

Can Prevention Classification be Improved by Considering the Function of Prevention?

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Abstract Universal, selective and indicated forms of prevention have been adopted as improvements on previous notions of primary and secondary prevention. However, some conceptual confusion remains concerning the placing of environmental, community-based or mass media preventive interventions within this typology. It is suggested that a new dimension of functional types of prevention, namely environmental, developmental and informational prevention should be specified alongside the forms of prevention in a taxonomy matrix. The main advantage of this new taxonomy is that a matrix combining the form and function dimensions of prevention can be used to identify and map out prevention strategies, to consider where research evidence is present and where more is needed, and to evaluate the relative effectiveness of different categories and components of prevention for specific health and social issues. Such evaluations would provide empirical evidence as to whether the different categories of prevention are related to outcomes or processes of prevention in ways that suggest the value of the taxonomy for understanding and increasing the impact of prevention science. This new prevention taxonomy has been useful for conceptualising and planning prevention activities in a case study involving the Swedish National Institute for Public Health. Future work should assess (1) the robustness of this new taxonomy and (2) the theoretical and empirical basis for profiling prevention investments across the various forms and functions of prevention.

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Recent History of Prevention Classification

In 1983, Robert Gordon, then a Special Assistant to the Director at the US National Institutes for Health, wrote a letter

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to Public Health Reports (Gordon 1983) challenging the categories of primary and secondary prevention that had been widely used since the 1957 report of the Commission on Chronic Illness (1957). Importantly, Gordon also outlined an improved prevention classification typology.

Gordon recognised that the categories of primary and secondary prevention, whilst still useful in the context of infectious disease with a clear biological origin, were less useful when considering chronic conditions that did not have a clear biological manifestation. Primary prevention was defined as “...practiced prior to the biologic origin of disease...” and secondary prevention as “...practiced after the disease can be recognised, but before it has caused suffering and disability...”. Given that epidemiological research was drawing out links between behavioural and social risk factors and health problems, Gordon wrote that it was time to move on from the biomedically based categories of primary and secondary prevention: “As more is learned about multifactorial chronic diseases with long periods of latency, the concept of biologic origins of disease becomes progressively more diffuse.”

Instead, Gordon suggested that prevention should be classified according to the population groups in which there is optimal application. Universal prevention, the most generally applicable type, is a preventive measure that is desirable for everyone and can be advocated confidently for the general public. On the other hand, where groups of people were known to be at higher risk, and where the balance of risk against benefits and costs from prevention indicated that universal approaches were not attractive, then selective prevention, which targeted preventive measures to higher risk groups, was appropriate. Indicated prevention is further along the continuum toward treatment, and is defined as prevention targeted at individuals who have been personally identified as being at increased risk for poor health.

In 1994, the US Institute of Medicine (IoM) of the National Academies identified the need to put in place a systematic approach to categorising preventive measures (Institute of Medicine 1994): “...without a system for classifying specific interventions, there is no way to obtain accurate information

on the type or extent of current activities, ...and no way to ensure that prevention researchers, practitioners, and policy makers are speaking the same language” (p.24). In particular, the authors of this IoM report were concerned with how prevention classification systems could be applied to mental, rather than physical health. They rejected the notions of primary and secondary prevention because of the problems associated with identifying the cases of mental illness rather than risk factors for mental illness, in much the same way that Gordon had rejected these notions because of difficulties in identifying the biological origins of physical disease.

Instead, the Institute of Medicine (IoM; 1994) adopted the classification system proposed by Gordon (1983), namely universal, selective and indicated prevention and also provided a refinement to the definition of indicated prevention. Whereas Gordon had intended indicated prevention to be for asymptomatic individuals at higher risk of developing a disease, the IoM report proposed that, in the context of mental health, indicated prevention was for individuals at higher immediate or lifetime risk of developing mental illness, whether they were currently asymptomatic or were experiencing mild symptoms that did not yet merit a formal diagnosis of a mental disorder.

More recently, in 2009, the IoM looked again at the definition and classification of prevention, this time for a report on preventing mental, emotional and behavioural disorders in young people (National Research Council and Institute of Medicine 2009). In this report, the authors consider alternative prevention classification systems, including the older notions of primary and secondary prevention, as well as more recent developments such as personalised medicine which identifies risk to individuals based on genomic analysis. The report concludes that the original 1994 IoM classification system (Institute of Medicine 1994), largely based on Gordon's 1983 proposed categories of universal, selective and indicated prevention (Gordon 1983), provides the best system for classifying preventive interventions prior to the onset of disorders.

