasi-experimental design with pretest-posttest	NR	"Adolescents between ages 10 and 19 years"	(School-based) Substance Abuse Prevention Programmes "...aimed at primarily preventing drug abuse in adolescents	NR Participant views included? Y – (Self-report	21 (n=10,956 participants)	"Preventive program effectiveness was low (d= 0.16), although it was higher at the follow-up (d= 0.30). The	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		and/or follow-up measures Searches: from 2002- 2013 Grey literature: Y Experts consulted: Y Meta-Analysis		Age: range: 14.17-17.4 years Gender: mixed (NB: 6 female only studies: 1 male only study)	between ages 10 and 19 years within a school context." Universal and targeted interventions Comparator: NR Intervention delivered in primary and secondary schools	outcome measures)		programs were most effective in changing attitudes (d= 0.44) towards drugs. The models of health education (d= 0.48) and social learning (d= 0.20) were also very effective, especially in combination with oral, written, and audiovisual support material (d= 0.21) and the implementation of joint programs by health education professionals and faculty members (d=0.25)." (Applicability: D)	
MacArthur et al. (2016) [223]	To quantify the effect of peer-led interventions that sought to prevent tobacco, alcohol and/or drug use among young people aged 11-21 years.	Included studies: RCTs Searches: from Inception - 2015 Grey literature: Y Experts consulted: N Meta-Analysis	UK; Australia; Norway; Spain; Poland; Romania; Australia; Norway; Chile; Swaziland	"Young people aged 11–21 years" Age: range: 9-19 years Gender: NR	Peer-led Interventions: "To be classed as a peer-led intervention, programmes needed to include a substantial component in which peers were involved in the delivery of the intervention; for instance, via the direct delivery of curriculum components, or by acting as a mentor or 'buddy' to study participants." Universal Interventions Only	Tobacco, alcohol and/or drug use - tobacco use (including smokeless tobacco) or alcohol use, such as frequency of use or volume consumed.	17 (Sample Size Range: 100-9811)	"... identified evidence that peer-led interventions can be effective in preventing tobacco, alcohol and possibly cannabis use among young people, providing scope for considering the further development and evaluation of such	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Comparator: Usual practice, no intervention or teacher, adult or professional-led intervention. Intervention delivered in multiple settings.	Participant views included? Y- (Self-reported outcome measures)		programmes to strengthen the evidence base around effective means of prevention. Our findings, however, are somewhat limited by the poor quality of the evidence." (Applicability: C)	
Onrust et al. (2016)[9]	The present study provides an overview of universal and targeted programmes, while distinguishing four age groups and examining which intervention characteristics are the effective components for the respective groups.	Included studies: Controlled Studies. Searches: from 1966 - 2013 Grey literature: N Experts consulted: N Meta-Analysis	NR	"Elementary, middle or high school students" Age: 4-21 years Gender: NR	School-based Substance Use Prevention Programmes Universal and targeted interventions Comparator: NR Intervention delivered in primary and secondary schools	Behavioural outcomes in substance use (smoking, alcohol use and drug use) Participant views included? NR	241 (n= 43,6180 participants)	"To summarize, our study demonstrates that it makes good sense to adopt a developmental perspective when designing and offering preventive interventions for substance use in youngsters. All developmental periods offer different possibilities for the prevention or reduction of substance use fitting in with the primary developmental tasks and changes defining each developmental stage." (Applicability: NR)	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Petrie et al. (2007)[226]	To assess the effectiveness of parenting programmes in preventing or reducing use, misuse or abuse of drug, alcohol or tobacco by children under the age of 18 years	Included studies: RCTs; controlled trials and controlled before/after studies. Searches: from Inception - 2003 Grey literature: Y Experts consulted: Y Narrative analysis	USA; Russia; Australia; Norway	"Parents with children <18 years of age." Age: range: 5-18 years (Children) Gender: NR	Parenting Programmes: "we defined 'parenting programmes' as any intervention involving parents which was designed to develop parenting skills, improve parent/child communication or enhance the effects of other interventions, e.g. classroom-based programmes." Universal interventions only Comparator: Parenting programme versus no programme and parenting programme versus other type of intervention such as school- or community-based programme. Intervention delivered in multiple settings.	(i) smoking, drinking or drug use by child; (ii) intention of child to participate in smoking, drinking or using drugs; (iii) alcohol and drug-related risk behaviours in child such as criminal offending, anti-social behaviour, risky sexual behaviour and (iv) antecedent behaviours such as truancy, conduct disorders or poor academic performance. Participant views included? Y/N? details if yes	20 (n=36,323 participants)	"We concluded that parenting programmes 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 further the change processes involved in such interventions and their long-term effectiveness." (Applicability: D)	LOW

Table 4. Reproductive and Sexual Health

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
CONDOM USE									
Lopez et al. (2013)[237]	To identify interventions associated with effective condom use as measured with biological assessments, which can provide objective evidence of protection.	Included studies: RCTs Searches: from inception to 2013 Grey literature: Y Experts consulted: Y Narrative synthesis	Africa; South Africa; USA; UK	Heterosexual M/F; adolescents (n=3 RCTs); young women (n=2 RCTs) Age range: NR Gender: mixed	Behavioural interventions "behavioral intervention addressed the use of condoms specifically, that is, had an educational or counselling component to encourage or improve condom use." Universal and targeted interventions Comparator: Condom counselling described as 'standard' or 'routine' or standard contraception counselling or deferred Intervention. Intervention delivered in multiple settings	Pregnancy (test result or birth record); HIV (test result); STI (test result); Presence of semen as assessed with a biological marker, e.g., prostate-specific antigen Participant views included? Y (self-reported outcome measures)	7 RCTs (and 8 secondary articles) (n= 6 cRCTs ranged from 2157 to 15,614 8451 participants)	"Few studies and little clinical evidence of effectiveness for interventions promoting condom use for dual protection. We did not find favourable results for pregnancy or HIV, and only found some for other STI. The overall quality of evidence was moderate to low; losses to follow up were high" (Applicability: D)	LOW
HIV PREVENTION									
Johnson et al. (2013)[235]	To provide an updated review of the efficacy of behavioural interventions to reduce sexual risk of HIV among adolescents.	Included studies: RCTs and quasi-RCTS Searches: from 1985 to 2008 Grey literature: N Experts consulted: N	USA; Canada; Europe; Belize; Mexico; Tanzania; South Africa; England	Adolescents Mean age: Mean: 15 (SD: 2.02) years Gender: mixed (NB: 7 female only studies: 4	Educational, psychosocial or behavioural interventions Universal and targeted interventions Comparator: Wait-list/no treatment control; Standard HIV education intervention	Behavioral dependent measures relevant to sexual risk (Condom use, sexual frequency, condom use skills, interpersonal	67 (n=51240 participants)	"Relative to controls, interventions succeeded at reducing incident STIs, increasing condom use, reducing or delaying penetrative sex, and increasing skills to negotiate safer sex and to acquire	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Performed MA		male only studies)	Intervention delivered in multiple settings	communication skills, condom acquisition, and incident STIs) Participant views included? Y (self-reported outcome measures)		prophylactic protection. Initial risk reduction varied depending on sample and intervention characteristics but did not decay over time." (Applicability: D)	
Underhill et al. (2007)[242]	To assess the effects of abstinence-only programs for HIV prevention in high-income countries.	Included studies: RCTs and quasi-RCTS Searches: from 1980-2007 Grey literature: Y Experts consulted: Y Narrative synthesis	USA	Adolescents or young adults in the USA Mean age range: 10.6 - 19.25 years; Median 12.8 years Gender: mixed (NB: 1 female only study)	Abstinence-only interventions "Abstinence-only programs primarily encourage participants to refrain from sexual activity. They are designed to teach the social, health-related, and psychological benefits of abstaining from sexual activity; at the same time, most programs note the potential harms of sexual activity outside marriage. The interventions encourage both primary abstinence and secondary abstinence". Universal interventions only Comparator: No intervention; Attention control; Interventions that did not encourage abstinence as a primary outcome (e.g., condom promotion programs); Abstinence-plus programs; Comparisons between enhanced and non-enhanced	Outcomes: NR Participant views included? Y (self-reported outcome measures)	8 (13 trials) (n= approx. 15940 participants)	"Evidence does not indicate that abstinence-only interventions effectively decrease or exacerbate HIV risk among participants in high income countries; trials suggest that the programs are ineffective, but generalizability may be limited to US youth". (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					versions of the same program; Usual care (as defined by the trialists). Intervention delivered in multiple settings				
Underhill et al. (2008)[241]	To assess the effects of abstinence-plus programs for HIV prevention in high-income countries.	Included studies: RCTs and quasi-RCTS Searches: from 1980-2007 Grey literature: Y Experts consulted: Y Narrative synthesis	USA; Canada	Participants were adolescents or young adults Mean age range: 11.5-19.25 years Gender: mixed (NB: 4 female only studies: 4 male only studies)	Abstinence-plus interventions "These interventions convey the message that sexual abstinence is the best or safest behaviour choice; interventions encourage both primary abstinence and secondary abstinence. Abstinence-plus programs then also encourage sexually active participants to use condoms, limit their number of sexual partners, or practice other safer-sex behaviours. Abstinence-plus interventions also typically include extensive information on sexually transmitted infections, pregnancy, contraception, and HIV." Universal interventions only Comparator: No Intervention; Attention Control; interventions that did not encourage abstinence as a primary outcome (e.g. condom promotion programs, didactic HIV information sessions); abstinence-only programs; comparisons	Biological Outcomes: HIV incidence; STI incidence; Pregnancy incidence Participant views included? Y (self-reported outcome measures)	37 (39 trials) (n=approx. 37724 participants)	"Many abstinence-plus programs appear to reduce short-term and long-term HIV risk behaviour among youth in high-income countries. Evidence for program effects on biological measures is limited. Evaluations consistently show no adverse program effects for any outcomes, including the incidence and frequency of sexual activity" (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					between enhanced and non-enhanced versions of the same program; usual care (as defined by the trialists). Intervention delivered in multiple settings				
SEXUAL HEALTH									
Bailey et al. (2010)[231]	To determine effects of interactive computer-based interventions (ICBI) for sexual health promotion, considering cognitive, behavioural, biological and economic outcomes.	Included studies: RCTs, cRCTs Searches: from inception – 2007 Grey literature: Y Experts consulted: N Narrative synthesis and MA	USA (online)	Adolescents (n=6); Adult MSM (n=4); University or College Students (n=3) Male Soldiers (n=1); Adults at risk of HIV (n=1) Age range: NR (1 Study MSM 18+) Gender: mixed (NB: 4 female only studies: 5 male only studies)	Interactive Computer-Based Interventions (ICBI) "Programmes that provide information and also decision support, behaviour change support, and/or emotional support for health issues. 'Interactive' programmes require contributions from users to produce tailored material and feedback that is personally relevant." Universal and targeted interventions Comparator: Minimal Intervention; Non-computerised Intervention; 2 different designs of computerised Intervention Intervention delivered online (Face-to-Face - no setting provided)	Cognitive, behavioural and biological outcomes Participant views included? N	15 (17 papers) (n=3917 participants)	"ICBI are effective tools for learning about sexual health, and they also show positive effects on self-efficacy, intention and sexual behaviour". Consumer Advisory Group consulted helped to refine the aims of the SR, to interpret results, and to consider the implications of findings. Results from adolescent subgroup not well represented. (Applicability: C)	LOW
Kim and Free (2008)[236]	Conducted an SR and methodological	Included studies: RCTs and quasi-RCTS	USA; Africa, UK, Italy	Adolescents aged 10-19 years	Peer-Led Sex Education Interventions	Occurrence of pregnancy or STIs, age at first	13	"Despite promising results in some trials, overall findings do	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	appraisal of randomised and quasi-randomized controlled trials of peer-led sex education interventions.	Searches: from 1998 – 2005 Grey literature: N Experts consulted: N Narrative synthesis and MA		Age range: 13-18 years Gender: mixed	"Defined as the teaching or sharing of information, values, and behaviours by members of similar age or status group" Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	sex, number and types of sexual partnerships, condom use and contraceptive use Participant views included? Y (self-reported outcome measures)	(n=24756 participants)	not provide convincing evidence that peer-led education improves sexual outcomes among adolescents" . (Applicability: B)	
STI Prevention General									
Cooper et al. (2014)[374]	To explore opportunistic sexual and reproductive health services for sexual health communication delivered at primary health care level.	Included studies: RCTs and controlled clinical studies Searches: from 1980 – 2010 Grey literature: Y Experts consulted: Y Narrative synthesis	USA; Puerto Rico; Australia; New Zealand; Madagascar; Mexico; South Africa; Taiwan; UK	All ages, from adolescence onwards, were included. Participants could be of any gender, sexually active, not sexually active, and of any sexual orientation. Age Range: 12-45 years (Age: NR in 18 studies) Gender: mixed (NB: 12 female	Brief Sexuality Counselling "...Interventions needed to be brief (10–60 minutes) and include some aspect of communication or counselling on sexual health issues." Universal and targeted interventions Comparator: No intervention; Standard Care; Alternative Intervention Intervention delivered in primary healthcare settings	Decrease negative sexual health outcomes and/or improve positive sexual health outcomes Participant views included? Y (self-reported outcome measures)	31 (Range: 89-38635 participants)	"Brief sexuality communication can have a significant impact on health behaviour and outcomes. These interventions can be singular and can occur within a primary care visit. Interventions are effective among a variety of groups, including high-risk populations. They are effective in reducing STIs and reducing high-risk sexual behaviour, as well as improving knowledge, attitudes and behaviours"	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
				only studies: 4 male only studies)				Only 8/31 studies indicate inclusion of adolescents. (Applicability: C)	
Shepherd et al., (2010)[240]	To assess the effectiveness and cost-effectiveness of bias of schools-based skills building behavioural interventions to encourage young people to adopt and maintain safer sexual behaviour and to prevent them from acquiring STIs.	Included studies: Mapping: Outcome evaluations (RCTs or non-RCTs); SR: RCTs Economic Evaluations; Modelling Studies Searches: SR: 1985-2008; EE: 1990-2008 Grey literature: N Experts consulted: N Performed MA	SR: USA; UK - Scotland & England; South Africa; Europe; Africa EE: USA	Young people aged 13–19 years SR: Mean: 18.3 (SD: 1.1.) years; Range 12-18 EE: 13-21 years Gender: mixed (NB: 1 male only study)	Behavioural Intervention "'any activity to encourage young people to adopt sexual behaviours that will protect them from acquiring STIs'" Universal and targeted interventions Comparator: Standard practice: Standard sex education; control group (i.e. no intervention, delayed intervention, non-sex education intervention): teacher-led behavioural intervention (for peer-led interventions) Intervention delivered in multiple settings	Initiation of sexual intercourse; condom use; sexual intercourse; contraception and pregnancy; and sexual partners Participant views included? Y (self-reported outcome measures)	Mapping: 136 SR: 15 EE: 5 (SR: n= 35557 participants; EE: n=4355 (2/5 NR))	"School-based behavioural interventions for the prevention of STIs in young people can bring about improvements in knowledge and increased self-efficacy, but the interventions did not significantly influence sexual risk-taking behaviour or infection rates". "Young people should be involved as equal stakeholders in the design and delivery of interventions" (Applicability: C)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
UNINTENDED PREGNANCY									
Blank et al. (2010)[232]	To determine the effectiveness of contraception service interventions for young people that were delivered in educational settings.	Included studies: Any type of Study (e.g. RCTs; CBA, ITS) Searches: from 1995 – 2008 Grey literature: N Experts consulted: N Narrative synthesis	USA	Young people aged 19 years and under Age range: 11-24 years (NB. Age: NR in some studies) Gender: mixed (NB: 1 female only studies: 1 male only study)	Contraceptive Service Interventions "Interventions to provide contraception services for young people (or information to encourage young people to use established services), (which were delivered in educational settings)." Universal and targeted interventions Comparator: NR Intervention delivered in multiple (educational) settings	Rate of teenage pregnancy; rate of contraceptive use; and sexual behaviour Participant views included? Y (self-reported outcome measures)	29 (n= approx. 28249 participants (1 NR; 1 range provided)	"Intensive case management intervention conducted by a culturally matched school-based social worker (along with other components including peer education) were shown to be effective in preventing repeat adolescent pregnancy, at least for the duration of the intervention. Also, school-based health centres appear to be most effective when contraception provision is made available on site." (Applicability: D)	UNCLEAR
Blank et al (2012)[233]	To determine the effectiveness of contraception service interventions for young	Included studies: Any type of Study (e.g. RCTs; CBA, ITS) Searches: from 1995 – 2008 Grey literature: N	USA; Scotland; Canada; Sweden; UK	Young people aged <25 years Age range: 12-25 years (3 NR)	Contraceptive service Interventions "Interventions to provide contraceptive service provision to young people (or to encourage young people to use contraceptive services), which are delivered on health care premises	Provision of contraception and/or advice; contraception use; pregnancy and moderated behaviour	23 (n=approx. 219234 participants) (1 NR)	"The literature in general is not well developed in terms of good quality effectiveness studies and key outcome measures. However, it is possible to make recommendations in	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	people delivered in health care premises	Experts consulted: N Narrative synthesis		Gender: mixed (NB: 3 female only studies)	in developed countries, including interventions with an outreach element (where the majority of the service provided is delivered in the clinic)" Universal and targeted interventions Comparator: Any Intervention delivered in healthcare settings	Participant views included? Y (self-reported outcome measures)		terms of outreach versus targeted young people's services in health care settings, advanced provision of emergency contraception and long-acting reversible contraception to prevent repeat adolescent pregnancy" (Applicability: D)	
Lopez et al. (2014)[238]	To identify effective interventions for preventing pregnancy as well as HIV/STI transmission	Included studies: RCTs and non-RCTS Searches: from inception – 2014 Grey literature: Y Experts consulted: Y Narrative synthesis and MA	USA	Heterosexual; Participants were at risk for pregnancy or HIV/ STI. Adolescent girls (n=2); young Women (n=1); women up to age of 35 (n=1) Age range: 13-35 years Gender: although both sex were	Behavioural Interventions "Behavioural interventions to improve dual-method use typically involve counseling or educating individuals or groups. Programs may be based on direct oral communication and written materials. Broader educational programs and communication campaigns may also be included" Targeted interventions only Comparator: Routine services Intervention delivered in multiple settings	Reported use of dual methods, i.e., condoms plus another modern contraceptive method Participant views included? Y (self-reported outcome measures)	4 (n=2078 participants)	Insufficient evidence to guide practice or program development. "One multifaceted program showed the intervention group had more reporting of consistent dual-method use. The program involved case management and a peer leadership component, i.e., youth development. The other two trials were more applicable to clinical settings, but neither showed an effect on reported dual-method use or	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
				included, only 4 studies with female only popn were identified				rates for pregnancy or STIs" (Applicability: D)	
Oringanje et al. (2009)[239]	To assess the effects of primary prevention interventions (school-based, community/ home-based, clinic-based, and faith-based) on unintended pregnancies among adolescents.	Included studies: RCTs Searches: from inception – 2008 Grey literature: Y Experts consulted: Y Narrative synthesis	USA; England; Canada; Italy; Mexico; Scotland	Adolescents aged 10-19 years Age range: 9-24 years Gender: mixed (NB: 11 female only studies: 1 male only study)	Primary (Unintended Teenage Pregnancy) Prevention Interventions "Any activity designed to: increase adolescents' knowledge and attitudes about the risk of unintended pregnancies, promote delay in initiation of sexual intercourse, encourage consistent use of birth control methods and reduce unintended pregnancies" Universal and targeted interventions Comparator: No additional activity/intervention to existing conventional population-wide activities Intervention delivered in multiple settings	Unintended pregnancy Participant views included? Y (self-reported outcome measures)	41 (n=95662 participants)	"Combination of educational and contraceptive interventions appears to reduce unintended pregnancy among adolescents. Evidence for program effects on biological measures is limited. The variability in study populations, interventions and outcomes of included trials, and the paucity of studies directly comparing different interventions preclude a definitive conclusion regarding which type of intervention is most effective." (Applicability: C)	LOW
Wakhisi et al. (2011)[243]	To determine the effectiveness	Included studies: controlled trials or	USA; UK	Adolescents aged 11-19 years	Social Marketing	Change in number of unintended	12	Of the 12 studies, 9 reported significant effects on at least	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	of a social marketing approach in reduction of unintended teenage pregnancies	before and after studies Searches: from 1990 – 2008 Grey literature: Y Experts consulted: Y Narrative synthesis		Age range: Grade 6-12 (11-19 years old) Gender: mixed	"intervention must include: consumer research, specific behaviour change goal, segmentation and targeting, marketing mix, exchange, and competition." Universal and targeted interventions Comparator: Teacher or health professional led with less activities and contact time for participants or minimal involvement for participants Intervention delivered in multiple settings	pregnancies, delay in sexual initiation/ abstinence among participants, contraceptive use, knowledge of contraception and reproductive health, and self-efficacy to refuse unwanted sexual intercourse Participant views included? Y (self-reported outcome measures)	(n=31921 participants)	one of the outcomes. Long-term interventions were generally more effective than short-term ones for most outcomes. The impact on male participants' sexual behaviour was minimal in most studies." . (Applicability: B)	

