

Policy responses to multiple risk behaviours in adolescents

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ABSTRACT

Adolescence has long been considered a period of increased risk behaviour. This supposition has been supported by a wealth of empirical evidence and recently, health risk behaviours have been identified as a key mechanism for the general deterioration of adolescent health relative to other age groups. Research regarding adolescent risk behaviour suggests that there are often strong links between individual risk behaviours. The mechanisms for these associations have been attributed to common risk and protective factors, as well as gateway effects stemming from increased accessibility to additional risk behaviours. This has important implications for policy interventions designed to reduce risk behaviours in adolescence. Not only does a multiple risk behaviour approach increase the effectiveness of individual risk behaviour policy, but it is also conducive to a more cohesive, coherent and efficient approach to adolescent risk in general. Several examples of cohesive policy responses to multiple risk behaviours have emerged, but generally, policy remains segregated into individual risk domains. With increasing evidence for the effectiveness of integrated approaches, multiple risk behaviours require consideration to design and implement effective and efficient policy responses.

Keywords multiple risk behaviour, public policy, adolescence, substance use, sexual risk behaviour

Concerns about risk behaviours amongst youth have a very long history. Characterizations of adolescence as a time of difficult or rowdy behaviour abound throughout the literature since classical times. Late nineteenth century social reformers regarded adolescents, particularly violent or criminal males and pregnant females, as posing significant threats to the social order. In the USA this focused largely on immigrant youth, while in the UK the lower social classes were the recipients of attention.¹

Early twentieth century developmental theorists reiterated concerns about adolescent risk behaviour. G. Stanley Hall characterized adolescence as a period of ‘storm und drang’ (storm and stress) in which adolescence represented the later animal phases as human ontogeny recapitulated phylogenetic evolution in each individual.² Freud³ saw adolescence as a period in which earlier developmental dilemmas, particularly sexual ones, are re-enacted and later Freudians suggested that an adolescence devoid of characteristic difficulties was in fact a marker for psychological problems; ‘to be normal during adolescence is itself abnormal’ (p. 267).

In the first half of the twentieth century, adolescence was of little interest to legislators and policy-makers, largely because adolescence was the healthiest time of life, when morbidity and mortality were lowest across the lifecycle.

However, the epidemiological (or health) transition occurring in high-income countries since the mid-twentieth century has dramatically shifted the burden of disease away from children and towards adolescence.⁴ Morbidity rises year on year from childhood into adolescence.⁵ Mortality is now higher amongst adolescents than amongst children after the first year of life, largely due to increases in the relative importance of injuries and non-communicable diseases, compared with non-communicable diseases as causes of death.⁴ This constitutes the new paradox of adolescent health—that while we become fitter, stronger, faster and cleverer during adolescence, mortality and morbidity rise through the adolescent years. This shift makes adolescent lifestyle choices, particularly those relating to risk-taking behaviour, a fruitful area for policy intervention.

From the last quarter of the twentieth century, health problems relating to risk behaviours rose amongst adolescents to the extent that they began to constitute a key area of policy concern in many countries. Indeed, for some behaviours, such as smoking, binge drinking and cannabis use,

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their prevalence is now such that they can be considered normative, despite being to some extent illicit in many jurisdictions. Because of this, adolescence now occupies an ambivalent position for legislators and other policy-makers. On the one hand they remain mobilized by fear of anti-social behaviour, the promiscuousness denoted by sexual risk behaviours and disruption of the social order by substance users. On the other hand they recognize the normative nature of some behaviours in adolescence, the great potential of intervention during adolescence to protect young people from harm both in adolescence and later life, and the potential for a 'good' adolescence to contribute to forming later healthy and economically and socially productive citizens.

Risk behaviour surveillance in adolescence

National concerns about adolescent risk behaviours led to the development of specific national surveillance systems to track the prevalence of health risk behaviours in some high-income countries in the last decades of the twentieth century. A longstanding example is Monitoring the Future (<http://monitoringthefuture.org>), funded by the National Institute on Drug Abuse. Initiated in 1975, it surveys students in Grades 8, 10 and 12 regarding, among other issues, drug use, drinking, smoking and violence and delinquency. Another well-known American initiative is the Youth Risk Behavior Surveillance System (YRBSS)⁶ conducted by the Centers for Disease Control and Prevention (CDC). Launched in 1990, it is conducted biennially directed primarily at students in Grades 9–12 (ages 14–18). It assesses tobacco, alcohol and other drug use, dietary behaviours, risky sexual behaviours and other behaviours that contribute to accidents or injuries. National surveys regarding a number of health risk behaviours have also emerged in Canada and Australia.^{7–10}

In the UK, a number of regular cross-sectional surveys assess adolescent risk behaviours, some of which predate the YRBSS. The Smoking, Drinking and Drug Use among Young People in England survey, funded by the National Health Service (NHS) Information Centre and conducted by the National Centre for Social Research, began assessing representative samples of 11–15-year olds in 1988 and has been conducted annually since 1992.¹¹ It includes measures of frequency and circumstances of substance use, as well as attitudes to substance use. The survey has been carried out in Wales and Scotland as well, though a separate series was established in Scotland in 2002 by the Scottish Executive. The biennial Scottish