Some Clarity, but Some Confusion

Classifying prevention according to the population level in which there is optimal application, namely universal, selective or indicated prevention, provides a useful clarification on the form, or configuration, that prevention takes. Universal prevention takes the form of a whole population approach, where risk of developing a disease or disorder is typically diffuse and preventive interventions are not based on level of risk. Universal prevention is also relevant when the prevention paradox operates. The prevention paradox occurs when most harm, at a societal or population level, arises from those who are at low risk (Rose 1981) (essentially because there are many more lower risk than higher risk individuals in a population). Universal interventions have advantages when their costs per

individual are low, the intervention is effective and acceptable to the population, and there is a low risk from the intervention (National Research Council and Institute of Medicine 2009).

Selective prevention measures are targeted toward sub-groups or individuals whose risk is significantly higher than average, and indicated prevention measures are targeted to high-risk individuals who are identified as having minimal but detectable signs, symptoms or markers foreshadowing a disorder, so the form of selective and indicated prevention, in terms of population level, is smaller and more focused. Selective prevention is best when there is an easily identified and reachable population sub-group, and is appropriate if cost is moderate and if the risk of negative effects is minimal or non-existent. Indicated prevention is used only with those individuals, rather than groups, who are personally identified to be at high risk for a problem or disease.

However, there remains some conceptual confusion regarding particular prevention approaches, specifically where these approaches fit within the universal/selective/indicated classification system. For example, environmental prevention is often distinguished as a separate class of prevention, pertaining to public policies such as laws, regulations, rules and taxation levels. Prohibiting drugs, restricting advertising of potentially harmful substances, gun control laws, enforcing laws regarding selling of alcohol to minors, or increasing excise taxes on alcohol or tobacco are all environmental prevention measures. Similarly, water fluoridation or adding folic acid to bread flour, are also environmental prevention measures.

Environmental prevention, however, overlaps significantly with universal prevention. Laws, regulations, rules and taxation levels typically apply at a whole population level, and are not usually targeted towards higher risk groups or individuals. So can we regard environmental prevention as universal prevention: are they synonymous? The answer is no, because although environmental prevention often takes a universal form, it doesn't always. For example, restricting alcohol sales to people 21 years and older targets a higher risk group (children and adolescents) with the aim of preventing purchase and consumption of alcohol before their bodies are physically mature. Similarly, gun control laws may dictate that higher risk individuals should not be allowed access to firearms. So, although environmental prevention is typically universal, it can also take the form of selective or indicated prevention.

Similarly, efforts to organise and promote community development through establishing and acting on shared community level social, cultural, political and economic processes (Holder 1999; Burkhart 2011) have also been put forward as environmental prevention. This is because environmental factors such as laws, regulations, social and cultural norms, mass media messages, and access and availability (for example to alcohol) are important for behaviour. This broadening of the concept of environmental prevention is, on the one hand, useful because it helpfully indicates that environmental

prevention need not solely operate at regional or national (i.e. macro-) levels but, on the other hand, there is potential for confusion when community development approaches lead to conventional environmental approaches (e.g. local laws, policing, regulations, taxes) as well as other approaches that are not usually considered as environmental prevention (e.g. school or family based prevention programmes, mass media health promotion campaigns). So, although environmental prevention can result from community development initiatives, so can other types of prevention.

A distinction that is often drawn to separate environmental from other types of prevention is the level of implementation, with environmental prevention operating on the physical and social environment that individuals are located in. By contrast, individual level prevention is said to act by focusing on the personal characteristics of individuals. But this distinction is not straightforward. Take mass media approaches, for example, where television, radio, magazine and newspaper adverts promote five-a-day fruit and vegetable intake to prevent coronary heart disease and cancers. These health messages are located in the environment, but they do not change the environment; rather, they are designed to be read, understood and acted on by individuals. Similarly, family based prevention programmes typically focus on parenting or family climate and environment, but the individual child or adolescent in the family setting is expected to respond to better parenting and family socialisation. So, the distinction between environmental and individual prevention can be confusing.

Therefore, whilst the universal-selective-indicated system for classifying prevention is a useful advance on previous notions of primary and secondary prevention, there remains some conceptual confusion about how environmental, community-based and individually oriented prevention approaches should be classified and how these different types of prevention relate to the universal-selective-indicated scheme.