Table 5. Violence and Abuse Free Living

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
BULLYING AND CYBER-BULLYING									
Farrington and Ttofi (2009)[245]	To review the effectiveness of programs designed to reduce school bullying perpetration and victimisation (i.e. being bullied).	Included studies: RCTs, CBA, other experimental control comparisons; quasi-experimental age-cohort designs Searches: from 1983 – 2009 Grey literature: Y Experts consulted: Y Performed MA	USA; Europe; Canada; Korea; England; Australia; South Africa; New Zealand; Ireland	Participants: NR Age range: 5 – 19 years Gender: mixed (NB: 1 male only study)	School-based Anti-bullying programmes "...a program designed specifically to reduce school (kindergarten to high school) bullying." Universal interventions only Comparator: NR Intervention delivered in primary and secondary school settings	Numbers of bullies/non-bullies (or victims/ non-victims) Participant views included? Y (self-reported outcome measures)	89 (Participant number NR: but > 30000)	"School-based anti-bullying programs are often effective, and that particular program elements were associated with a decrease in bullying and victimization. We conclude that, on average, bullying decreased by 20% - 23% and victimization by 17% – 20%. The effects were generally highest in the age-cohort designs and lowest in the randomised experiments" (Applicability: C)	UNCLEAR
Mishna et al. (2009)[252]	To examine the effectiveness of cyber abuse interventions in increasing Internet safety knowledge and	Included studies: "Experimental or two-group quasi-experimental design" Searches: "last 10 years" Grey literature: Y	USA; Canada	Children and youth between the ages of 5 –19 years and/or their parents (who use the Internet or cell phones)	Cyber Abuse Prevention and Intervention Programmes: "1. Technological and software initiatives used with children and adolescents to block or filter access to inappropriate online content; 2. Online and offline cyber abuse preventive interventions for children and youth delivered	Cyber abuse of children and adolescents; Risky behaviours by children and adolescents; Knowledge related to cyber abuse; Negative	3 (n=2713 participants)	"Results indicated that participation in psychoeducational Internet safety interventions is associated with an increase in Internet safety knowledge but is not significantly associated with a	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	decreasing risky online behaviour.	Experts consulted: Y Narrative synthesis		Age range: 10 – 13 years Gender: mixed	through any medium (including face-to-face presentations, video games, interactive software, etc.); 3. Online and offline cyber abuse preventive interventions for parents to protect children from cyber abuse; 4. Therapeutic interventions for children and youth who have experienced cyber abuse." Universal interventions Comparator: NR Intervention delivered in primary and secondary school settings	impact on psychological state among those who have been victimised by cyber abuse. Participant views included? Y (self-reported outcome measures)		change in risky online behaviour. The need for further research in this field is highlighted." (Applicability: D)	
GANG INVOLVEMENT									

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Fisher et al. (2008)[251]	To determine the effectiveness of cognitive-behavioural interventions for preventing youth gang involvement for children and young people (ages 7-16).	Included studies: RCTs, quasi-RCTs Searches: from inception – 2007 Grey literature: Y Experts consulted: Y Analysis: NA	NA	Children and young people aged 7-16 not involved in a gang Age range: NA Gender: NA	Cognitive-Behavioural Interventions "... designed to address these cognitive deficits and learning patterns in order to reduce maladaptive or dysfunctional behaviour" Comparator: No intervention or comparisons against other interventions, specifically designed for gang or delinquency prevention or other social services or support interventions being delivered to the control group Intervention delivered: NA	Gang membership status (dichotomous); and Conviction for gang-related delinquent behaviour and criminal offences, including homicide, assault, robbery, burglary, and drug trafficking Participant views included? NA	No trials identified	"No randomised controlled trials or quasi-randomised controlled trials were identified." (Applicability: NA)	LOW
Fisher et al. (2008)[250]	To determine the effectiveness of opportunities provision for preventing youth gang involvement for children and young people aged 7 to 16.	Included studies: RCTs, quasi-RCTs Searches: from inception – 2007 Grey literature: Y Experts consulted: Y Analysis: NA	NA	Children and young people aged 7-16 not involved in a gang Age range: NA Gender: NA	Opportunities Provision Gang Prevention Programmes "... a gang prevention strategy derived from this theory about why youth become involved in gangs based on the premise that providing the relevant educational and employment opportunities at various developmental stages will reduce the need or motivation for young people to join gangs. Opportunities provision thus encompasses tutoring, supplementary or remedial education, job training and	Gang membership status (dichotomous); and Gang-related delinquent behaviour and criminal offences, including homicide, assault, robbery, burglary, and	No trials identified	""No randomised controlled trials or quasi-randomised controlled trials were identified."" (Applicability: NA)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					preparation, job development, job placement, and other programmes designed to increase economic or educational opportunities or enable youth to take advantage of them" Comparator: NR Intervention delivered: NA	drug trafficking (objective measures such as arrest and subjective measures such as self-report were acceptable) Participant views included? NA			
SEXUAL ABUSE									