Schools Adolescent Lifestyle and Substance Use Survey (SALSUS) targets 13–15-year olds, with the latest sweep consisting of a sample size of 9500.¹²

Risk behaviour trends for young people over the age of 16 are also available from general population health surveys such as the annual Health Survey for England,¹³ the Scottish Health Survey¹⁴ and the Welsh Health Survey¹⁵ established in 1991, 1995 and 2003, respectively, which contain a number of questions related to smoking, drinking and diet and exercise among other topics. The National Survey of Sexual Attitudes and Lifestyles cross sectionally surveys respondents of 16 and over regarding sexual behaviour as well as substance use every 10 years beginning in 1990. It is conducted in Scotland, Wales and England, with a separate but similar survey in Northern Ireland.¹⁶ These surveys not only demonstrate a growing commitment in the UK to tracking risk behaviour but provide the bulk of the data regarding current prevalence and trends for risk behaviours.

Internationally, a number of studies provide a partial picture of adolescent risk behaviours globally. The Health Behaviours for School-aged Children study was initiated in 1982 by researchers from three European countries and was thereafter adopted by the World Health Organization (WHO) as a WHO collaborative study. There are now 43 participating countries in Europe and North America. In the middle- and low-income world, two WHO studies irregularly assess tobacco use (the Global Youth Tobacco Survey, set up in 1988 by the WHO and the CDC; <http://www.who.int/tobacco/surveillance/gyts/en/>) and a range of key behavioural risk factors (the Global School Health Survey, set up in the late 1990s; <http://www.who.int/chp/gshs/en/>). A number of other international studies (e.g. the European School Survey Project on Alcohol and Other Drugs: www.espad.org) collect regional international data on risk behaviours.

These data support adolescence as a period of increased risk. In the UK, those aged between 16 and 24 years are most likely to drink over double the daily recommended amounts on their heaviest drinking day in the last week, an indicator of high levels of binge drinking in this age group.¹³ Frequent drug use in the same age group is much higher than for older respondents.¹⁷ With regard to sexual health, abortion rates rise steeply throughout adolescence before tapering off in early adulthood (p. 7),¹⁸ and rates of sexually transmitted infections (STIs) peak in late adolescence.¹⁹ Though they represent just 12% of the population, 16–24-year olds account for over half of new STIs diagnosed in the UK.¹⁹ Further, there is evidence that adult risk behaviours, in particular smoking and alcohol use, are

initiated in adolescence and that early initiation of such behaviours is related to dependency in adulthood.

Trends over time offer some scope for optimism. Regular cigarette smoking amongst 11–15-year olds has been declining since peaking in the mid-1990s.¹¹ Likewise, the prevalence of illegal drug use among the same age group has dropped over the last 10 years.¹² With regard to sexual health, the teenage conception rate in England and Wales is said to be the lowest rate since the early 1980s.²⁰ However, the picture is not universally encouraging, with adolescent STI rates increasing substantially over the last decade,²¹ though slight decreases in diagnoses have been noted from 2009 to 2010, suggesting improvements in this area.¹⁹ Though the number of 11–15-year olds who have ever consumed alcohol decreased slightly between since the late 1980s, the mean weekly units doubled in the period 1990–2007.²²

Multiple risk behaviour

Statistics on individual risk behaviours often fail to illustrate the extent to which risk behaviours tend to co-occur. Data from the USA suggest that the correlation between risk behaviours such as drug use, alcohol use, smoking and sexual activity have been found to be, on average, moderately high, e.g. 0.35.²³ With regard to particular risk clusters, smoking and alcohol abuse correlate between 0.4 and 0.6, and sexual experience correlates with substance use between ~0.3 and 0.5.²⁴ There is substantial evidence that early initiation of substance use predicts a number of individual risk behaviours as well as multiple health risk behaviours.^{25–28}

In the UK, evidence regarding co-occurrence is less pervasive but points to similar conclusions. In England, drug use and smoking and to a lesser extent, alcohol, are strong predictors of other substance use.¹¹ Similar patterns are evident in Scotland as well.¹² Adolescents who are sexually active before the age of 16 are more likely to be individual substance users as well as multiple substance users. Additionally, substance use before the age of 16 is associated with a lower likelihood of condom use²⁹ as well as a whole host of other sexual risk-taking behaviour.³⁰

