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Behavioural Interventions - a Powerful Tool or Unnecessary Intrusion?

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During this era of health promotion and disease prevention, interest in health behaviour change has never been greater. For example, interventions are being developed to prevent the occurrence of chronic disease through efforts aimed at reducing cholesterol, blood pressure, body weight and smoking-related behaviours. Other programmes are aimed at improving, through behavioural interventions, the health outcomes of patients with a variety of existing chronic conditions, including asthma, diabetes, arthritis and coronary heart disease. Still other programmes are being designed to encourage the public to enrol and participate fully in screening programmes for cancer prevention (e.g. mammography and Pap tests), as well as for other preventive clinical services, including immunisations. Previously, behavioural interventions were usually considered to be the stepchild of medical treatment and clinical interventions; now, behaviour change strategies are often considered to be the 'action of choice' for the prevention and control of many acute and chronic conditions. One need only look at the global efforts to control AIDS to understand the significant role that behaviour change strategies are currently playing and their potential for future applications.

THE DEVELOPMENT OF BEHAVIOURAL INTERVENTIONS

To appreciate fully the current application of behavioural interventions in public health and clinical medicine it is useful to understand the historical trends which have influenced the development of contemporary behaviour change strategies. While today most effective public health interventions are multi-faceted and draw their theoretical basis from a variety of social and behavioural sciences, the discipline of psychology has had the largest influence on the development of health behaviour interventions. The current use of psychological principles to modify health behaviours has derived from vastly different perspectives on how the human organism behaves and the types of interventions necessary to achieve and sustain behavioural change.

An oversimplification of the factors which have influenced contemporary behavioural interventions would go back approximately 70 years to when Freud was exploring the determinants of human behaviour. He viewed human behaviour as a function of the deliberations of a troubled mind, struggling to deal with unresolved sexual tension

between child and parent. This tension resulted in the mind being partitioned into three elements – id, ego and superego – with each element interacting with the other resulting in the neurosis, psychosis and occasional normal behaviour which made each of us unique. Of most significance for this discussion is that this psychodynamic view of the human mind was totally *intrapsychic*, i.e. all the determinants of human behaviour emanated from within a person's mind and that, for the most part, personality was determined by the age of five.

While there were clearly departures from and disagreements with Freud's perspective over the ensuing years, the intrapsychic or psychoanalytic interpretation of human behaviour maintained its influence on our understanding of behaviour and the associated interventions until approximately 20 to 30 years ago and the advent of behaviourism. Behaviourism can be seen as a complete swing of the pendulum away from an intrapsychic explanation of human behaviour to a complete 'extra' psychic view. In this schema, behaviour is completely determined by events occurring outside the organism, that is external reinforcers, both rewards and punishments, determine behaviour. According to Skinner, the leading proponent of behaviourism, it really does not matter what you thought or how you felt; your behaviour is strictly a function of behavioural responses to external stimuli. This stimulus-response perspective has led to many of the advances in contemporary health behaviour theory, including contracting, contingency management, reward schedules and reinforcement for positive behaviours. However, while this perspective contributed to our understanding of human behaviour and was a welcome departure from the Freudian intrapsychic approach, it also had its limitations by excluding the role a person's thoughts and cognitions actually play in determining behaviour.

As is often the case with a swinging pendulum, after touching the extremes, it settles in the middle range. This is presently the case with the wide acceptance of social learning theory and other behavioural-cognitive models. Bandura of Stanford University is the leading proponent of social learning theory which posits that human behaviour can best be understood by viewing the interaction among cognitive, environmental and behavioural variables. This theoretical model draws upon the strengths of both the intrapsychic model of Freud and the behaviourism of Skinner to create a robust, but yet intuitive model to explain human behaviour. Social learning theory includes cognitive constructs such as outcome and efficacy expectations, both of which are important in determining whether the desired behaviour is actually performed. The concept of self-efficacy has evolved out of these constructs and has been integral to the development of many health behaviour interventions.

CAN HEALTH BEHAVIOURS BE CHANGED?

While contemporary health behaviour research is based on a long and rich history of psychological theory and theory from other behavioural sciences, the question remains, 'Are behavioural interventions a powerful tool?' and 'Can we actually change health behaviours?' The answer to these probing questions is, like the answer to many difficult questions, 'Well, it depends!'