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Walsh et al. (2015)[253]	To systematically assess evidence of the effectiveness of school-based education programmes for the prevention of child sexual abuse	Included studies: RCTs, quasi-RCTs Searches: from 2006 – 2014 Grey literature: Y Experts consulted: N Performed MA	USA; Canada; China; Germany; Spain; Taiwan; Turkey	Children (aged 5 – 12 years and adolescents (aged 13 – 18 years) Mean age range: 5.8-13.44 years (NR in 8 studies) Gender: mixed (NB: 1 female only study)	School-based education programmes Universal and targeted interventions Comparator: No intervention or standard school curriculum Intervention delivered in primary and secondary school settings	Protective behaviours (as measured by an independently scored simulation test); Knowledge of sexual abuse or knowledge of sexual abuse prevention concepts, or both (as measured by questionnaires or vignettes); Retention of protective behaviours over time; Retention of knowledge over time; Harm, manifest as parental or child anxiety or fear (as measured by questionnaires); and Disclosure of sexual abuse by child or adolescent during or after programmes	24 (29 reports) (n= 5802 participants)	"Evidence of improvements in protective behaviours and knowledge among children exposed to school-based programmes, regardless of the type of programme. There is evidence that children's knowledge does not deteriorate over time, although this requires further research with longer-term follow-up. Programme participation does not generate increased or decreased child anxiety or fear; however there is a need for ongoing monitoring of both positive and negative short- and long-term effects." (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
						Participant views included? Y (self-reported outcome measures)			
TEEN DATING VIOLENCE									
De La Rue et al. (2014)[244]	To evaluate and synthesize the efficacy of school-based interventions	Included studies: Experimental or quasi-experimental design with a control group; pre-post-test studies.	USA; Canada	4th-12th grade students	School-based dating violence prevention programs ".. designed to reduce teen dating violence. The intervention could also seek to change other outcomes (e.g., bullying	Attitudes about teen dating violence behaviours; Frequency of engagement in	23 (n= 17969 participants)	"Prevention programs do have an impact on teen dating violence knowledge and attitudes. At post-test, students in the	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	that sought to reduce or prevent teen dating violence or sexual violence in intimate relationships	Searches: from 1960 – 2013 Grey literature: Y Experts consulted: Y Performed MA		Age range NR (6-12th Grade: 11-17 years) Gender: mixed	perpetration, sexual harassment, etc.); however, a clear goal, as provided by the authors, must have stated that the program sought to explicitly reduce teen dating violence behaviours, change attitudes supportive of teen dating violence, increase bystander intervention to reduce perpetration, or increase peer support for victims of dating violence." Universal and targeted interventions Comparator: Wait-list control, treatment-as-usual, and straw-man designs Intervention delivered in secondary school settings	adolescent intimate partner violence behaviours; including perpetration of: Frequency of victimization in adolescent intimate partner violence behaviours, including being a victim of: Knowledge about teen dating violence and what behaviours constitute teen dating violence Recognizing both safe and unhealthy behaviours in intimate partner disputes; Skill development to appropriately manage conflicts in intimate partner		intervention conditions increased their knowledge and endorsed attitudes that were less accepting of violence in relationships. In addition, at post-test, prevention students were less accepting of rape myths and reported an increased awareness of appropriate approaches to conflict resolution. The positive results for teen dating violence knowledge and attitudes were supported at follow-up. However, the results for dating violence perpetration and victimization were less encouraging... the results indicated that prevention programs are not impacting these behaviours to a great extent." (Applicability: D)	

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
						disputes and/or to prevent victimization in an intimate partner relationship; Learning how to be a bystander who intervenes when dating violence is perpetrated or learning how to support a victim of dating violence Participant views included? Y (self-reported outcome measures)			
Fellmeth et al. (2013)[248] Fellmeth et al. (2015)[375]	To assess the efficacy of educational and skills-based interventions designed to prevent relationship and dating violence in adolescents and young adults	Included studies: RCTs, cRCTs, quasi-RCTs Searches: from inception – 2012 Grey literature: Y Experts consulted: Y Performed MA	USA; Korea	Adolescents aged 12 to 18 years and young adults aged 19 to 25 years in any setting. Approx. mean age range: 12.8-23.9 years	Educational and skills-based interventions "...interventions that actively provide the participants with knowledge and skills aimed at preventing initial or further relationship violence." Universal and targeted interventions Comparator: No intervention, placebo intervention (e.g.	Reduction in the number of episodes of relationship and dating violence experienced; reduction in injuries resulting from relationship and dating violence experienced; self reported subjective	38 (n=15903 participants)	"No evidence of effectiveness of interventions on episodes of relationship violence or on attitudes, behaviours and skills related to relationship violence. We found a small increase in knowledge but there was evidence of substantial	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
				(NB: Not all mean ages reported) Gender: mixed (NB: 5 female only studies; 10 male only studies)	provision of first aid classes) or standard care Intervention delivered in multiple settings	improvement in mental well-being; adverse events Participant views included? Y (self-reported outcome measures)		heterogeneity among studies." (Applicability: D)	