There is considerable debate regarding the mechanisms of these associations. Two main models have been posited. There is some evidence for ‘gateway’ models, which propose that young smokers or drinkers have more exposure to and opportunity for illicit drug use and risky sex.^{31,32} There have also been suggestions of a ‘reverse gateway’ effect, suggesting that the causal relationships between substance use and subsequent risk behaviours can be complex.³³ Others have

suggested that multiple risk behaviours in adolescence may represent a ‘single syndrome’ of behavioural risk³⁴ in which associations between risk behaviours represent common underlying factors arising from earlier developmental processes.^{34–36} This single syndrome has been suggested to represent a general dimension of unconventionality,³⁴ which manifests as a ‘health-compromising lifestyle,’³⁷ related to poor emotional well-being and lack of connection to the conventional institutions of family, school and religion. Evidence for this model is largely cross sectional and based on observations that factors such as depression, parental substance use, poor school achievement, low socio-economic status, delinquency and poor connection with family and school appear linked with many individual risk behaviours, including sexual risk.^{38–40} Evidence regarding risk and protective factors for multiple risk behaviours in the UK is scarce but again, appears to reflect the factors highlighted in international research. For instance, co-occurrence of multiple substance use has been associated with truancy and exclusion and family influences¹¹ as well as ethnicity, mental health, religious affiliation, obesity and family structure and social support.⁴¹

Policy relevance

The morbidity and mortality related to health risk behaviours in adolescence is clearly of substantial policy relevance. Individual risk behaviours pose a major burden for health and for the health services. For example, around one-fifth of UK adolescents who become regular smokers will die from smoking in middle age and a further fifth will die prematurely from smoking in old age, losing about 12 years of non-smoker life expectancy.⁴² Costs to the NHS from alcohol misuse have been estimated to be £1.4–1.7 billion per annum, with alcohol-related mortality in the <44-year group tripling since 1979.⁴³ STIs disproportionately affect young people with the total workload in UK genitourinary medicine clinics increasing in the last decade.¹⁹ In the UK, ‘volatile substance misuse accounts for 65 deaths per year, which is ~2% of all deaths below the age of 18 years’ (p. 358).⁴⁴ Additionally, adolescent substance use has been linked with substance use in later life.⁴⁵ Other social and economic costs related to health risk behaviours include increased incidence of violence and crime, accidents, mental health disorders and loss of educational opportunities.⁴⁴

Further, there is evidence that health behaviours in adulthood often have roots in adolescence. For example, as many as 10% of adolescent drug users continue this behaviour into adulthood.⁴⁶ Most adult substance users were initiated into substance use as adolescents, with substance use

initiation falling sharply in early adulthood.⁴⁷ Adolescent alcohol use disorders predict adult substance use disorders and ‘for the majority of adolescents, [they] are not benign conditions that resolve over time’ (p. 83).⁴⁸

While evidence regarding the outcomes of multiple health risk behaviours is scant, there is some evidence that, beyond the individual effects of each risk behaviour, multiple risk behaviours are associated with effects beyond the cumulative effects of individual health risk behaviour. For example, there have been suggestions that concurrent substance use is related to higher likelihood of excessive substance use, early substance use initiation and higher likelihood of substance dependence than single substance users.⁴⁹ Multiple adolescent risk behaviour is also associated with poorer emotional well-being and higher incidences of injury.⁵⁰ Furthermore, preliminary evidence suggests that the more health risk behaviours adolescents indulge in, the higher the likelihood of psychological distress and depressive symptoms. Co-occurring health risk behaviour is also associated with poorer educational outcomes, fewer job prospects and criminal convictions.⁵¹

Further, there have been suggestions that health risk behaviours contribute to health inequalities.⁵ Health is strongly associated with socio-economic status. For example, in England, those in the most advantaged class can expect an additional 17 years of healthy life expectancy compared with the poorest neighbourhoods.⁵² Economic and social deprivation have been identified as significant predictors of risk behaviours. It has been recognized that policy approaches to reducing health inequalities must focus on health risk behaviours.⁵² Since deprivation is a common predictor of many types of risk behaviours it contributes to the association between risk behaviours.^{38,40} As such, multiple risk behaviours are more likely in people experiencing deprivation and may lead to further health inequality.

Because of these concerns, multiple health risk behaviour has recently become a policy focus for a number of national governments. In the USA, the Institute of Medicine in conjunction with the National Research Council recently released a report summarizing the findings of a series of workshops regarding adolescent health risk behaviours which focused extensively on multiple health risk behaviour and the policy relevance.⁵³ In the UK, a recent MRC-funded Scottish report focused on the prevalence of health risk behaviours in Scotland and included a systematic review of relevant interventions,⁴⁰ and in England the Department of Health has recently funded a Policy Research Unit in Children, Young People and Families (www.ucl.ac.uk/cpru) with a mandate to explore multiple health risk behaviours in adolescents. With growing recognition among policy-makers

of the links between risk behaviours, attention is being turned to developing appropriate policy responses.