Considering the Function, as Well as Form, of Prevention

A suggestion to try and get over this conceptual confusion is that alongside the forms of prevention in the universal-selective-indicated scheme, it would also be helpful to classify prevention according to its function or purpose. Proposed functional types of prevention are environmental, developmental or informational preventive measures.

We can regard environmental prevention as comprising those interventions that are intended to reduce the availability of opportunities to engage in risky health behaviours in a particular setting. Developmental prevention comprises those interventions that are intended to shape the socialisation and development of young people as they grow and mature so that they are less susceptible to any such opportunities for risky behaviour that are present in the environment. Such social

developmental interventions will most probably operate over an extended time period through the social learning of acceptable and unacceptable behaviours. Environmental and developmental prevention are also distinct from a third functional class of prevention: informational prevention. Informational prevention can be regarded as comprising those interventions that are intended to directly improve knowledge and awareness, for example through challenging pre-existing beliefs and attitudes about health risk behaviours, or by simply providing information about risks and harms.

In this proposed typology, clear definitions should emphasise distinctive *functional* characteristics rather than overlapping levels of implementation or operation:

Environmental prevention comprises interventions that aim to limit the *availability* of maladaptive behaviour opportunities, through system-wide policies, restrictions, and actions; for example, legal restrictions, economic (dis)incentives or situational crime prevention. Environmental preventive interventions can be implemented at regional, national, local, community or organisational levels.

Developmental preventive interventions aim to promote adaptive behaviours, and prevent maladaptive behaviours, by focusing on the development of *skills* that are key in socialisation and social development of appropriate behaviours. For example, parental monitoring practices, teacher behaviour management strategies and individual social or life skills. Developmental preventive interventions tend to be implemented at local, community, organisational, or family levels, and can also reflect regional or national policy objectives.

Informational prevention interventions aim to increase *knowledge* and raise awareness about specific risk behaviours, through communications. For example, mass media campaigns to raise awareness or social normative feedback to challenge preconceptions. Informational preventive interventions can be implemented at regional, national, local, community, organisational, family and individual levels.

These functions of prevention can be considered alongside the different forms of prevention, in a grid or matrix. This prevention matrix, it is suggested, provides an improved classification framework for preventive interventions (Table 1). At each intersection of form and function, illustrative examples can be described.

The prevention matrix shown in Table 1 also prompts consideration of the profiling of prevention planning or activities across a range of forms and functions. Rose (1981) generally advocated population-based universal prevention strategies as a means of improving the distribution of behaviour across the population, but Frolich and Potvin (2008) have pointed out that such universal strategies can have the unfortunate consequence of increasing health inequalities, because

Table 1 Classifying prevention: form and function in a prevention matrix, with illustrative examples

	Universal	Selective	Indicated
Environmental	Making behaviours illegal, for example, cocaine use or drunk driving; tax and pricing policy for unhealthy commodities; gun controls that prohibit firearm purchases without approval from relevant authorities	Reducing alcohol retail outlet density in high-risk neighbourhoods; improved street lighting and CCTV in town centres; age restrictions on harmful products, for example, tobacco and alcohol purchasing	Legislation to prevent violent individuals from obtaining firearms; incarceration to remove individuals from settings in which they could cause harm to others, or to themselves
Developmental	Parenting programmes that bring parents and children together to model and practice positive interactions and rule setting; classroom behaviour management programmes that promote pro-social behaviour in children; social/life skills programmes that teach young people skills to cope with social influences	Home visiting programmes for at-risk new mothers, for example, first time teenage pregnancies; Family/parenting programmes with high-risk family groups, for example families in the most deprived areas in a region or country	Multi-systemic therapy for individuals with serious antisocial or criminal behaviour; individual or group counselling or skill development with adolescents with particular personality characteristics, for example males with impulse control problems
Informational	General population mass media campaigns to raise awareness of risk behaviours, for example, fear arousal advertising campaigns; school-based knowledge and awareness curricula that provide information about alcohol and drugs	Informational interventions targeted at groups with particular characteristics, for example young girls from deprived neighbourhoods where there are higher teenage pregnancy rates; targeting school-based knowledge and awareness curricula to vulnerable groups, for example young males in deprived neighbourhoods with strong gang cultures	Normative feedback interventions for individuals who screen positive for a behavioural risk factor; information messaging targeted at high sensation seekers

they are generally more impactful on better off, lower risk, population groups. In fact, Rose (1981; see also Allebeck 2008) acknowledged this and, as Marmot suggests (Marmot et al. 2010), an optimal strategy is one which combines universal with targeted approaches, in a progressive universalism. Similarly, organising prevention activities across informational, developmental and environmental functions of prevention should promote optimal coverage, based on the expectation that ‘one size does not fit all’. However, this assumption should, in the future, be checked against theoretical analysis and empirical evidence reviews that weigh up the relative benefits and disbenefits of investment in the different functional types of prevention.