Table 6. Active Living

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
LOW PHYSICAL ACTIVITY									
Baker et al. (2015) [376]	To determine the effects of community wide, multi-strategic interventions upon community levels of physical activity	Included studies: Cluster-RCTs; RCTs; quasi-experimental designs which used a control population for comparison, ITS, and prospective controlled cohort studies Searches: from 1995-2014 Grey literature: Y Experts consulted: Y Narrative synthesis	North America, Australia, Japan, Europe, Pakistan, Vietnam, China, Iran	Persons of any age residing in a geographically defined community, such as urban, peri-urban, village, town, or city Approximate range: 11-102 years Gender: NR	Whole of Community Approach (Physical Activity) "1. Social marketing through local mass media (e.g. television (TV), radio, newspapers). 2. Other communication strategies (e.g. posters, flyers, information booklets, websites, maps) to raise awareness of the project and provide specific information to individuals in the community. 3. Individual counselling by health professionals (both publicly and privately funded), such as the use of physical activity prescriptions. 4. Working with voluntary, government and non-government organisations, including sporting clubs, to encourage participation in walking, other activities and events. 5. Working within specific settings such as schools, workplaces, aged care centres, community centres, homeless shelters, and	Physical Activity (could be quantified using a variety of measurements, for example percentage of people active or inactive, frequency of physical activity, percentage meeting recommendations, percentage undertaking active travel; and other objective (for example accelerometers, pedometers) or subjective methods (for example self-reported questionnaires, diaries) Participant views included? Y (self-reported outcomes)	33 267 communities. Population range: less than 1000 to 1,895,856	"Overall, we still found no consistent evidence to support the effectiveness of multi-component community wide interventions to increase population levels of physical activity, with the weight of the evidence indicating no increase in physical activity levels" (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					shopping malls. This may include settings that provide an opportunity to reach disadvantaged persons. 6. Environmental change strategies such as creation of walking trails and infrastructure with legislative, fiscal or policy requirements, and planning (having ecological validity) for the broader population.")." Universal interventions only Comparator: Existing programmes and infrastructure Intervention delivered in community settings				
Barnett et al. (2011)[336]	To investigate the level of EE attained during participation in AVG and whether and how participation is sustained at a beneficial frequency and duration	Included studies: NR Searches: from inception - 2009 Grey literature: N Experts consulted: N Performed MA	NR	Youth (18 years or younger) Age range: 6-18 years Gender: mixed	Active Video Games "For the purpose of this review, a video game was considered an AVG if the game was controlled by body movements greater than the finger and wrist movement typical of hand controller based games (e.g., games in the role playing, maze, fighter, and construction and management genres)."	EE outcomes Participant views included? Y (self-reported outcomes)	13 (n=324 participants)	"AVGs, like many activities, can elicit PA of recommended intensity, sustainable play has yet to be demonstrated. The popularity of video game play is seen as an indicator that maintenance of play is possible, but some studies highlight	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Universal and targeted interventions Comparator: NR Intervention delivered in which setting(s)?: NR			barriers to this occurring" (Applicability: NA)	
Chillon et al. (2011)[337]	To review intervention studies related to active school transportation to guide future intervention research	Included studies: all study designs Searches: from inception - 2010 Grey literature: Y Experts consulted: N Narrative synthesis	USA; Australia; UK	Children and adolescents (6-18 years) (and parents) Age range: Children: 5-15 years; Parents: 20-59 years Gender: NR	Active transportation to school Interventions "defined as the use of active means, such as walking and bicycling to and from school." Universal interventions Comparator: NR Intervention delivered in primary school settings only	Active transportation or PA Participant views included? Y (self-reported outcomes)	14 (Range: 11-2000 participants; Parents: 5645 Children: 12987 (1 NR)	"Interventions with appropriate school, parent, and community involvement and that work toward a specific goal (i.e., increasing active transportation) seemed to be more effective than interventions that were broader in focus. Interventions evidenced a small but promising effectiveness in increasing active transportation to school." (Applicability: C)	UNCLEAR
Demetriou and Honer (2012)[338]	To review the effectiveness of school-based interventions	Included studies: controlled trials Searches: NR - 2010	USA; UK; Greece; Ireland; Finland; Canada;	Students between the ages of 6 and 19 Gender: mixed (NB: 9 female only	School-based PA interventions: "PA component implemented during	Students' levels of PA (behaviour level), the health and fitness of the students (health	57	"Numerous school-based physical activity interventions achieved positive	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	with a PA component by measuring changes in psychological determinants, PA, and health outcomes	Grey literature: N Experts consulted: N Narrative synthesis	Belgium; Australia	studies:4 male only study)	physical education lessons or regular school hours." Universal interventions Comparator: NR Intervention delivered in multiple settings	and fitness level), and the psychological determinants of PA (psychological determinants level) Participant views included? Y (self-reported outcomes)		effects on three target levels.... Majority of the studies examining motor performance, PA, and knowledge of PA achieved significant results (69.7%, 56.8% & 87.5% respectively). Significant effects on self-concept and attitudes were also found but to a smaller extent" (Applicability: C)	
Dobbins et al. (2013)[256]	To summarise the evidence of the effectiveness of school-based interventions in promoting PA and fitness in children and adolescents	Included studies: RCTs Searches: from 2007 - 2011 Grey literature: N Experts consulted: Y Narrative synthesis	USA; Australia; Canada; India; Belgium; China; Greece; Portugal; Spain; Mexico; Switzerland	Children and adolescents aged 6 to 18 years Approx. mean age range: 6.9-16.1 years Gender: mixed (NB: 8 female only studies: 1 male only study)	(School-Based) Physical Activity and Fitness Promotion Programmes "educational, health promotion, counselling, and management strategies focused on the promotion of PA and fitness that were or could be provided by public health professionals" Universal and targeted interventions Comparator: Standard, currently existing physical education programs in schools	Rate MVPA; Duration of PA (time spent engaged in MVPA); Television viewing (time spent watching TV). Participant views included? Y (self-reported outcomes)	44 (number of trials here) (n=36593 participants)	"Evidence suggests the on-going implementation of school-based physical activity interventions at this time, given the positive effects on behaviour and one physical health status measure...However the magnitude of effect is generally small, so these results should be interpreted cautiously. Additional research	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Intervention delivered in multiple settings			on the long-term impact of these interventions is needed." (Applicability: D)	
Dudley et al. (2011)[257]	To review the evidence from experimental and quasi-experimental studies of curriculum interventions using physical education and school sport that aimed to promote PA, increase movement skill proficiency and enjoyment of physical activity in children and youth	Included studies: RCTs, cRCTs, CCTs and experimental pilot studies if they included a control group Searches: from 1990 - 2010 Grey literature: N Experts consulted: Y Narrative synthesis	Australia; USA; Greece; Belgium; Canada; UK; Netherlands	School-aged children and youth with a mean age between 5 - 18 years Approx. mean age range: 8.1-16.5 years (Not all mean ages reported) Gender: mixed (NB: 5 female only studies)	Physical Education and School Sport Interventions "Well-designed PE curriculum to maximize physical activity during lessons (the target being 50 percent of PE class time spent in MVPA)" Universal interventions only Comparator: NR Intervention delivered in primary and secondary school settings	Movement skill proficiency, and/or PA participation, and/or enjoyment of PA Participant views included? Y (self-reported outcomes)	23 (Range: 38-25000 participants)	"Evidence was found that the most effective teaching strategy to increase children's levels PA and improve movement skill proficiency in primary schools was direct instruction, a prescribed curriculum, adopting a whole-school approach to PA and providing teachers with sufficient, on-going professional development in using PE instruction methods and curriculum. For secondary schools, using a combination of prescribed curriculum with elements of student choice and substantial teacher professional development	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								combined with sufficient teaching resources have the potential to make important differences to levels of PA participation and should be promoted" (Applicability: C)	
Gao and Chen (2014)[258]	This review synthesises the impact of field-based exer-games on children's physical and psychosocial outcomes	Included studies: RCTs; Non-RCTs; pre-post designed studies Searches: from 1985 - 2013 Grey literature: Y Experts consulted: N Narrative synthesis	USA; Europe; New Zealand; Asia; Canada	Children and/or Adolescents (18 years and younger). Children and Adolescents (n=22) Children only (n=8) Adolescents only (n=4) Age: 7 – 19 years Gender: mixed	(Field-Based) Exer-games: "Integrate exercise and gaming entertainment." Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Obesity-related outcomes (Physiological and Psychosocial) Participant views included? Y (self-reported outcomes)	34 (n=3779 participants)	"The effects of field-based exer-games on children's habitual physical activity (PA) and obesity-related outcomes (e.g. weight loss, body composition) remain unclear due to design problems, measurement issues and other methodology concerns" (Applicability: C)	LOW
Gao et al. (2015)[259]	To examine the physiological and psychological responses of AVGs in comparison to SB (e.g. playing	Included studies: NR Searches: from 1985 - 2015 Grey literature: N	NR	Children/adolescents (18 years and younger) Age range: 7.5-15.2 years Gender: NR	Active video games Description of intervention here in "quotes" Universal and targeted interventions	Psychological (self-efficacy (towards AVGs/PA), enjoyment/ liking, attitudes, intention, situational interest	35 (n=3339 participants)	"Compared with SB, AVGs had a large effect on health outcomes. The effect sizes for physiological outcomes were marginal when	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	sedentary video games), laboratory-based exercise (e.g. running, walking) and field based PA (e.g. recess, dance), respectively, among youth	Experts consulted: N Performed MA			Comparator: NR Intervention delivered in multiple settings	and intrinsic motivation towards AVGs) and Physiological outcomes (energy expenditure, heart rate, VO2 max, metabolic equivalent (MET), PA, rate of perceived exertion, body composition and cardiovascular fitness) Participant views included? Y (self-reported outcomes)		comparing AVGs with laboratory-based exercises. The comparison between AVGs and field-based PA had null to moderate effect sizes. AVGs could yield equivalent health benefits to children/adolescents as laboratory-based exercise or field-based PA. Therefore, AVGs can be a good alternative for SB and addition to traditional physical activity and sports in children/ adolescents." (Applicability: NA)	
Korber (2015)[260]	To evaluate the currently available evidence on the cost-effectiveness of programs encouraging PA in children and adolescents	Included studies: Economic evaluation Searches: from inception - 2015 Grey literature: N Experts consulted: N	Australia; New Zealand; USA; Germany; UK	Infants and adolescents Age range: 5-17 years Gender: mixed	PA Promotion Programmes "All programs that aimed to encourage PA or prevent physical inactivity were considered, even if they also focused on other parameters besides PA, such as nutrition for example." Universal interventions	Costs; Effects Participant views included? N	14 (Participant no: NR)	"Studies showed wide variation. Findings ranged from US$11.59 for a person to become more active (cheapest intervention) up to US$669,138 for a disability adjusted life year saved (most expensive	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	and to assess their quality				Comparator: NR Intervention delivered in school and community based settings			intervention), with everything in between. Overall, the results of three studies are below a value of US$3061, with one of them even below US$200.00, for the achieved effects. For the other programs, the context-specific assessment of cost-effectiveness is problematic as there are different thresholds for cost-effectiveness in different countries or no clearly defined thresholds at all." (Applicability: C)	
Lai et al. (2014)[261]	To determine whether typically developing children and adolescents (aged 3–18 years) who have participated in school-based interventions	Included studies: RCTs, quasi-RCTs; cohort studies Searches: from 1995 - 2012 Grey literature: N	Australia; Canada; Crete; England; Hong Kong; Iran; Norway; Poland; USA	Participant group aged 3–18 years Mean age: range 6.3-14.8 years Gender: mixed (NB: 1 female only study: 2 studies NR)	Pre-School/ School-Based Interventions Universal interventions Comparator: NR Intervention delivered in primary and secondary school settings	PA, fitness, FMS Participant views included? Y (self-reported outcomes)	14 (Range: 161-5106 participants)	"Of the 13 studies that had PA as an outcome of interest at follow-up, ten found a sustained impact. Whilst only one of the three studies that addressed fitness at follow-up reported a sustained impact, both studies that	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	have sustained outcomes in PA, fitness, and/or FMS	Experts consulted: N Narrative synthesis						assessed FMS reported a sustained impact." (Applicability: C)	
Lau et al. (2011)[262]	To systematically evaluate the efficacy and methodological quality of ICT-based PA interventions for children and adolescents based on evidence from randomised controlled trials	Included studies: RCTs Searches: from 1997 - 2007 Grey literature: N Experts consulted: N Narrative synthesis	USA; UK; Australia; New Zealand	Children (6-12 years old) and adolescents (13-18 years old) Age range: 5 – 18 years Gender: mixed (NB: 2 female only studies: 1 male only study)	Information and Communication Technology (ICT)–Based Interventions "ICT-based intervention is defined as an intervention that employs Internet, email, and/or SMS as one of the intervention delivery modes" Universal and targeted interventions Comparator: Non–ICT-based, no treatment, or different types of ICT-based interventions. Intervention delivered in multiple settings	PA behaviour (which could be cognitive [i.e., PA knowledge], psychosocial [e.g., PA intention, PA self-efficacy, social support to PA, stage of change], or behavioural [i.e., energy expenditure, step counts, or self-reported PA level) Participant views included? Y (self-reported outcomes)	9 (n=1456 participants; range: 57-473)	"Evidence supporting the positive effects of ICTs in PA interventions for children and adolescents, especially when used with other delivery approaches (i.e., face-to-face). Because ICT delivery approaches are often mixed with other approaches and these studies sometimes lack a comparable control group, additional research is needed to establish the true independent effects of ICT as an intervention delivery mode". (Applicability: C)	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
LeBlanc et al. (2013)[263]	To explain the relationship between AVGs and nine health and behavioural indicators in the paediatric population (aged 0–17 years)	Included studies: NR Grey literature: N Experts consulted: Y Narrative synthesis	Canada; USA; Europe; China; England; New Zealand; Scotland;; Australia	Children and youth aged 0–17 years Age range: 3 -19 years Gender: mixed (NB: 1 female only study; 1 male only study; 1 NR)	Active video games Universal interventions only Comparator: NR Intervention delivered in home-based settings	Time spent playing AVG; a health or behaviour indicator Participant views included? Y (self-reported outcomes)	51 (n=1992 participants)	"Overall, AVGs are associated with acute increases in EE, but effects on habitual physical activity are not clear. Further, AVGs show promise when used for learning and rehabilitation within special populations. Evidence related to other indicators was limited and inconclusive" (Applicability: C)	UNCLEAR
Lonsdale et al. (2013)[264]	To systematically review the evidence related to interventions designed to increase active learning time during school PE lessons.	Included studies: RCTs, cross-over RCTs, quasi-RCTs Searches: from inception - 2012 Grey literature: N Experts consulted: N Performed MA	USA; UK; Belgium; Australia	Students from PE classes in primary or secondary schools Age: 8-14 years Gender: mixed (NB: 4 female only studies: 2 male only studies)	PE-Focused Interventions "a deliberate attempt to implement a change to usual teaching practice in order to increase the proportion of PE lesson time spent in MVPA." Universal interventions only Comparator: usual practice condition Intervention delivered in primary and secondary schools	The proportion of PE lesson time spent in MVPA Participant views included? N	14 (Range: 15-1250O participants; median 1O6 participants in the intervention groups)	"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" (Applicability: C)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Meester et al. (2009)[266]	This review was conducted to summarise the effectiveness of interventions to promote PA among European teenagers.	Included studies: NR Searches: from 1995 - 2008 Grey literature: N Experts consulted: N Narrative synthesis	USA; Belgium; UK; Greece; Ireland; Sweden; France; Scotland; Netherlands	Teenagers with an average age between 10 and 19 years Mean age: 10.2-19 years (Not all means reported) Gender: mixed (NB: 3 NR)	Primary interventions (to promote PA)/ PA promotion interventions Universal interventions only Comparator: NR Intervention delivered in multiple settings	PA Participant views included? Y (self-reported outcomes)	20 (n=14203 participants) (1 NR)	" (1) School-based interventions generally lead to short term improvements in PA levels; (2) Improvements in PA levels by school-based interventions were limited to school related PA and there was no conclusive transfer to leisure time PA; (3) Including parents appeared to enhance school-based interventions; (4) PA level of secondary school children increased under the support of peers and the influence of direct environmental changes. (5) Inconclusive evidence was found for the assumption that a multi-component approach should produce synergistic results; (6) When interventions aimed to affect more than	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								one health behaviour the intervention appeared to be less effective in favour of PA" (Applicability: C)	
Metcalfe al. (2012)[267]	To determine whether, and to what extent, PA interventions affect the overall activity levels of children.	Included studies: RCTs, cRCTs, Searches: from 1990 - 2012 Grey literature: N Experts consulted: N Performed MA	NR	Participants aged < 17 years or younger (NB: overweight/ obese participants in 8 studies) Mean age range: 1.8 – 13.1 years Gender: mixed (NB: 2 female only studies: 2 male only studies)	PA Interventions "The intervention must have incorporated a component that aimed to increase PA." Universal and targeted interventions Comparator: control condition must not have incorporated an activity/ exercise related element of any kind. Intervention delivered in multiple settings	Follow-up PA; Whole day activity; Time spent in MVPA Participant views included? N	30 (n=14326 participants)	"This review provides strong evidence that PA interventions have had only a small effect (approximately 4 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." (Applicability: NA)	LOW
Morgan et al. (2013)[268]	The objective of this study was to systematically review evidence for the benefits of	Included studies: RCTs, quasi-RCTs, single group pre-post trials	USA; Australia; Sweden	Children enrolled in primary/ elementary, middle, or high school. Adolescents only (n=1) (NB: overweight	Fundamental Movement Skill (FMS) Interventions: "Any school-, home-, or community-based intervention for children and	FMS competence Participant views included? N	22 (n=5979 participants) (NR in 1 study)	"School- and community-based programs that include developmentally appropriate FMS learning experiences	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	FMS interventions targeting youth.	Searches: from inception - 2013 Grey literature: N Experts consulted: N Performed MA		and obese children in 2 trials) Age: 5 – 14 years Gender: mixed (NB: 2 female only studies: 1 male only study)	adolescents with clear intent to improve FMS proficiency." "FMS are considered to be the foundation skills that lead to specialized movement sequences required for participation in many organized and non-organised PA for children and adolescents." Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings			delivered by physical education specialists or highly trained classroom teachers significantly improve FMS proficiency in youth" (Applicability: D)	
Morton et al. (2016)[269]	The purpose of this review was to summarise the current evidence on school-based policy, physical and social-environmental influences on adolescent PA and SB.	Included studies: RCTs, cross-sectional; prospective cohort design; qualitative studies Searches: from inception - 2014 Grey literature: Y Experts consulted: N Narrative synthesis	USA; Canada; Australia; New Zealand; UK; Europe; Asia	Healthy adolescents (11–18 years old) Age range: NR Gender: NR	School Environment Interventions "We defined environment as the physical and aesthetic surroundings of the school and/or the psychosocial climate and culture of the school. In this sense, environment refers to the wider 'ethos' of the school relating to physical activity, including physical activity-specific policies (e.g. organisational statements or rules that are meant to influence behaviour), school organisation/ management;	PA and/or SB outcomes Participant views included? Y (Both self-reported outcomes and qualitative data)	91 (93 reports) (Quantitative studies: >1000 participants, with several studies including >10,000 participants. Qualitative Studies Range: 30-100)	"A range of school-based policy (e.g. break time length), physical (e.g. facilities) and social-environmental (e.g. teacher behaviours) factors were associated with adolescent physical activity, with limited research on sedentary behaviour. The mixed-studies synthesis revealed the importance of specific activity	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					teaching; discipline; pastoral care and features of the physical environment." NR whether the interventions were universal and/or targeted Comparator: NR Intervention delivered in secondary school settings only			settings (type and location) and intramural sport opportunities for all students". (Applicability: C)	
Sluijs et al. (2007)[272]	To review the published literature on the effectiveness of interventions to promote PA in children and adolescents	Included studies: Controlled trials Searches: from inception - 2006 Grey literature: N Experts consulted: N Narrative synthesis	USA; UK; Greece; Ireland; Finland; Canada; Belgium; Australia	Children and adolescents (≤18 years) Age range: 10-17 years Gender: mixed (NB: 5 female only studies)	Behaviour change interventions: Promotion of PA through behaviour change Universal and targeted interventions Comparator: non-PA intervention Intervention delivered in multiple settings	PA outcomes Participant views included? Y (self-reported outcomes)	57 (n=35609 participants)	"Interventions that were found to be effective achieved increases ranging from an additional 2. 6 minutes of PE related PA to 283 minutes per week of overall physical activity. Among children, limited evidence for an effect was found for interventions targeting children from low socioeconomic populations, and environmental interventions. Strong evidence was found that school	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								based interventions with involvement of the family or community and multicomponent interventions can increase PA in adolescents." (Applicability: C)	
Sun et al. (2013)[271]	To better understand the specific role of increasing school-delivered PA on children and adolescence's health	Included studies: RCTs Searches: from inception - 2010 Grey literature: Y Experts consulted: N Performed MA	USA; Europe; Australia; Canada; Egypt; China	School children in primary (elementary) and/or secondary schools (aged 5–18 years) Gender: mixed (NB: 3 NR)	School-based interventions PA Interventions Universal and targeted interventions Comparator: 'standard' or no physical education programme Intervention delivered in primary and secondary school settings	Primary outcomes NR Participant views included? N	18 (n=6207 participants)	"Intervention was consistent in increasing fitness with large, higher quality studies and high dose of intervention providing strong evidence. 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." (Applicability: D)	LOW
SEDENTARY BEHAVIOUR									

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Biddle et al. (2011)[255]	To determine whether interventions targeted at reducing SB in young people are successful.	Included studies: NR Searches: from inception - 2010 Grey literature: N Experts consulted: N Performed MA	USA; Canada; Australia; France; UK	Participants aged < 19 years Age range: 3-15 years Gender: NR	SB interventions Universal interventions only Comparator: NR Intervention delivered in multiple settings	SB outcomes Participant views included? Y (self-reported outcomes)	17 (n=4976 participants)	"Interventions produce a small but significant reduction in SB – mainly screen-based behaviours – in children, with preliminary data showing that community-based interventions and those assessing SB with a combination of objective and self-report methods being suggestive of larger effects. Future interventions need to build on pilot work that takes into account the views of young people and families, that involves process evaluation and assessment of intervention fidelity, and has longer follow-up with larger samples" (Applicability: C)	UNCLEAR
Marsh et al. (2014)[265]	To review evidence from randomized controlled	Included studies: RCTs	USA; Canada; New Zealand;	Children aged 2 – 18 years	Family-based interventions "defined as those involving at least one parent/caregiver	Change in sedentary time (total sedentary time, targeted and	17 (n=3433 participants)	"Level of parental involvement, rather than the setting itself, appeared an	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	trials of interventions with a family component that targeted reduction of sedentary time, including TV viewing, video games and computer use, in children.	Searches: from inception- 2012 Grey literature: N Experts consulted: N Narrative synthesis	Israel; England; Switzerland	Mean age range: 6 – 13 years (Not all mean ages reported) Gender: mixed	and at least one child. Active involvement of a parent was required. Active involvement required contact between the intervention team and the parent/caregiver via telephone, counselling or group sessions, or use of a TV-monitoring device at home, which required parental monitoring and therefore participation" Universal interventions only Comparator: No intervention, wait-list control and treatment-as usual control, which involved standard advice about diet and exercise. Intervention delivered in multiple settings	non-targeted (e.g. reading and listening to music) sedentary time, sedentary screen time and video and TV use.) Participant views included? Y (self-reported outcomes)		important determinant of intervention success. Studies including a parental component of medium-to-high intensity were consistently associated with statistically significant changes in sedentary behaviours. TV exposure appeared to be related to changes in energy intake rather than PA". (Applicability: C)	
SPORT PARTICIPATION									
Priest et al. (2008)[270]	To review all controlled studies evaluating interventions implemented through sporting organisations to increase participation	Included studies: RCTs, quasi-RCTs, CBA Searches: from 2004 - 2007 Grey literature: Y Experts consulted: N	NA	People of all ages No studies identified	Sport Participation interventions "Any intervention designed to increase active and/or non-active participation in sport" Universal and targeted interventions	Change in the number of (active and non-active) participants in organised sport; Change in status from non-participating to non-active or active participation;	No studies identified	"Despite a thorough review of the published and unpublished literature, we found no rigorous studies evaluating the effects of interventions organised through sporting	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Comparator: NR Intervention delivered in	Change in status from non-active to active participation Participant views included? NA		organisations to increase participation in sport." (Applicability: NA)	