It depends upon the behaviour in question, the underlying theory used to guide the intervention, the actual intervention selected to achieve the behavioural change, and the manner in which it is implemented. In addition to these conditions, there are also a number of caveats or warnings that need to be heeded in applying behavioural interventions and these will be discussed later in this paper. Fortunately, despite these conditions and caveats, there is good evidence to indicate that behavioural interventions are effective in

initiating and sustaining health behaviour change. The question becomes, 'What degree of change can realistically be expected from behavioural interventions?' Can we expect complete and immediate behaviour change similar to that associated with brainwashing, or can we only expect small changes in those already motivated, those who tend to be highly educated and at low overall risk?

The cessation of cigarette smoking provides an interesting example. Huge advances have been made in reducing the prevalence of smoking in the United States of America (USA). The reduction that has occurred over the last 25 years has been regular and consistent – dropping about one-half percent a year among white males. While this reduction represents a relatively small behaviour change each year, over time it has a dramatic effect on national smoking prevalence and the associated smoking-related disease burden. However 50 million Americans continue to smoke. The vast majority of these smokers would give up smoking if there were an easy way to do so, however, few are actually able to stop and the majority of those that do, do so without formal assistance.⁽¹⁾ The difficulty in giving up smoking is illustrative of the difficulty of making other behavioural changes. Of 100 people who quit smoking today, two-thirds will have relapsed to their old habit within three months, with another 10 to 20% relapse over the next nine months. Unfortunately, this type of response is not unusual with behavioural interventions, particularly when dealing with addictive behaviours. Thus, individual level interventions (such as smoking cessation) can lead to modest individual changes with major societal benefits.

In addition to significant and sustained changes in risk factor profiles resulting from individual behavioural interventions, a number of community and worksite intervention programmes have recently been completed. These programmes have demonstrated significant improvements in risk factors, morbidity and mortality due to organisational level interventions. Recently, the Stanford Five-City Project reported their results after 30 to 64 months of health education intervention and found significant differences in risk factor profiles and total mortality risk scores between treatment and control cities in California. Most significantly, these investigators found that community-wide interventions based on social learning theory, communication-behaviour change model, community organisation principles and social marketing methods resulted in a 13% reduction in smoking prevalence among a cohort sample and similar reductions in total mortality and coronary heart disease risk scores. Similar organisational level results have been achieved for cardiovascular disease variables in worksites and in schools. Clearly, organisational level interventions have a great potential in achieving and maintaining individual level change and corresponding disease risk reduction.⁽²⁾

ADVANCES IN BEHAVIOURAL INTERVENTIONS

While behavioural interventions have been shown to be effective in developing the skills to achieve behaviour change and subsequent risk reduction, not everyone at risk is interested or willing to change. Given this acknowledgement of uneven readiness, American psychologists Jim Prochaska and Carlo DiClemente have developed the Trans-theoretical Model of Behaviour Change, more commonly referred to as the Stages of Change. This model acknowledges the fact that not every individual is at the same degree or readiness and that some are not interested in changing at all – these intransients are referred to as precontemplators. Clearly, the probability of interesting these precontemplative individuals in a behavioural intervention is much less

edged a health problem and was seeking out the opportunity to change. Thus, interventions need to be tailored to the stage of readiness of each individual.

Clinically, on a one-to-one basis, it is relatively easy to recognise an individual's interest (or readiness) to change and to tailor the intervention accordingly. Unfortunately, this is rarely done, and different individuals receive the same intervention or counselling, regardless of individual differences or readiness. Despite this failed implementation at the clinical level, the real challenge for behavioural interventions is to learn how to apply the stages of change within a public health model, that is to deliver the stage-appropriate intervention to each individual in a defined group corresponding to individual readiness.

The author is currently involved in conducting two workplace health promotion interventions where this is being attempted. The first project is entitled Clean Air/Clean Lungs and is aimed at improving the respiratory health behaviours of painters and allied workers using local unions as intermediaries. Increased respirator use, improved ventilation and decreased smoking prevalence are the goals of the project and the stages of change model is being used to achieve these goals. During the one year intervention period, respiratory health photovideos have been developed corresponding to the stages of change and are being distributed to workers in a sequential manner, that is, all workers receive the precontemplation material first, followed a few weeks afterwards by the contemplation, action and maintenance materials. In this project, the population is assumed to be homogeneous with respect to its readiness to change and materials are provided in a logical, sequential fashion, but not tailored to the individual's readiness.