Policy response

The most pressing rationale for policy initiatives to focus simultaneously on multiple health risk behaviours is that due to the relationships between risk behaviours, a multiple risk approach may often be essential in effectively targeting each individual risk behaviour. Even in the context of individual risk policy, it may be unfeasible to promote policies that do not take other risk behaviours into account, particularly in areas where there is evidence of gateway effects. For instance, being drunk or stoned during intercourse has been linked with lower likelihood of condom use.²⁹ Furthermore, there is evidence of strategic use of substances for sexual purposes among adolescents which is linked to sexual risk by increasing numbers of partners and impairing decision-making.³⁰ As such, there is a clear directive to consider the causal impact of alcohol in sexual risk behaviour, and any coherent and comprehensive policy response cannot ignore its influence. Similarly, exposure opportunities may explain gateway effects between different substances³¹ and, as such, there is an argument to be made for more integrated substance use policies. For instance, there is evidence that the prevalence of smoking and drug use among adolescents who had never tried alcohol is near zero, prompting calls that alcohol use may have a place as a screening measure for the identification of those at risk for other substance use.⁵⁴ A similar, and perhaps stronger, case can be made for tobacco, which has been identified as a robust predictor of other risk behaviours.⁵⁵ The potential of interventions targeting multiple risks is particularly intriguing considering the general lack of evidence for the effectiveness of most single-risk policy responses.⁴⁰

Yet the argument for more cohesive policy responses to multiple risk behaviours transcends the gains in effectiveness for each individual risk domain. Amalgamating policy responses to risk behaviours could prove more efficient. If, as posited, different risk behaviours may be manifested symptoms of common underlying risk factors, then it follows that coherent policy approaches should focus on these underlying risk factors.⁵³ Not only would this provide a more parsimonious policy approach, but might also prove more cost-effective. There is early evidence for the cost-effectiveness of interventions for multiple risk behaviours suggesting that they constitute a more cost-efficient means of preventing risk behaviours in adolescence.⁴⁰

An increased understanding of the contributing factors to adolescent risk taking has the capacity to guide policy. Most

importantly, recent advances in adolescent neuroscience have resulted in new claims for a scientific basis for risky behaviours in adolescence. However, there is considerable controversy regarding the applicability of neuropsychological findings to policy. There have been attempts to apply adolescent neuroscience in policy-making by using these findings to, for example, determine appropriate timing for interventions and prevention efforts, determine legal age limits, and establish the extent of adolescents' accountability for undertaking dangerous, harmful or illegal activity.⁵⁶

Yet there are limitations to such an approach, not least because 'neuroscientific data are continuous and highly variable from person to person; the bounds of "normal" development have not been well delineated' (p. 218).⁵⁶ Neuroscience, it has been argued, can supplement behavioural research to offer guidance for policy-makers but that, like any research, requires interpretation and does not offer unambiguous direction for policy-makers.⁵⁷

Suggestions that science should guide policy for risk behaviours is not new. In 1992, Coie *et al.*⁵⁸ stated that, 'a new research discipline, which we term *prevention science*, is presently being forged at the interfaces of psychopathology, criminology, psychiatric epidemiology, human development and education' (p. 1013). Prevention science aims to identify malleable risk and protective factors underlying health and social problems. The most recent approaches in adolescent health, e.g. positive youth development approaches, have moved beyond traditional risk factor reduction focused on the individual to emphasize the importance of enhancing protective factors in young people's lives. Such resiliency-based approaches have focused on family and peer factors as key to protecting young people from harm, but also emphasize that a successful and healthy transition to adulthood requires promotion of positive social and emotional development as much as avoiding drugs, violence or sexual risk.⁵⁹ The emergence of such approaches is partly due to the recognition that risk behaviours share common antecedents which raises questions about the feasibility of tackling risk behaviours individually.

In most countries policy initiatives targeting health risk behaviours remains organized in isolated 'silos' such as sexual and reproductive health, alcohol use, drug use and violence. This is partially due to a pervasive focus on what have been termed 'downstream' approaches to health policy. These include measures to reduce accessibility, prohibition and harm-minimization,⁶⁰ whereas 'upstream' approaches refer to early intervention by focusing on individual and environmental vulnerabilities, and family and society influences. Because upstream approaches are likely to focus on risk and protective factors that are often shared across

health risk behaviours they are likely to be more suitable as policy approaches for multiple risk behaviour.

Despite the typically discrete policy approaches to health risk behaviours, several examples of policy approaches to multiple health risk behaviour can be identified both in the UK and internationally. Many of these can be categorized as education- or school-based approaches. Reducing or preventing health risk behaviours through education initiatives has a long history and school-based programmes have shifted towards evidence-based approaches targeting appropriate risk factors and pathways towards risk behaviours. As such, many prevention programmes have sought to cultivate a number of personal assets such as social and emotional skills, school connectedness, positive mental health, self-esteem, goals and aspirations and protective health-related attitudes. These efforts have typically been organized in the USA under the umbrella of social-emotional learning or character education. In the UK, the role of schools in adolescent health promotion has been well recognized. 'Schools . . . have an important part to play, since they have a central role in health promotion, as well as facilitating access to health services and providing information about the services in the community' (p. 7).²¹ Schools have a statutory obligation to prevent a number of health risk behaviours. Along with statutory requirements to provide sex and relationships education and drugs education, a number have been established to contribute to student mental health, wellbeing and safety.⁶¹ As such, risk behaviour prevention is often integrated with generic skill building and the development of core assets to prevent multiple risk behaviours.