Table 7. Healthy Eating

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
DIET									
Van Cauwenberghe et al. (2010)[273]	To review the evidence for effectiveness from studies conducted across Europe on school-based healthful diet promotion among children and adolescents on changes in nutrition behaviours and body composition.	Included studies: any study design Searches: from 1990 – 2007 Grey literature: Y Experts consulted: Y Narrative synthesis	UK, Europe	Young children 6-18 years Age range: NR Gender: mixed	Healthy diet promotion "... interventions that targeted dietary behaviours that may be associated with obesity risk." NB: Not explicitly school-based as some had additional family- or community-based components. Universal interventions only Comparator: NR Intervention delivered in primary and secondary schools	Dietary behaviour or anthropometrics Participant views included? Y (self-reported outcome measures)	42 (Adolescents: n= 30540; Children: n= 46865)	"In adolescents, moderate evidence of effect was found for educational interventions on behaviour and limited evidence of effect for multicomponent programmes on behaviour" (Applicability: B)	UNCLEAR
Driessen et al. (2014)[275]	Aimed to review the evidence for the effect of isolated food environment interventions on both eating behaviours (including food purchasing)	Included Studies: Cluster-RCT; Cohort; Uncontrolled Trial; Pre-post Intervention; Cross-Sectional Searches: from 2008-2013 Grey literature: N Experts consulted: N	USA, UK	Children Age range: 4-19 years Gender: mixed	Food Environment Interventions "The school food environment was defined as all food and drink made available to students and provided or supported by the school through policy interventions or other mechanisms... Interventions included those in which a material change was made to the school food environment, with or without a relevant school policy directing this."	Change in weight or other anthropometric measures (body mass index [BMI] or waist circumference); eating-related behaviours (includes both the purchasing and consumption of foods).	18 (Participant Number: NR; Range 1-80 schools)	"A school environment supportive of healthy eating is essential to combat heavy marketing of unhealthy food. Modification of the school food environment (including high level policy changes at state or national level) can have a	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	and/or body weight.	Narrative synthesis			Universal interventions only Comparator: NR Intervention delivered in primary and secondary schools	Participant views included? Y (self-reported outcome measures)		positive impact on eating behaviours. A need exists, however, for further high-quality studies" (Applicability: D)	
Ells et al. (2008) [276]	To investigate the effects of nutrition, diet and dietary change on learning, education and performance in school-aged children (4–18 years) from the UK and other developed countries.	Included studies: RCTs; CCTs Searches: from inception to 2005 Grey literature: N Experts consulted: N Narrative synthesis	USA; UK; France; Chile; Israel; Sweden; Japan	School-aged children aged 4-18 years Age range: NR Gender: mixed	Dietary Exposure "Nutritional and dietary exposure that can be achieved through normal dietary intake (no more than twice the daily recommended dietary reference value." Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Educational performance, behaviour and motivation Participant views included? Y (self-reported outcome measures)	29 (Participant number: NR; NR. (Sample size <100 participants)	"Insufficient evidence to identify any effect of nutrition, diet and dietary change on learning, education or performance of school-aged children from the developed world. However, there is emerging evidence for the effects of certain fatty acids which appear to be a function of dose and time" (Applicability: D)	UNCLEAR
Jensen et al. (2011)[278]	To examine the existing literature on the effectiveness of economic incentives for producing sound nutritional	Included studies: any study design Searches: from 1990 – unclear Grey literature: Y Experts consulted: N	Norway; USA; Ireland; UK; Australia	Non-obese children aged 10–12 years have mainly been used. Other age groups of children/ adolescents are also	Aerobic PA interventions "…. Interventions resulting from policy, legislative, built environment, and economic/pricing/food subsidy changes that aimed to reduce popn risk of obesity" Universal and targeted interventions	Dietary behaviour measured as the intake of relevant foods, beverages, and snacks – or the availability of healthy foods and beverages in schools.	28 (30 reports) (Approx. range: 6 –3600 participants)	"Studies addressing price incentives suggest that such incentives are effective for altering consumption in the school setting. Other types of economic	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	behaviour in schools.	Narrative synthesis		included due a low number of studies fulfilling all these criteria and Parents. Age range: 4-15 years (11 NR) Gender: NR	Comparator: NR Intervention delivered in primary and secondary schools	Participant views included? Y (self-reported outcome measures)		incentives have been included in combined intervention schemes, but the inclusion of other intervention elements makes it difficult to draw conclusions about the effectiveness of the economic incentive instruments per se in these studies." (Applicability: C)	
Long et al. (2015)[280]	To evaluate the impact of menu calorie labelling with or without a daily anchor statement, compared with menus without calorie labelling on calories ordered, purchased, or consumed during the meal as well as impact on	Included studies: All experimental and quasi-experimental studies (not cross-sectional studies). Searches: from inception – 2013 Grey literature: N Experts consulted: N Performed MA	USA	Any population with no age or other population restriction. Children & adolescents only (n=1); adults only (n=11); College students (n=1); Parents with children <12years (n=2);	Menu Calorie Labelling "Posting calorie content on menus and menu boards." Universal interventions only Comparator: Menus without calorie labelling or other nutrition information Intervention delivered in multiple settings	Change in the number of calories in a single meal ordered or purchased with and without menu calorie labelling Participant views included? N	19 (n=30865 participants) (No. of transactions: NR in 2 studies)	"Current evidence does not support a significant impact on calories ordered, however, menu calorie labelling is a relatively low-cost education strategy that may lead consumers to purchase slightly fewer calories" (Applicability: D) NB: The majority of the studies included were conducted with adults or with	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	total daily energy intake or weight or BMI among adults and children of any age.			Adults and adolescents (n=2) Age range: NR (Children and Adolescents 1-17 years) Gender: mixed				adults and children pairs with children under 12 years	
FRUIT AND VEGETABLE CONSUMPTION									
Diep et al. (2014)[274]	To test the hypotheses that interventions clearly based on theory, multiple theories, or a formal intervention planning process will be more effective in changing FV consumption	Grey literature: N Experts consulted: N Performed MA	NR	Children aged 2 – 18 years Age range: NR Gender: NR	Behavioral Interventions "...Behaviour change procedures e.g. goal-setting, recipe preparation, or modified school meals" Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Dietary change, specifically FV consumption Participant views included? Y (self-reported outcome measures)	11 (n=14426 participants) (1 range reported 440-1486)	"Predicating an intervention on behavioral theory had a small to moderate enhancement (P < .001) of outcome effectiveness. There was mixed support, however, for enhanced dietary change with multiple theories or a formal planning process. After controlling for study	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	among children than interventions with no behavioural theoretical foundation.							quality, theory use was related only to vegetable consumption (b=0.373; P < .001)." (Applicability: C)	
Ganann et al. (2014)[277]	To examine the effects of interventions delivered in the home, school and other nutritional environments designed to increase FV availability for 5- to 18-year olds.	Included studies: RCTs; Non-RCTs; CBA; ITS Searches: from inception to 2012 Grey literature: Y Experts consulted: Y Narrative synthesis	USA; South Africa; The Netherlands, France; UK	Children aged 5 to 18 years (NB: Some studies included parents); General population (n=2); School teachers (n=1) Age range: NR Gender: mixed	Fruit and Vegetable - FV (Food) Environment Interventions "…. interventions that can bring about change in FV environment". Universal interventions only Comparator: NR Intervention delivered in multiple settings	FV supply (i.e., market inventory); change in food environment (e.g., at home, at school); FV disappearance/food transition (cafeteria and grocery store sales). Participant views included? N	23 (n= approx. 25203 participants) (13 studies NR - reported number of schools involved or average number of students)	"The most promising strategies for improving the FV environment for children are through local school food service policies. Access to FV was successfully improved in four of the six studies that evaluated school-based policies, with the other two studies finding no effect." (Applicability: D)	LOW
Knai et al. (2006) [279]	A systematic review of the worldwide evidence of interventions to promote	Included studies: NR Searches: from inception– 2004	USA; UK; Ireland	Children Age Range: 5 – 18 years	All individual and population-based interventions and promotion programmes encouraging consumption of fruit and/or vegetables	Change in fruit and/or vegetable intake Participant views included? Y (self-	15 (17 reports) (Sample size range from 100-1000) participants)	"None of the studies reviewed had a detrimental effect on fruit and vegetable consumption. Ten	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	children's FV consumption.	Grey literature: Y Experts consulted: Y Narrative synthesis		Gender: mixed (NB: 1 study female only)	".... intervention had to promote a diet high in fruit and vegetables. This could involve dietary advice taking any form (for example, verbal or written nutrition education, single or multiple contacts with individuals or groups), publicity campaigns, social marketing approaches, or by increasing production such as home gardening." Universal and targeted interventions Comparator: NR Intervention delivered in primary and secondary schools	reported outcome measures)		studies had a significant effect, ranging from +0.3 to +0.99 servings/day." (Applicability: C)	