Case Study

This revised prevention classification taxonomy, emphasising the function as well as the form of preventive interventions, was first presented to the European Society for Prevention Research meeting that took place in December 2011. Over the following year, the Swedish National Institute of Public Health (SNIPH) used the taxonomy to help plan preventive interventions to tackle problem gambling, including co-morbid alcohol and tobacco problems.

They found the taxonomy useful for identifying and placing gambling, alcohol and tobacco prevention approaches into different categories. It was also useful for specifying prevention

action plans and responsibilities for implementation, and SNIPH consider that it could be used as a tool for arguing who should be responsible for various prevention efforts (the SNIPH is not responsible for indicated and some informational prevention, but could still recommend that other agencies should be given a commission in that area).

SNIPH's suggested strategy for gambling prevention in Sweden has identified the following potential prevention actions, based on the taxonomy:

Environmental

Universal: increase taxes, limit availability (e.g. casinos, electronic gambling machines), improved enforcement of laws, e.g. enforcement regarding illegal gambling machines;

Selective: legislate and enforce age limits (18 years old to purchase gambling products), limit availability in disadvantaged areas where there are higher rates of gambling problems, restrict availability in schools and workplaces; Indicated: suspension of higher risk gamblers from gambling venues, e.g. casinos.

Developmental

Universal: school and parent/family located programmes that develop social and life skills in young people to resist/limit gambling or promote responsible gambling; Selective: social influence and skills-oriented prevention programmes directed towards arenas where risk groups

(young men and middle aged women) live, work or socialise;

Indicated: cognitive-behavioural or motivational interviewing interventions targeted at higher risk individuals with a history of gambling but do not meet the criteria for a formal diagnosis.

Informational

Universal: gambling risk information and anti-gambling persuasion messages presented through media campaigns; Selective: venue- and location-specific information, delivered by the gambling industry, for example, to inform about the odds of winning;

Indicated: brief advice and normative feedback interventions for individuals screened or identified as being at risk of problem gambling, for example high sensation seekers.

Although the proposed strategy, summarised briefly above, identifies a number of potential actions in each category, further consideration should be given to the effectiveness and cost-effectiveness of these preventive actions, and where evidence gaps are identified whether to implement and evaluate because of perceived need, or whether to commission research evaluations before wider implementation (Foxcroft 2007).

SNIPH has also considered the co-morbidity of gambling with alcohol and tobacco problems. For example, research into alcohol prevention has shown that brief interventions in health care settings are an effective and relatively cost-effective method to reduce risky alcohol consumption. SNIPH research, as well as other international research, has shown that problem gambling is often co-morbid with alcohol (risky consumption as well as dependence). A possible recommendation from SNIPH, based on this evidence and illustrated by the taxonomy, is that another authority could be given a commission to trial a problem gambling module for brief interventions that is used alongside brief interventions for alcohol misuse.

Conclusion

Existing typologies of prevention emphasise the population basis of prevention activity but neglect the different functions of prevention leading to some conceptual confusion. In a proposed refinement, three functional types of prevention, namely environmental, developmental and informational, are added alongside the existing typology of universal, selective and indicated to provide a new framework for classifying preventive interventions. Future research should assess the robustness of this new taxonomy, for example, how easily the categories can be reliably applied and also the theoretical and empirical basis for profiling prevention investments across the various forms and functions of prevention.

The main advantage of this new taxonomy is that a matrix combining the form and function dimensions of prevention can be used to identify and map out prevention strategies, to consider where research evidence is present and where more is needed, and to evaluate the relative effectiveness of different categories of prevention for specific health and social issues, including the components of multi-component prevention programmes delivered at different ecological levels. Such evaluations would provide empirical evidence as to whether the different categories of prevention are related to outcomes or processes of prevention in ways that suggest the value of the taxonomy for understanding and increasing the impact of prevention science. In one European country, this new taxonomy has already been useful for identifying and planning a strategy for preventing problem gambling and co-morbid conditions.

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