The role of school-based interventions in multiple risk behaviour is highlighted by a recent meta-analysis to identify interventions designed to prevent or reduce multiple-risk behaviours (defined in this case as substance use and sexual risk behaviour).⁴⁰ Of the eight identified programmes, six were at least partially school based. In general, these programmes were designed to deliver 'life skills' education, target underlying risk factors for unhealthy behaviour or improve school environment and connectedness. While the effectiveness of these interventions in multiple risk-relevant domains was mixed, it is suggestive of the potential for education-based initiatives to successfully target multiple health risks.

Another prominent area for interventions targeting multiple health risk behaviours stems from evidence that family-level factors are related to all domains of risk behaviour. These factors include family connectedness and conflict, parental attitudes and involvement in the problem behaviour,⁵³ parental violence, supervision and communication.⁶² As such, interventions targeting these factors have the

potential to be successful in multiple risk domains. Family-targeted interventions, including parent training, encouraging parental involvement and communication, and family conflict resolution have been successfully trialled in several countries.^{40,60} Additionally, social marketing campaigns designed to encourage parental communication about risk areas such as substance use and sexual risk, have been rolled out with some success.

Finally, there is growing recognition that adolescent health in general would benefit from more easily accessible health services.²¹ In the UK, there have been calls to tailor health services for adolescents as this would increase accessibility and approachability of these services. 'Few youth specific services exist, yet there is considerable evidence that young people avoid using services not designed for them and that they believe are not respectful or confidential' (p. 902).⁵ This is particularly relevant to domains of health risk behaviour because of the sensitive nature of these issues and the difficulties involved in seeking help, when necessary. For example, there is evidence that young people often feel uncomfortable approaching health professionals, with a quarter of 15-year old young women feeling uncomfortable following a GP consultation.²¹ Youth health services can also contribute to issues regarding health risk behaviour by providing counselling services and information regarding sexual health and substance use.⁵

Evidence-based policy: gaps in the research base

Despite advances in the understanding of the occurrence and mechanisms of multiple risk behaviour as well as policy interest in these areas, there are a number of gaps in the knowledge base that must be adequately targeted before a coordinated and comprehensive policy approach to multiple risk behaviour can be developed. First, research regarding the causal mechanisms of multiple risk behaviour is hampered by an over-reliance on cross-sectional and correlational data. This is problematic for establishing clear causal pathways linking multiple risk behaviours. This has important ramifications for the development of interventions, particularly for interventions based on a gateway model of multiple risk behaviour. It is both practical and efficient to target risk behaviours early in the pathway of multiple risk behaviour. For example, Fortenberry⁶³ argues that the directionality of causation between substance use and sexual risk behaviour is a clear determinant in the development of efficient interventions. More recent research has highlighted that changes in alcohol use precede and predict sexual risk behaviours in adolescence, particularly, numbers of sexual

partners.⁶⁴ The authors posit that the findings 'suggest that targeting alcohol use in prevention and intervention programmes may reduce the number of sexual partners' (p. 1757). While there is substantial evidence for the links between risk behaviours, the mechanisms of these associations are not always clear; this information is essential for forming effective policy approaches.

In addition to gaps in knowledge regarding the causal pathways of multiple risk behaviours, little is known about the health consequences of co-occurrence in adolescence or later in the life course. There is, as mentioned, preliminary evidence that in addition to the cumulative impacts of individual risk behaviours there may be additional detrimental effects involved in participating in more than one such behaviour. There may also be different outcomes for multiple risk behaviour depending on gender, ethnicity socio-economic status or other factors. If differences existed, they have the capacity to contribute to health inequalities but, as it stands, the extent to which multiple risk behaviours mediate health inequalities is unknown. This requires further evidence, both cross sectionally and crucially, longitudinally. These data are essential for formulating preventive strategies and assessing the outcomes and effectiveness of multiple risk policy interventions.

Relatedly, little is known about the prevalence of adolescent multiple health risk behaviours and how this may have changed over time. One of the few studies that intended to assess multiple risk behaviours prevalence over time uses data from the Youth Risk Behavior Survey to analyse trends in sexual risk behaviours for adolescents involved in various levels of non-sexual risk behaviour.⁶⁵ This study reaffirmed the link between risk behaviours but highlighted differences in the trends between sexual risk taking and other forms of risk taking. This is important to highlight because despite substantial links between risk behaviours there is still substantial variance that is not shared between risk factors. Identifying trends in multiple risk behaviour are essential in determining where multiple risk policies have particular potential, where they may have been successful and where discrete policy strategies are needed in conjunction with policies targeting multiple risk behaviours. Tracking of these trends would also help to determine the extent to which policy approaches are sufficiently targeting multiple risk-takers who may be categorically different from individual risk-takers in the number of risk and preventive factors they are exposed to and, as such, may have different susceptibilities to intervention. This information is crucial in formulating and adapting policy strategies.