Table 8. Obesity prevention

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
STAND-ALONE LIFESTYLE INTERVENTIONS									
da Silveira et al. (2013)[296]	To evaluate effectiveness of school-based nutrition education interventions in reducing or preventing overweight and obesity among children and adolescents	Included studies: RCTs Searches: from inception to 2010 Grey literature: N Experts consulted: N Performed MA	Europe; England; Brazil; USA; China	5-18 years Gender: mixed	School-based nutrition education Universal interventions only Comparator: NR Context: intervention delivered in primary and secondary schools	BMI Participant views included? N	8 (n=8451 participants)	Evidence that school-based nutrition education interventions are effective in reducing the BMI of children and adolescents Only 1/8 RCTs included participants >12years (Applicability: C)	UNCLEAR
Harris et al. (2009)[286]	To determine whether school-based physical activity interventions improve children's body composition	Included studies: RCTs and non RCTS Searches: from inception to 2008 Grey literature: Y Experts consulted: N Performed MA	USA; Canada; Australia; Chile; Sweden	"School age" (5-18 years) Range: Grades 1–12 (Age: 6-18 years) (Majority Grade 3-6) Gender: mixed (NB: 6 female only studies: 1 male only study)	School-based exercise or physical activity Interventions "which took place during regular class time." Universal and targeted interventions Comparator: could not have received the intervention and must have continued with the existing physical education curriculum, with no change in duration or intensity Context: intervention delivered in primary and secondary	Mean change in BMI Participant views included? N	18 (n=18141 participants)	BMI did not improve with school-based physical activity interventions. No consistent changes in other measures of body composition. Majority of studies included children in Grades 3-6 (under 12) (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					schools. Study duration ranged from 6 months to 3 years.				
Kader et al.(2015)[288]	To evaluate the effectiveness of universal parental support interventions to promote dietary habits, PA or prevent overweight and obesity	Included studies: RCTs and non RCTS Searches: from 1990-2013 Grey literature: N Experts consulted: N Narrative synthesis	Australia; England; USA; China; Europe; Canada	One parent or caregiver of a child aged 2–18 years, either with or without their child; Gender: mixed	Parental involvement interventions "Four intervention types were identified: face-to-face counselling, group education, information sent home, and telephone counselling." Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Dietary Habits, PA; Sedentary Behaviour or Weight Status Participant views included? Y (self-reported outcome measures)	35 (Range: 57-2991 participants)	Face-to-face / telephone counselling was effective in changing children's diet; weak evidence for improvement in PA. Sending information home was not effective. Group education more promising than counselling for body weight outcomes. Intervention effectiveness was generally higher in younger compared to older children. Group-based approaches more promising in children with lower socio-economic position (Applicability: C)	UNCLEAR
Kellou et al. (2014)[290]	To evaluate to what extent integration of a socio-ecological approach into PA/SB programmes	Included studies: controlled design (with or without randomisation) Searches: from 1990-2012 Grey literature: N	USA; Canada; Europe; New-Zealand; Australia; Pacific Islands; Asia;	Popn aged < 18 years at beginning of intervention; mean age range: 3.9 – 15.2 years	Prevention Programmes with PA or SB Components (including interventions with a diet component) Universal and targeted interventions Comparator: no intervention	Weight status Participant views included? N	54 (n=78942 participants)	"Programmes targeting PA determinants at the different levels of the socio-ecological model, including the social and organizational/built	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	has impacted their success in terms of weight status	Experts consulted: N Narrative synthesis	South America; Israel	Gender: mixed Gender: mixed (NB: 5 female only studies	Intervention delivered in multiple settings			environments, had the greatest potential for preventing obesity in youngsters" Majority of studies targeted children under 12. 5 studies focused on children 13-18 years. (Applicability: D)	
Laframboise and deGraauw (2011)[291]	To systematically search and assess the quality of the literature on the efficacy of aerobic physical activity to decrease adiposity in school-aged children and youth	Included studies: RCTs Searches: from 2000 – 2010 Grey literature: N Experts consulted: N Narrative synthesis	NR	Children and adolescents aged 0–18 years. Age range: 6.5-18.5 years Gender: NR	Aerobic PA interventions "Interventions resulting from policy, legislative, built environment, and economic/pricing/food subsidy changes that aimed to reduce popn risk of obesity" Universal and targeted interventions Comparator: sedentary control group, an active controlled group, or a sedentary control with lifestyle education only Intervention setting: NR	Adiposity (body composition, percent body fat, weight, BMI, skinfold thickness, trunk and visceral fat composition, and adiponectin levels) Participant views included? N	10 (Range: 16 –1140 participants)	5 RCTs had positive results in decreasing adiposity compared to controls and 5/10 RCTs had no change in adiposity compared to controls. 3/10 studies included participants with healthy weight (Applicability: NR)	UNCLEAR
Liao et al. (2014)[292]	To assess the overall effect size of sedentary behaviour interventions on BMI	Included studies: RCTs Searches: from inception – 2012 Grey literature: N	USA; Canada; Australia; New Zealand; Europe; Asia	Children aged 18 or younger; 5-18 years; mean age range: 4 – 14.7 years	SB Interventions "(1) Interventions solely aiming to reduce SB; (2) interventions aiming to reduce SB in combination with the promotion of PA and (3) interventions	BMI reduction Participant views included? N	25 (n=7045 participants)	Evidence that school-based nutrition education interventions are effective in reducing the BMI of children and adolescents	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	reduction, and to compare whether interventions that have multiple components (SB, PA, and diet) have a higher mean effect size than interventions with single (SB) component.	Experts consulted: N Performed MA		Gender: mixed (NB: 1 male only trial)	aiming to reduce SB, in combination with promoting PA and improving dietary habits (SB+PA+diet)." Universal and targeted interventions Comparator: "active control group that received some non-obesity prevention related information (e.g., a general parenting skill training, or a fire drill training), or a control group with usual-programming (e.g., standard physical education classes or any standard school curriculum classes), or an assessment-only control group" Intervention delivered in multiple settings			5 RCTs where mean age is >12 years. All other mean age is <12 years. (Applicability: D)	
Nguyen et al. (2011)[294]	To provide a qualitative comparison of interactive electronic media interventions for the prevention or treatment of obesity and/or obesity-related behaviours in	Included studies: all study designs Searches: from inception – 2010 Grey literature: Y Experts consulted: N Narrative synthesis	USA, Germany; Taiwan	5-18 years; Approximate Mean Age: 9.5-15.8 years (not all studies reported mean age) Gender: mixed (NB: 8 female only studies)	Interactive electronic interventions "Interventions requiring participant interaction (e.g. following prompts, entering information, completing online tasks, receiving automated feedback) with the electronic technology and which were delivered via computer-based programmes, interactive Internet sites, electronic messaging systems, emails, social networking media (e.g.	Change in either knowledge, mediators, behaviours and/or in physical status as outcomes Participant views included? Y (self-reported outcome measures)	24 (n=5812 participants)	Most studies reported "some form of significant outcome (e.g. reported changes in dietary and/or physical activity behaviours) in participants receiving interactive electronic interventions, with 11 out of 15 studies leading to positive	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	children and adolescents.				Facebook), e-whiteboards or related media." Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings			changes in measured or reported adiposity outcomes. In 87% of studies, the effects of interactive electronic interventions were not separately evaluated from other intervention components. Results should be viewed with caution because of the overall poor quality of the studies". (Applicability: D)	
Van Grieken et al. (2012)[299]	To provide an overview of the evidence regarding the effects of interventions, implemented in the school- and general population setting, aiming to prevent excessive sedentary behaviour in children and adolescents on (1) the amount	Included studies: Controlled trials with at least one intervention and one control or non-intervention group Searches: from 1999 – 2011 Grey literature: N Experts consulted: N Performed MA	USA; Mexico; UK; Ireland; France; Australia; New Zealand; Scotland; The Netherlands	Children or adolescents (age range 0–18 years) Mean Age Range: 1.9-18.2 years (1 NR) Gender: mixed (NB: 2 female only studies: 2 male only study; 1 study NR)	SB Interventions "Interventions resulting from policy, legislative, built environment, and economic/pricing/food subsidy changes that aimed to reduce popn risk of obesity" Universal interventions only Comparator: NR Intervention delivered in multiple settings	SB outcomes (e.g. TV viewing, snacks during TV viewing) and/or a weight related outcome (e.g. BMI, BMI-z, percentage overweight children Participant views included? Y (self-reported outcome measures)	34 (n=18034 participants)	Results showed significant decreases for the amount of SB and BMI. No differences were found between single and multiple health behaviour interventions. "Studies need to increase follow-up time to estimate the sustainability of the intervention effects found."	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	of SB and (2) BMI.							Majority of studies included participants < 12years (Applicability: C)	
COMBINED LIFESTYLE INTERVENTIONS									
de Bourdeaudhuij et al. (2011)[283]	To summarise school-based interventions targeting dietary and PA behaviour in primary (6–12 years old) and secondary school (12–18 years old) children in Europe	Included studies: any study design Searches: from 1990 – 2007 Grey literature: Y Experts consulted: N Narrative synthesis	Europe: UK; Netherlands; Belgium; Germany; Italy, Greece; Norway	Young people aged btw 6-18 years; Age range: 5 – 15 years Gender: mixed (NB: 3 studies NR)	School-Based Combined Healthy Diet Promotion and PA Interventions Universal interventions only Comparator: NR Intervention delivered in school	Obesity Participant views included? Y (self-reported outcome measures)	11 (n=14426 participants) (1 range reported 440-1486)	Combining educational and environmental components that focus on both sides of the energy balance give better and more relevant effects. Computer-tailored personalised education in the classroom showed better results than a generic classroom curriculum. (Applicability: C)	UNCLEAR
Gonzalez-Suarez et al. (2009)[284]	To evaluate the effectiveness of school-based programs in the prevention and management of childhood obesity	Included studies: RCTs and CCT Searches: from 1995 – 2007 Grey literature: N Experts consulted: N Performed MA	Europe; USA; Taiwan; China; Chile; UK	Schoolchildren of any nationality who were of normal BMI, overweight or obese, and in preadolescent and adolescent phases	School-based interventions Interventions that "increase PA, improve dietary behaviours, modify poor exercise or dietary behaviours, or a combination" Universal and targeted interventions Comparator: NR Intervention delivered in primary and secondary schools	BMI, waist girth, percentage body fat, and triceps skinfold Participant views included? N	19 (n=15964 participants)	Long-term school-based interventions were effective in preventing childhood overweight and obesity. Combined interventions of PA and classroom curriculum were effective in preventing	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
				Age Grade: 1-7; Age Range: 8.2-13.9 years Gender: NR				childhood overweight and obesity. Duration of the intervention was positively associated with its effectiveness (Applicability: C)	
Guerra et al. (2014)[285]	To evaluate the effect of school-based physical activity (PA) and nutritional education interventions on children and adolescents' body mass index.	Included studies: RCTs Searches: from inception – 2012 Grey literature: N Experts consulted: N Performed MA	USA; Europe; Israel; England; New Zealand; Australia; India	Children and adolescents; Age range: 8-18 years; Gender: mixed (NB: 4 female only studies; 1 study NR)	Combined School-based PA and Nutritional Education Interventions Universal and targeted interventions Comparator: NR Intervention delivered in primary and secondary schools	BMI Participant views included? N	38 (Range: 41-5106 participants) (1 NR)	School-based PA and nutritional education interventions showed no statistically significant mean reduction on childrens' and adolescents' BMI. "High heterogeneity among studies requires caution in the generalisation of the results." (Applicability: C)	UNCLEAR
Wolfenden et al. (2014)[302]	To systematically assess the current state of knowledge about the effectiveness of population-based whole of community interventions in preventing	Included studies: RCTs, cRCTs, quasi-RCTs with a parallel control group Searches: from 1990 – 2011 Grey literature: N	Fiji; Australia; New Zealand; Tonga; USA	Community samples of children and/or adults or specific population groups within a community defined based on their demographic, ethnic or	Population-based, whole of community interventions (Weight Prevention) "Population-based, whole of community interventions were defined as those targeting the weight status of a population characterised along geographical boundaries, such as cities, villages or regions" Universal interventions only	Weight Status: weight, body mass index (including standardised BMI), waist circumference, body fat percentage, skin fold thickness, or population	8 (No. Participants: NR)	Population-based, whole of community interventions can be effective in achieving modest reductions in population weight gain among children (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	excessive population weight gain	Experts consulted: N Performed MA		socioeconomic characteristics Age range: 0-19 years Gender: NR	Comparator: No intervention; 'treatment as usual'; attention controls; waitlist controls Intervention delivered in multiple settings	prevalence of overweight or obesity Participant views included? Y (self-reported outcome measures and qualitative data)			
Yildirim et al. (2011)[303]	To systematically review the results and quality of studies investigating the moderators of school based interventions aimed at energy balance-related behaviours	Included studies: RCTs, quasi-RCTs Searches: from 1990 – 2009 Grey literature: N Experts consulted: N Narrative synthesis	New Zealand; USA; UK; Ireland; Australia; Europe; Canada	Children and/or adolescents aged between 4 and 18 years Age Range: 4-16.9 years (8 NR) Gender: mixed (NB: 3 female only studies; 12 study NR)	School-based energy balance-related behaviour (EBRBs) Interventions (PA, sedentary or dietary behaviours) Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Energy balance-related behaviour (EBRB) outcomes Participant views included? Y (self-reported outcomes)	61 (n=68195 participants) (1 NR)	School-based interventions appear to work better for girls than for boys. Due to the inconsistent results, many studies reporting non-significant moderating effects, and the moderate methodological quality of most studies, no further consistent results were found. Consequently, there is lack of insight into what interventions work for whom (Applicability: C)	UNCLEAR
MIXED LIFESTYLE INTERVENTIONS									

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Connelly et al. (2007)[282]	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	Included studies: RCTs, CCTs Searches: from inception – 2006 Grey literature: N Experts consulted: N Narrative synthesis	USA; Mexico; Chile; England; Germany; Thailand; Australia; Italy	Non-overweight children 0-18 years; Mean age: 10.89 years Gender: mixed (NB: 3 female only studies; 1 male only study)	Interventions to prevent overweight or obesity Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	Any measure of Adiposity Participant views included? N	28 (n=20603 participants) (1 NR)	11/28 trials were effective and 17/28 trials were ineffective in reducing adiposity. Main factor distinguishing effective from ineffective trials was the provision of moderate to vigorous aerobic physical activity in the former on a relatively 'compulsory' rather than 'voluntary' basis." (Applicability: D)	UNCLEAR
Hung et al. (2015)[287]	To evaluate the effectiveness of school-based childhood obesity prevention programs, and to examine program components (moderators).	Included studies: RCTs, cohort; interventions with control groups and pre-post intervention Searches: from inception – NR Grey literature: N Experts consulted: N	USSR (Russia); Italy; USA; England; Chile; Switzerland; Greece; Australia; Finland	"Boys or girls 6 to 18 years old" Mean age range: NR Gender: NR	School-based interventions "Interventions resulting from policy, legislative, built environment, and economic/pricing/food subsidy changes that aimed to reduce popn risk of obesity" Universal interventions only Comparator: NR Intervention delivered in primary and secondary school settings	BMI or skinfold thickness Participant views included? Y (self-reported outcomes)	27 (n=26114 participants)	"Concluded that overall, school-based interventions have not been effective for improving body mass index or skinfold thickness to curb childhood obesity; however, randomized controlled trials that focused on physical activity or nutrition appeared to produce promising results."	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Performed MA						(Applicability: C)	
Kamath et al. (2008)[289]	To summarise evidence on the efficacy of interventions aimed at changing lifestyle behaviours (increased PA, decreased sedentary activity, increased healthy dietary habits, and decreased unhealthy dietary habits) to prevent obesity.	Included studies: RCTs Searches: from inception – 2006 Grey literature: Y Experts consulted: Y Performed MA	UK; France; USA; Australia	"Children and adolescents (ages 2–18 years)" Age range: 2.6 – 19 years Gender: mixed (NB: 6 female only studies; 2 NR)	Paediatric Obesity Prevention Interventions "As the Agency for Healthcare Research and Quality review (3) pointed out, behavioural interventions, which represent expertise- driven approaches using principles to improve behaviours such as diet and physical activity, should be considered conceptually apart from these behaviours in preventing obesity. In most reviews, dietary behaviour and physical activity were considered interventions (rather than behavioural outcomes)." Universal and targeted interventions Comparator: No treatment; usual care/ routine; minimal Intervention Intervention delivered in multiple settings	Lifestyle behaviours: 1) dietary changes, i.e. increased HD (healthy dietary habits) and decreased UD (unhealthy dietary habits), and 2) changes in physical activity, i.e. increased PA and decreased SA. Participant views included? Y (self-reported outcomes)	47 (n=30939 participants)	"interventions caused small changes on their respective target behaviours and no significant effect on BMI compared with control. Further exploration found 1) there were no sex-treatment interaction; 2) trials in children found larger reductions in SA than trials in adolescents; 3) trials of long treatments (6 months) found larger reductions in SA and BMI than shorter trials, which were more effective in reducing UD; and 4) trials measuring outcomes during treatment found larger reductions in SA and smaller reductions in BMI than trials that measured these outcomes after treatment".	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								(Applicability: C)	
Luckner et al. (2012)[293]	To evaluate interventions that promote healthy weight in general populations (unselected by weight) using a comprehensive meta-analysis.	Included studies: RCTs, quasi-RCTs, CCTs, SR Searches: from inception – 2008 Grey literature: N Experts consulted: N Performed MA	USA, Australia, Switzerland Netherlands	General population Younger children (<6 years), children (6–12 years) adolescents (12–18 years); adults (>18 years) Gender: mixed	Projects to promote healthy weight in general populations Universal interventions only Comparator: NR Intervention delivered in multiple settings	BMI and/or Percentage Body Fat Participant views included? N	68 (103 reports) (n=90122 participants)	"Interventions with multiple components and those that aimed to reduce TV viewing in children led to a significant reduction in BMI. … Reduced children's television viewing was also a promising strategy. There were also statistically significant reductions for five of the other intervention groups, but substantial heterogeneity limits the ability to interpret these results". (Applicability: C)	UNCLEAR
Sobol-Goldberg et al. (2013)[297]	Attempts have been made to reduce childhood obesity through school-based programs.	Included studies: RCTs, quasi-RCTs, CCTs, SR Searches: from 2006 – 2012 Grey literature: NR	USA; Germany; Australia; Greece; Turkey; Norway; Brazil; China;	Children and teenagers (ages 5-18 years) Mean age range: NR	School-based obesity prevention programmes "…school-based obesity prevention programs directed at improving nutrition and increasing physical activity…The interventions included in the studies were designed to reduce	BMI Participant views included? N	32 (n=52109 participants)	"Programs were mildly effective in reducing BMI relative to controls not receiving intervention. Studies of children had significant	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	Systematic reviews of studies until 2006 reported a lack of consistency about effectiveness of such programs. Presented is an updated systematic review and meta-analysis.	Experts consulted: NR Performed MA	Spain; France; England; Ireland; Belgium; Netherlands	Gender: NR	body mass by altering lifestyle. This includes changing eating habits by increasing intake of healthy foods and decreasing consumption of unhealthy foods; and by changing patterns of activity to more physical and less sedentary". Universal or targeted interventions? NR Comparator: no intervention Intervention delivered in school-based settings			intervention effects, those of teenagers did not, though the difference between the two groups was not statistically significant". (Applicability: C)	
Stice et al. (2006)[298]	To summarise obesity prevention programs and their effects and investigates participant, intervention, delivery, and design features associated with larger effects.	Included studies: RCTs, quasi-RCTs Searches: from 1980 – 2005 Grey literature: Y Experts consulted: Y Performed MA	NR	Children and Adolescents, (age up to 22 years) Mean age range: NR Gender: mixed (NB: 4 female only studies; 2 male only studies)	Obesity prevention programmes Universal and targeted interventions Comparator: Usual programming (e.g., standard physical education classes), active interventions that were not focused on weight gain prevention (e.g., a general parent training intervention), waitlist, or assessment-only control conditions, as well as trials in which some relevant comparison group was used (e.g., matched controls)	Body fat: BMI; Skinfold Thickness Participant views included? N	46 (64 programmes) (n=23172 participants)	"Review suggests that most interventions do not produce the hypothesized weight gain prevention effects and that the overall average intervention effect was small. Findings also indicated that for most programs that produced significant weight gain prevention effects, the effect sizes are clinically meaningful, but	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					Intervention delivered in multiple settings			usually confined to pre to post effects". (Applicability: NA)	
Wang et al. (2013) [300]	To review the comparative effectiveness of obesity prevention programs in children conducted in high-income countries	Included studies: RCTs, non-RCTs Searches: from inception– 2012 Grey literature: Y Experts consulted: Y Performed MA	USA; Australia; Belgium, Canada; the Northern Marianas, France; Germany; Greece; Iceland,; Italy, New Zealand, Poland; Portugal; Spain; Switzerland; UK; England; Israel; Sweden; Netherlands	Children 2–18 years, regardless of BMI classification Approx. mean age range: 2-17 years (NB: not all studies reported age range) Gender: mixed (NB: 3 female only studies; 2 male only studies)	Obesity prevention programmes "KQ1: Diet, PA, or combination interventions delivered in schools (includes nutrition education, nutrition, diet, healthy eating, parenting styles, education, policy) KQ2: Diet, PA, or combination interventions delivered or implemented in the home (includes healthy eating education, parenting styles, education) KQ3: Diet, PA, or combination interventions delivered or recommended in a primary care setting (includes patient, parent, and family counselling; referrals to nutritionists) KQ4: Diet, PA, or combination interventions delivered in a childcare setting (Includes menu changes, PA, policy) KQ5: Diet, PA, or combination interventions delivered or implemented at the community level or through environmental modification (includes PA, farmers' markets, community gardens, cooking lessons, policy, green space, food store	Weight-related or body composition outcomes, including BMI or BMI distribution in the population, adiposity or other weight measures, and prevalence of obesity or overweight Participant views included? Y (self-reported outcomes)	124 (131 reports; home-based n= 6; community-based n =9) (n=144706 participants) (Community n=53160 participants (1 NR); Home sample size: 26-1323)	"Overall, there is moderate-to-high strength of evidence to support that diet and/or PA interventions that are implemented in schools help prevent excessive weight gain or reduce the prevalence of overweight and obesity. The added value of school-based interventions, including involvements at home or in the community or the implementation of policies directed at the environment to improve dietary intake or increase PA is generally positive. However, the effectiveness of interventions primarily implemented at home, in primary care, and child-care settings or those	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
					accessibility, access to healthy food choices) KQ6: Diet, PA, or combination interventions delivered with consumer health informatics (includes Web-based interventions, cell phone–based interventions) KQ7: Diet, PA, or combination interventions delivered across a combination of settings." Universal and targeted interventions Comparator: No intervention; usual care or other interventions by settings Intervention delivered in multiple settings			using consumer health informatics approaches is largely unknown." (Applicability: C)	
Waters et al. (2011)[301]	This review primarily aims to update the previous Cochrane review of childhood obesity prevention research and determine the effectiveness of evaluated interventions intended to	Included studies: RCTs, quasi-RCTs, CCTs, SR Searches: from inception – 2008 Grey literature: N Experts consulted: N Performed MA	USA; Canada; UK; Europe; Australia; New Zealand; Brazil; Chile; Mexico; Thailand	Children (aged < 18 years) at the start of the study, including studies where children were part of a family group receiving the intervention Age range: 0-5 years (n=8);	Obesity prevention interventions "Strategies: Educational Interventions; Health Promotion Interventions; Psychological/family/ behavioural therapy/counselling/ management strategies: Interventions or programmes that involved diet and nutrition, exercise and PA, lifestyle and social support or ...any intervention which aimed to	Weight and height; Per cent fat content; BMI; ponderal index; skin-fold thickness; prevalence of overweight and obesity Participant views included? Y (self-reported outcomes)	55 (81 reports) (n=27946 participants in the meta-analyses (based on data from 37 studies)	"Strong evidence to support beneficial effects of child obesity prevention programmes on BMI, particularly for programmes targeted to children aged six to 12 years". (Applicability: C)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	prevent obesity in children, assessed by change in Body Mass Index (BMI).			6-12 years (n=39), 13-18 years (n=8) Gender: mixed (NB: 3 female only studies; 1 male only study)	improve food intake, PA and/or prevent obesity." Universal interventions only Comparator: Non-intervention control group who received usual care or another active intervention (i.e. head-to-head comparisons) Intervention delivered in multiple settings				

TABLE 9. General Health

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
CIVIC ENGAGEMENT									
Van Goethem et al. (2014)[361]	To assess the effect of community service on adolescent development	Included studies: All empirical studies (with a control group) Searches: from 1980 -2012 Grey literature: Y Experts consulted: N Meta-Analysis	Canada; Thailand; New Zealand; USA	Adolescents between 12 and 20 years old who did not have a mental disability Age: 12-20 years Gender: NR	Community Service Interventions: "Volunteering, community service, and service-learning." Universal interventions only Comparator: NR Intervention setting: NR	Adolescent Developmental Outcomes (domains of academic, personal, social, and civic outcomes) Participant views included? Y (Self-reported outcome measures)	49 (n= 24,477 participants)	"Random effects analyses, based on 49 studies (24,477 participants, 12–20 years old), revealed that community service had positive effects on academic, personal, social, and civic outcomes. Moderation analyses indicated that reflection was essential; the effect for studies that include reflection was substantial (mean ES = .41) while community service in the absence of reflection yielded negligible benefits (mean ES = .05). Effects increased when studies include more frequent reflection and community service, reflection on academic content, and older adolescents. These	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								findings have implications for understanding and improving community service." (Applicability: D)	
GENERAL HEALTH AND/ OR WELLBEING									
Bonell et al. (2013)[313]	To synthesise evidence on how the school environment influences health	Included studies: Experimental and Quasi-Experimental Studies; Qualitative studies Searches: from Inception - 2010 Grey literature: Y Experts consulted: Y Narrative analysis and Meta-ethnography	USA; UK; Australia; Canada; Europe; New Zealand; China; Thailand; South Africa; Israel	"Students (age 4–18 years) or staff" Age: multi-level studies: range: 9-21 years Gender: NR	School Environment Interventions: "the effect of the school social and/or physical environment, interventions to address this and/or processes underlying these effects or interventions (not including the provision of health education or health-related goods or services)" Universal and targeted interventions Comparator: NR Intervention delivered in primary and secondary schools	Health or well-being outcomes Participant views included? Y- (Self-reported outcome measures and qualitative analysis)	Evidence Map: 1144; Theory: 38 Outcome Evaluations: 10; Process Evaluations: 6; Multi-Level Studies: 42; Qualitative Studies: 19 (Participants - NR)	"there is evidence for the potential of school environment interventions addressing these to promote health but the evidence is far from definitive. Five outcome evaluations examined interventions encouraging staff/students to build a stronger sense of community and/or better interpersonal relations in a range of US/UK school settings. These evaluations generally reported benefits, including for measures related to emotional health and aggression. Two evaluations assessed interventions	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								modifying American middle schools' food/physical activity environments and empowering students' involvement in this, reporting benefits for physical activity measures but not for diet." (Applicability: C)	
Ferreira-Vorkapic et al. (2015)[360]	To examine the available literature for yoga interventions exclusively in school settings, exploring the evidence of yoga-based interventions on academic, cognitive, and psychosocial benefits	Included studies: Pilot studies, quasi-experimental designs, or randomized designs and included control groups Searches: from 1980 - 2014 Grey literature: N Experts consulted: N Meta-analysis	NR	"Children and adolescents (ages 5–18)" Age: range: 8-17 years Gender: mixed (NB: 1 female only study)	Yoga or Yoga-Based Interventions Universal and targeted interventions Comparator: No interventions or an active control (comparative intervention). Intervention delivered in primary and secondary schools	Anxiety, depression, stress, or other psychological measures such as mood indicators, self-esteem, confidence, and quality of life; academic or cognitive performance Participant views included? Y (Self-reported outcome measures)	9 (n=1144 participants)	"This review analysed nine peer-reviewed RCT studies, in which yoga was taught to children in a school setting. Outcome measures included psychological well-being and cognitive functions, such as attention and memory. While supportive in some studies and different variables, the utility of yoga in educational settings is uncertain due to the small number of randomized control	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								trials in the literature." (Applicability: NR)	
Priest et al. (2008)[363]	To evaluate policy interventions organised through sporting settings to increase healthy behaviour (related to smoking, alcohol, healthy eating, sun protection, discrimination, safety and access)	Included studies: Randomised controlled trials (RCTs)/cluster RCTs; Quasi-randomised' trials; Controlled before and after studies Searches: from 2004- 2007 Grey literature: Y Experts consulted: N Analysis: NA	NR	"People of all ages" Age: NA Gender: NA	Policy Interventions: "Any policy intervention implemented through sporting organisations to instigate and/ or sustain healthy behaviour change, intention to change behaviour, or changes in attitudes, knowledge or awareness of healthy behaviour." Comparator: NR Intervention Setting: NA	Behaviour change; Intention to change behaviour; Change in attitudes, knowledge or awareness of healthy behaviour; and Changes in policies or policy presence Participant views included? NA	No trials identified	"We found no rigorous studies evaluating the effectiveness of policy interventions organised through sporting organisations to increase healthy behaviours, attitudes, knowledge or the inclusion of health-oriented policies within the organisations." (Applicability: NA)	LOW
Audrey and Batista-Ferrer (2015)[366]	To synthesise evidence from interventions which included changes to the urban environment and reported at least one health behaviour or outcome for	Included studies: RCTs; controlled trial; CBA; ITS Searches: from Inception - 2014 Grey literature: Y Experts consulted: N	USA; New Zealand; Australia; UK; Canada	"Children and Young People" Age: NR Gender: mixed	Urban Environment Interventions: "A change to the built environment" Universal interventions only Comparator: NR Intervention delivered in urban areas	Physical or Mental health and wellbeing; Health behaviours; Counts of Active transport or park use Participant views	33 (Participants: NR)	"The interventions captured in this review related to active travel, park renovations, road traffic safety, and multi-component community health initiatives. Although the majority of studies had a serious risk of bias, there	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	children and young people	Narrative analysis				included? Y (Self-reported outcome measures)		was some evidence of effectiveness of in relation road safety measures and active travel. Future research studies should involve collaborations between researchers, policy makers and planners, and consider using randomised controlled study designs which incorporate objective outcome measures." (Applicability: C)	
Burkhardt and Brennan (2012)[359]	To explore the effects of participating in recreational dance on the physical health and psychosocial outcomes of children and adolescents	Included studies: Controlled trials, cohort studies, case control studies and cross-sectional studies with a control group. Searches: from 1947 - 2009 Grey literature: N Experts consulted: N	UK; USA; Israel; Croatia; Greece; Australia; Korea; Indonesia	"Young people aged from 5 to 21 years." Age: range: 6-21 years Gender: mixed (NB: 7 female only studies: 1 male only study)	Recreational Dance Interventions: "Recreational dance is defined as non-elite dance for recreational, community or educational purposes, excluding dance programmes with high levels of intensity and frequency of training." Universal and targeted interventions Comparator: NR	Physical, psychological or social health Participant views included? Y (Self-reported outcome measures)	14 (n=3090 participants)	"There is some evidence to suggest that involvement in dance may have some positive outcomes on physical and psychosocial well-being. Further high-quality research is recommended." (Applicability: C)	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
		Narrative analysis			Intervention delivered in multiple settings				
Cugelman et al. (2011)[357]	To assess online intervention design features in order to inform the development of online campaigns, such as those employed by social marketers that seek to encourage voluntary health behaviour change	Included studies: Experimental, quasi-experimental, and correlational studies, including those with randomized and nonrandomized allocations Searches: from 1999 - 2009 Grey literature: Y Experts consulted: N Meta-Analysis	NR	"Pre-teens to older persons" Age: Mean: 34.7 years Gender: mixed (NB: 4 female only studies)	Web-based or Web and Email-based Interventions Universal and targeted interventions Comparator: Control group intervention comprising print, Web-based interventions, waitlists, placebos, and therapists Intervention delivered online	Behavioral change outcome	29 (n=17,524 participants)	"Online interventions targeting voluntary behaviour change can work. Compared with waitlists, they demonstrate moderate efficacy, while compared with print materials, they offer similar impacts but with the advantages of lower costs and broader reach. In general, the interventions informed users about the consequences of their behaviour, helped them set and achieve goals, taught them skills, and provided normative pressure. Feedback mechanisms were common, with many interventions using tailoring along with personalization and offering services to track and report	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								users' progress toward their goals." (Applicability: NR)	
Hamm et al. (2014)[356]	To determine: 1) for what purposes social media is being used in child health and its effectiveness; and 2) the attributes of social media tools that may explain how they are or are not effective	Included studies: Primary research, with analytic quantitative designs; descriptive and qualitative designs Searches: from 2000 - 2012 Grey literature: Y Experts consulted: N Narrative analysis	USA; Canada; Sweden; Australia; China; Taiwan	"Children, youth, or their families or non-professional caregivers" Age: range: Children (<13 years old); Youth (13–18 years old) Gender: NR	Social Media Interventions: "Social media was defined according to Kaplan and Haenlein's classification scheme, including: collaborative projects, blogs or microblogs, content communities, social networking sites, and virtual worlds." Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	NR Participant views included? Y (Self-reported outcome measures)	25 (Participants: NR)	"Adolescents were the most common target audience, discussion forums were the most commonly used tools, and the tools were largely community-based. Nearly all studies concluded that the social media tool evaluated showed evidence of utility; however, results of the primary outcomes from the majority of comparative studies showed no significant effect." (Applicability: D)	UNCLEAR
Hollands et al. (2015)[362]	To assess the effects of interventions involving exposure to different sizes or sets of physical dimensions of a portion, package,	Included studies: RCTs Searches: from Inception - 2015 Grey literature: Y	USA; Canada; Belgium; The Netherlands; UK; Australia; South Korea	Adults and children directly engaged with the manipulated products. Mean age: 22.2 years (Range: 2.6-55.2 years)	Larger-sized portion, package, individual unit or item of tableware (Portion, Package or Tableware Size) "...Comparison of the effects of exposure to at least two sizes or sets of visible physical dimensions (that is volume,	Behavioural Endpoint: consumption (intake) of a product or selection of a Product	72 (n=6603 participants)	"People consistently consume more food and drink when offered larger-sized portions, packages or tableware than when offered smaller-sized versions. This	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	individual unit or item of tableware on unregulated selection or consumption of food, alcohol or tobacco products in adults and children	Experts consulted: N Narrative analysis		Gender: mixed	shape, height, width or depth) of either a portion of the same food (including non-alcoholic beverages), alcohol or tobacco product, its package or individual unit size, or an item of tableware used to consume it. Universal and targeted interventions Comparator: Smaller-sized portion, package, individual unit or item of tableware Intervention delivered in multiple settings	Participant views included? N		suggests that policies and practices that successfully reduce the size, availability and appeal of larger-sized portions, packages, individual units and tableware can contribute to meaningful reductions in the quantities of food (including non-alcoholic beverages) people select and consume in the immediate and short term. However, it is uncertain whether reducing portions at the smaller end of the size range can be as effective in reducing food consumption as reductions at the larger end of the range. We are unable to highlight clear implications for tobacco or alcohol policy due to identified gaps in the current evidence base."	