Finally, it is important to build a stronger evidence base regarding the effectiveness of interventions for multiple risk

behaviours. At this point, there is only preliminary evidence of efficacy for such interventions. This evidence comes mainly from trials designed to assess interventions that target only one risk behaviour, but also assess other risk behaviours as secondary outcomes. Few interventions that specifically target multiple risk behaviours have been developed and evaluated, which has implications for the strength of the evidence base. Though there is strong evidence for the links between risk behaviours as well as a number of shared risk and protective factors which are suggestive of intervention pathways, further direct evidence of effectiveness is needed.

Conclusion

It is not a novel suggestion that adolescence can be a turbulent time of life. Nor is it a modern concern that adolescents are prone to exposing themselves to health risks. However, the recent shift from adolescence as one of the healthiest times in life to a period of increased morbidity and mortality, due largely to adolescent involvement in health risk behaviours, is certainly a cause for concern. The past several decades have seen a growing interest in adolescent health risk behaviour which has led to a burgeoning research area focusing on the causes, outcomes and prevalence of risk behaviours. This is reflected in a number of endeavours to track adolescent risk behaviour nationally and these have contributed substantially both to an understanding of health risk behaviour, but also the extent of adolescent involvement in these behaviours and, in turn, policy interest.

In a number of domains, the data suggest that adolescent risk taking is a cause for concern, despite some areas where prevalence rates suggest that risk-taking behaviours are decreasing. Notably, there is consistent evidence for a strong relationship among risk behaviours. This has led to growing interest regarding the mechanisms of these associations, the prevalence and outcomes of multiple health risk behaviours, as well as the policy relevance. There are a number of indications that policy-makers are identifying the importance of multiple risk behaviours and the implications for interventions. Amid growing calls for integrated policy responses to risk behaviours there are several areas of intervention that have proved amenable to such approaches including education and school-based interventions, family interventions and adolescent health services. However, despite these fledgling policy applications, responses to risk behaviours continue to emerge from segregated policy silos, focusing individually on health risk behaviours. There is scope for more integration among policies for health risk behaviours

to take account of shared risk factors and the causal relationships between risk behaviours, as well as the negative outcomes resulting from multiple health risk behaviours. These must be informed by continuing research in these areas. Despite a growing knowledge in the area, policy-makers do not yet have a comprehensive evidence base upon which to base policy decisions. By continuing to pursue evidence-based policy approaches to multiple risk behaviour there is substantial scope to target adolescent risk behaviours effectively and efficiently and in turn, improve adolescent health in an effort to restore adolescence as a notably healthy part of life.

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References

- 1 Viner R. Politics, power, and pediatrics. *Lancet* 1999;**353**:232–4.
- 2 Hall GS. *Adolescence: Its Psychology and Its Relation to Physiology, Anthropology, Sociology, Sex, Crime, Religion and Education*. New York: Appleton, 1904.
- 3 Freud A. Adolescence. *Psychoanal Study Child* 1958;**15**:255–78.
- 4 Viner RM, Coffey C, Mathers C *et al*. 50-year mortality trends in children and young people: a study of 50 low-income, middle-income, and high-income countries. *Lancet* 2011;**377**:1162–74.
- 5 Viner RM, Barker M. Young people's health: the need for action. *BMJ* 2005;**330**:901–3.
- 6 Brener ND, Kann L, Kinchen S *et al*. Methodology of the youth risk behavior surveillance system. *Morb Mort Wkly Rep* 2004;**53**:1–13.
- 7 Agius PA, Pitts MK, Smith AMA *et al*. Sexual behaviour and related knowledge among a representative sample of secondary school students between 1997 and 2008. *Aust New Zealand J Public Health* 2010;**34**(5):476–81.
- 8 White V, Smith G. *Australian Secondary School Students' Use of Tobacco, Alcohol, and Over-The-Counter and Illicit Substances in 2008*. Canberra: Drug Strategy Branch, Australian Government Department of Health and Ageing, 2009.