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
								(Applicability: C)	
Langford et al. (2014)[352]	To assess the effectiveness of the Health Promoting Schools (HPS) framework in improving the health and wellbeing of students and their academic achievement	Included studies: Cluster-RCTs Searches: from Inception - 2013 Grey literature: Y Experts consulted: N Meta-Analysis	North America; Europe; Australasia; China; Mexico; India; Egypt; Tanzania	"Children and young people aged four to 18 years attending schools or colleges (including special schools)." Age range: 5-15 years Gender: mixed	Health Promoting Schools (HPS) Framework "The HPS framework is a holistic, whole-school approach. Included interventions (of any duration) based upon the HPS framework that demonstrates active engagement of the school in health promotion activities in each of the following areas: School curriculum; Ethos or environment of the school or both; Engagement with families or communities or both." Universal interventions only Comparator: Schools that implemented either no intervention or continued with their usual practice, or schools that implemented an alternative intervention that included only one or two of the HPS criteria. Intervention delivered in primary and secondary schools	Health outcomes (Obesity or overweight or body size, Physical activity or sedentary behaviours, nutrition, tobacco use, alcohol use, other drug use, sexual health, mental health & emotional wellbeing, violence, bullying, infectious diseases, safety & accident prevention, body image or eating disorders, skin or sun safety, oral health) Academic Outcomes: student-standardised	67 (n=210,576 participants – some participants not reported)	"The results of this review provide evidence for the effectiveness of some interventions based on the HPS framework for improving certain health outcomes but not others. More well-designed research is required to establish the effectiveness of this approach for other health topics and academic achievement." (Applicability: D)	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
						academic test scores, IQ tests or other validated scales; school academic performance. Participant views included? Y (Self-reported outcome measures)			
Laranjo et al. (2015)[354]	To evaluate the use and effectiveness of interventions using social networking sites (SNSs) to change health behaviours	Included studies: Any prospective study design Searches: from 2010 - 2013 Grey literature: Y Experts consulted: Y Meta-Analysis	USA; Australia; UK	"Patients/consumers" Age: NR Gender: mixed (NB: 1 female only study)	Social Networking Site Interventions "They are generally defined as web-based platforms that allow individuals to create their own personal profile and build a network of connections with other users." Universal and targeted interventions Comparator: Any type of comparison (e.g., with a control group, with another intervention, or pre–post) Intervention setting: NR	Health Behaviour Change or presumed to be a consequence of it (e.g., weight loss in a fitness or dieting intervention) Participant views included? Y (Self-reported outcome measures)	12 (n=7411 participants)	"We found a statistically significant positive effect of SNS interventions on behaviour change, boosting encouragement for future research in this area." (Applicability: C)	LOW
Maher et al. (2014)[355]	To systematically review the current level of	Included studies: Experimental Studies;	Australia; Japan; USA; UK	"Adults or children were included, regardless of health	Online Social Network Intervention	Health behaviour change	10	"Nine of the 10 included studies reported significant	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	evidence regarding the effectiveness of online social network health behaviour interventions	Ecological Studies, Case Studies Searches: from 2000 - 2012 Grey literature: Y Experts consulted: N Narrative analysis		status (healthy or participants with specific health conditions or diseases)." Age: range: 20.5-45 years Gender: mixed (NB: 2 female only studies	Universal and targeted interventions Comparator: Any comparator was acceptable (i.e., a traditional control group, an alternative intervention, or a within subject pre-post design). Intervention delivered in multiple settings	(tobacco smoking, alcohol use, physical inactivity, or diet) Participant views included? Y (Self-reported outcome measures)	(n=113,988 participants)	improvements in some aspect of health behaviour change or outcomes related to behaviour change". (Applicability: C)	
INFECTIOUS DISEASES									
Bieri et al. (2012)[358]	To provide a descriptive summary of the results and make recommendations for studies using preventive educational videos targeting infectious diseases in schoolchildren	Included studies: RCTs; pre-/post-test design; quasi-experimental and observational studies Searches: from Inception - 2012 Grey literature: Y Experts consulted: N Narrative analysis	NR	"Primary school and secondary school students 5–17 years of age." Age: range: 3-17 years Gender: mixed (NB: 1 female only study)	Health education Universal interventions only Comparator: NR Intervention delivered in primary and secondary schools	Knowledge, attitudes, and inducing behaviour changes Participant views included? Y (Self-reported outcome measures)	11 (n=9920 participants)	"The majority of the 11 studies we reviewed concluded that videos were well received by schools, teachers, and children, and are promising and effective health education tools, having a positive impact on knowledge and attitudes." (Applicability: NR)	UNCLEAR
ORAL HEALTH									

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
Alves-Antunes et al. (2013)[365]	To evaluate changes in the quality of life (QOL) of children and adolescents younger than 14 years old after oral health interventions	Included studies: NR Searches: from Inception - 2010 Grey literature: N Experts consulted: N Narrative analysis	NR	"Subjects from 0 to 14 years old." Age: range: 4.1-12.1 years Gender: NR	Oral Health Intervention Complete intervention treatment of oral conditions Universal interventions: NR Comparator: NR Intervention Setting: NR	Quality of Life Participant views included? Y (Self-reported outcome measures)	11 (n=1024 participants)	"Based on the study's results, the following conclusions can be made: 1. The level of evidence was moderate and detected changes in the impact on the quality of life of children and adolescents under 14 years old after interventions related to oral health. 2. Although some studies have demonstrated the ability to detect changes in quality of life, these results must be interpreted carefully because of the lack of important methodological details or the varying methodologies employed." (Applicability: NR)	LOW
Marinho et al. (2015)[364]	To determine the effectiveness and safety of fluoride gels in preventing dental caries in	Included studies: Randomised or quasi-randomised controlled trials	USA; Europe; Brazil; Canada;	"Children or Adolescents aged 16 or younger at the start of the study"	Fluoride Gel "Fluoride gels are either administered by a professional or are self applied under	1. Caries increment in permanent tooth surfaces	28 (44 reports)	"The conclusions of this updated review remain the same as those when it was first published. There	LOW

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	the child and adolescent population	Searches: from Inception - 2014 Grey literature: Y Experts consulted: Y Meta-Analysis	Israel; China; Venezuela	Age: range: 2-15 years Gender: mixed (NB: 1 male only study)	supervision. In general, operator applied fluoride gels use trays and self-applied gels use either a tray or a toothbrush. Fluoride gels must be differentiated from some fluoride toothpastes, which are also available in the form of gels." Universal and targeted interventions Comparator: Placebo or no treatment Intervention delivered in community and school settings	2. Caries increment in primary tooth surfaces Participant views included? N		is moderate quality evidence of a large caries-inhibiting effect of fluoride gel in the permanent dentition. Information concerning the caries-preventive effect of fluoride gel on the primary dentition, which also shows a large effect, is based on low quality evidence from only three placebo-controlled trials. There is little information on adverse effects or on acceptability of treatment. Future trials should include assessment of potential adverse effects." (Applicability: D)	
SCHOOL DROP-OUT									
Wilson et al. (2011)[353]	To summarise available evidence on the effects of prevention and intervention programs aimed	Included studies: RCTs; Controlled before and after; Uncontrolled before and after Studies	USA; UK; Canada	"School-aged youth, defined as those expected to attend pre-k to 12th grade primary and secondary schools, or the equivalent in	Drop Out Programmes "School-based or school-affiliated Psychological, Educational, or Behavioral Prevention or Intervention Programs, broadly defined, that	School completion or dropout (or was a close proxy measure or recognised	167 (548 reports) (Participants: NR; 317 independent samples)	"Overall, results indicated that most school- and community-based programs were effective in decreasing school	UNCLEAR

Author (Year)	Aim	Methodological details of review (included study design; search dates)	Geographical regions	Participants	Interventions	Outcomes	No. Studies included (number of participants included)	Summary of results (Applicability to Scotland/UK)	ROBIS
	at primary and secondary students for increasing school completion or reducing school dropout	Searches: from 1985 - 2011 Grey literature: Y Experts consulted: Y Performed MA		countries with a different grade structure, corresponding to approximately ages 4-18..." Age: 15 (SD: 3) years Gender: mixed	involved actions performed with the expectation that they would have beneficial effects on student recipients... Community-based programs that were explicitly billed as dropout prevention or intervention programs were also eligible whether or not a school affiliation was evident." Universal and targeted interventions Comparator: NR Intervention delivered in multiple settings	precursor for dropout.) Participant views included? N		dropout. Given the minimal variation in effects across program types, the main conclusion from this review is that dropout prevention and intervention programs, regardless of type, will likely be effective if they are implemented well and are appropriate for the local environment." (Applicability: C)	
SOCIO-ECONOMIC INEQUALITY									
Moore et al. (2015)[351]	To determine whether school-based physical activity interventions improve children's body composition	Included studies: RCTs or Quasi-experimental studies Searches: from 2008 - 2014 Grey literature: Y Experts consulted: N Narrative analysis	Europe; UK North America; Australasia; South America; Asia	"School children (age 4–18)" Age: NR Gender: NR	Interventions delivered partially or wholly within the school setting, or relating to travel to school Universal interventions only Comparator: No intervention or practice as usual Intervention delivered in primary and secondary schools	Diet, physical activity (including measures of physical fitness), smoking or alcohol Participant views included? Y (Self-reported outcomes)	20 (Number participants NR; Sample size range: 124-10261)	"Universal school-based interventions may narrow, widen or have no effect on inequality. There is a significant need for more routine testing of the effects of such interventions on inequality to enable firmer conclusions regarding types of interventions which affect inequality." (Applicability: C)	UNCLEAR

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