- 9 Health Canada. *Canadian Alcohol and Drug Use Monitoring Survey*. http://www.hc-sc.gc.ca/hc-ps/drugs-drogues/stat/_2010/summary-sommaire-eng.php (20 August 2011, date last accessed).
- 10 Statistics Canada. *Canadian Tobacco Use Monitoring Survey (CTUMS)*. <http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=4440&lang=en&db=imdb&adm=8&dis=2> (20 August 2011, date last accessed).
- 11 Bridges S, Gill V, Omole T *et al.* *Smoking, Drinking and Drug Use Among Young People in England in 2010*. London: National Centre for Social Research and the National Foundation for Educational Research, 2011.
- 12 Black C, MacLardie J, Maihot J *et al.* Scottish schools adolescent lifestyle and substance use survey (SALSUS). National Report. Edinburgh: Information Services Division, 2009.
- 13 Craig R, Hirani V, (eds). *Health Survey for England—2009: Health and Lifestyles*. London: National Centre for Social Research, 2010.
- 14 Bromley C, Given L, Ormston R *et al.* (eds). *The Scottish health Survey—2009*. Edinburgh: Scottish Government, 2010.
- 15 National Statistics. *Welsh Health Survey, 2009*. Newport: National Statistics, 2010.
- 16 Schubotz D, Simpson A, Rolston B. *Towards Better Sexual Health: A Survey of Sexual Attitudes and Lifestyles of Young People in Northern Ireland*. Belfast: FPA, 2002.
- 17 NHS Information Centre. *Statistics on Drug Misuse: England, 2010*. London: NHS Information Centre, 2011.
- 18 Department of Health. *Abortion Statistics, England and Wales: 2010*. London: Department of Health, 2011.
- 19 Health Protection Agency. *STI Annual Data Tables*. <http://www.hpa.org.uk/stiannualdatatables> (20 August 2011, date last accessed).
- 20 Office of National Statistics. *Conceptions in England and Wales, 2009*. Newport: Office for National Statistics, 2010.
- 21 Coleman J. *Adolescent Health in the UK Today: Where Next?* London: Association for Young People's Health, 2011.
- 22 Fuller E (ed.). *Drug Use, Smoking and Drinking Among Young People in England in 2007*. London: National Centre for Social Research and the National Foundation for Educational Research, 2008.
- 23 Guilamo-Ramos V, Litardo HA, Jaccard J. Prevention programs for reducing adolescent problem behaviors: implications of the co-occurrence of problem behaviors in adolescence. *J Adolesc Health* 2005;**36**(1):82–6.
- 24 Wiefferink C, Peters L, Hoekstra F *et al.* Clustering of health-related behaviors and their determinants: possible consequences for school health interventions. *Prev Sci* 2006;**7**(2):127–49.
- 25 DuRant RH, Smith JA, Kreiter SR *et al.* The relationship between early age of onset of initial substance use and engaging in multiple health risk behaviors among young adolescents. *Arch Pediatr Adolesc Med* 1999;**153**(3):286–91.
- 26 Stueve A, O'Donnell LN. Early alcohol initiation and subsequent sexual and alcohol risk behaviors among urban youths. *Am J Public Health* 2005;**95**(5):887–93.
- 27 Ellickson PL, Tucker JS, Klein DJ. High-risk behaviors associated with early smoking: results from a 5-year follow-up. *J Adolesc Health* 2001;**28**(6):465–73.
- 28 Guo J, Chung I-J, Hill KG *et al.* Developmental relationships between adolescent substance use and risky sexual behavior in young adulthood. *J Adolesc Health* 2002;**31**(4):354–62.
- 29 Parkes A, Wight D, Henderson M *et al.* Explaining associations between adolescent substance use and condom use. *J Adolesc Health* 2007;**40**(2):180.e1–18.
- 30 Bellis M, Hughes K, Calafat A *et al.* Sexual uses of alcohol and drugs and the associated health risks: a cross sectional study of young people in nine European cities. *BMC Public Health* 2008;**8**(1):155.
- 31 Wagner FA, Anthony JC. Into the world of illegal drug use: exposure opportunity and other mechanisms linking the use of alcohol, tobacco, marijuana, and cocaine. *Am J Epidemiol* 2002;**155**(10):918–25.
- 32 Degenhardt L, Coffey C, Carlin JB *et al.* Who are the new amphetamine users? A 10-year prospective study of young Australians. *Addiction* 2007;**102**(8):1269–79.
- 33 Patton GC, Coffey C, Carlin JB *et al.* Reverse gateways? Frequent cannabis use as a predictor of tobacco initiation and nicotine dependence. *Addiction* 2005;**100**(10):1518–25.
- 34 Jessor R, Turbin MS, Costa FM. Protective factors in adolescent health behavior. *J Pers Soc Psychol* 1998;**75**(3):788–800.
- 35 Zweig JM, Phillips SD, Lindberg LD. Predicting adolescent profiles of risk: looking beyond demographics. *J Adolesc Health* 2002;**31**:343–53.
- 36 Igra V, Irwin CE. Theories of adolescent risk-taking behavior. In: DiClemente RJ (ed). *Handbook of Adolescent Health Risk Behavior*. New York: Plenum Press, 1996, 35–51.
- 37 Elliot D. Health-enhancing and health-compromising lifestyles. In: Millstein SG, Peterson AC, Nightingale EO (eds). *Promoting the Health of Adolescents*. Oxford: Oxford University Press, 1993, 19–145.
- 38 Lynskey MT, Fergusson DM, Horwood IJ. The origins of the correlations between tobacco, alcohol, and cannabis use during adolescence. *J Child Adolesc Psychiatry* 1998;**39**(7):995–1005.
- 39 Resnick MD, Bearman PS, Blum RW *et al.* Protecting adolescents from harm. *JAMA* 1997;**278**(10):823–32.
- 40 Jackson C, Haw S, Frank J. *Interventions That Address Multiple Risk Behaviours or Take a Generic Approach to Risk in Youth: An Environmental Scan with Special Reference to Scotland*. Edinburgh: Scottish Collaboration for Public Health Research and Policy, 2010.
- 41 Viner RM, Haines MM, Head JA *et al.* Variations in associations of health risk behaviors among ethnic minority early adolescents. *J Adolesc Health* 2006;**38**:55.e16–23.
- 42 Peto R, Lopez AD, Boreham J *et al.* *Mortality from Smoking in Developed Countries 1950–2000*. Oxford: Oxford University Press, 1994.
- 43 Institute of Alcohol Studies. *Alcohol and Health*. London: Institute of Alcohol Studies, 2005.
- 44 Mirza KAH, Mirza S. Adolescent substance misuse. *Psychiatry* 2008;**7**(8):357–62.
- 45 Newcomb MD. Psychosocial predictors and consequences of drug use: a developmental perspective within a prospective study. *J Addict Dis* 1997;**16**(1):51–89.

- 46 Fergusson DM, Horwood LJ, Ridder EM. Conduct and attentional problems in childhood and adolescence and later substance use, abuse and dependence: results of a 25-year longitudinal study. *Drug Alcohol Depend* 2007;**88**(Suppl. 1):S14–26.
- 47 Chen K, Kandel DB. The natural history of drug use from adolescence to the mid-thirties in a general population sample. *Am J Public Health* 1995;**85**(1):41–7.
- 48 Rohde P, Lewinsohn PM, Kahler CW *et al.* Natural course of alcohol use disorders from adolescence to young adulthood. *J Am Acad Child Adolesc Psychiatry* 2001;**40**(1):83–90.
- 49 Schmid B, Hohm E, Blomeyer D *et al.* Concurrent alcohol and tobacco use during early adolescence characterizes a group at risk. *Alcohol Alcohol* 2007;**42**(3):219–25.
- 50 Pickett W, Schmid H, Boyce WF *et al.* Multiple risk behavior and injury: an international analysis of young people. *Arch Pediatr Adolesc Med* 2002;**156**(8):786–93.
- 51 Viner R. Co-occurrence of adolescent health risk behaviors and outcomes in adult life: findings from a National Birth Cohort. *J Adolesc Health* 2005;**36**(2):98–9.
- 52 Marmot M. *Fair Society, Healthy Lives: The Marmot Review*. London: University College London, 2010.
- 53 Institute of Medicine. *The science of adolescent risk-taking: workshop report*. Washington, DC: Committee on the Science of Adolescence, 2010.
- 54 Leatherdale S, Ahmed R. Alcohol, marijuana, and tobacco use among Canadian youth: do we need more multi-substance prevention programming? *J Prim Prev* 2010;**31**(3):99–108.
- 55 Camenga DR, Klein JD, Roy J. The changing risk profile of the American adolescent smoker: implications for prevention programs and tobacco interventions. *J Adolesc Health* 2006;**39**(1):120.e1–10.
- 56 Johnson SB, Sudhinaraset M, Blum RW. Neuromaturation and adolescent risk taking: why development is not determinism. *J Adolesc Res* 2010;**25**(1):4–23.
- 57 Steinberg L. Should the science of adolescent brain development inform public policy? *Am Psychol* 2009;**64**(8):739–50.
- 58 Coie JD, Watt NF, West SG *et al.* The science of prevention: a conceptual framework and some directions for a national research program. *Am Psychol* 1993;**48**(10):1013–22.
- 59 Catalano RF, Hawkins JD, Berglund ML *et al.* Prevention science and positive youth development: competitive or cooperative frameworks? *J Adolesc Health* 2002;**31**(6, Suppl. 1):230–9.
- 60 Vimpani G. Getting the mix right: family, community and social policy interventions to improve outcomes for young people at risk of substance misuse. *Drug Alcohol Rev* 2005;**24**(2):111–25.
- 61 Crow F. Learning for well-being: personal, social and health education and a changing curriculum. *Pastoral Care Educ* 2008;**26**(1):43–51.
- 62 Chan LS, Kipke MD, Schneir A *et al.* *Preventing Violence and Related Health-risking Social Behaviors in Adolescents*. Los Angeles: Agency for Healthcare Research and Quality, 2004.
- 63 Fortenberry JD. Adolescent substance use and sexually transmitted diseases at risk: a review. *J Adolesc Health* 1995;**16**(4):304–8.
- 64 Dogan SJ, Stockdale GD, Widaman KF *et al.* Developmental relations and patterns of change between alcohol use and number of sexual partners from adolescence through adulthood. *Dev Psychol* 2010;**46**(6):1747–59.
- 65 Santelli J, Carter M, Orr M *et al.* Trends in sexual risk behaviors, by nonsexual risk behavior involvement, U.S. high school students, 1991–2007. *J Adolesc Health* 2009;**44**(4):372–9.