The second project involves work with rural, blue-collar construction workers, attempting to modify their smoking, diet and occupational health and safety behaviours. In this project, rather than providing the stage-specific intervention materials in a sequential fashion, attempts are made to distribute them to workers based on their individual readiness determined by simple computerised smoking and diet assessments. Workers are encouraged to complete and return very brief assessment instruments which provide an indication of individual worker readiness and then stage-specific intervention materials are distributed. Incentives, lotteries and competitions are to be used to encourage precontemplators to complete and return these brief assessment instruments. By developing strategies to provide stage-specific materials to large groups of workers, it is hoped that the provision of tailored interventions, which have been shown to be effective in the clinic, can be extended to the general public.

While there is evidence that some behavioural interventions are effective and can result in significant and sustained behaviour change, these results do not occur equally for everyone and are especially elusive for certain population groups. As was mentioned earlier, in the USA, the groups with the highest incomes, better jobs, and, most importantly, highest educational levels, are the ones most successful in making positive changes in health behaviour. This is true for the risk factors associated with chronic disease and it also appears to be true for AIDS and other emerging health problems. While this phenomenon is widely observed, it is more difficult to explain. Is it a matter of competing priorities, ineffective health education messages, or some unidentified intrinsic characteristic?

Not only are behavioural interventions limited with whom they are effective, but the guiding health behaviour theories are limited in their ability to explain and predict human behaviour. In a recent comparative analysis of some of the major health behaviour theories and models, Mullen

explained more than half of the observed behaviour change. Thus the majority of changes in health behaviour remain unexplained. On the one hand, knowing the wonderful diversity of the human condition, it makes sense that we can understand only about half of why people do what they do. We all know this first hand when we try to predict the behaviour of our children, spouses and friends! In addition to the difficulty in initiating and maintaining behaviour change, there are a number of other issues, ethical, moral and genetic that behavioural interventions call into question. How does one strike the balance between a powerful tool or an unnecessary intrusion?

Even though the accumulating research evidence suggests that health education interventions may be effective in influencing individual behaviours, there are a number of biological, epidemiological and ethical issues which must be confronted before behavioural interventions are universally embraced. Specifically, we need to address adequately issues such as the balance between: (i) individual liberties *versus* the public health; (ii) personal responsibility *versus* victim blaming; and (iii) heredity *versus* behaviour.

In many parts of the world, one of the greatest challenges to behavioural interventions lies not in the ability to change behaviour, but in the acceptability of the behavioural intervention to the public. For example, public health measures such as water fluoridation, motorcycle helmet laws and others are often rejected by the public on the basis of restricting individual freedom and the right to live (or die) as one chooses. Public health measures and the associated behavioural interventions are particularly at risk when they threaten the right to privacy and other closely-held individual freedoms. Again, one need only look to the AIDS epidemic to see the dilemma which is being faced over voluntary and confidential testing for HIV infection and the associated fear of discrimination.

In addition to striking the proper balance between individual freedoms and the public health, the effectiveness of behavioural interventions is also dependent on avoiding 'victim blaming' when attempting to encourage individuals to be responsible for their own health. In our zeal to improve health through risk factor reduction, we must never 'blame' people because of their health habits or make them feel as though they are 'victims' because of their disease. Unfortunately, when the focus is only on the manifestation of behaviour and not on its determinants, 'victim-blaming' occurs all too frequently. To avoid this problem, it is important to remember that behaviour is not determined by one factor only, and that environmental, economic and cultural factors also influence behaviour. Unfortunately, these factors are often difficult to modify and may not be included in traditional behavioural interventions. However, some of the more lasting behavioural changes are achieved when the goal of the intervention is to change the structural variables which influence health behaviour. To explore these complex issues further, the following section will review briefly the genetic determinants of health and how this particular issue illustrates both the power and limitations of behavioural interventions.

DETERMINANTS OF HEALTH: GENES, ENVIRONMENT OR BEHAVIOUR?

The latter half of the 20th century will be as much known for advances in the genetic understanding of health and disease as it will for any other scientific achievement. The Human Genome Project, molecular biology, gene therapy, recombinant DNA technology and the polymerase chain reaction have contributed greatly to the unfolding of the

responsive genes been identified for over 100 inherited diseases, most notably the prevalent disorder of cystic fibrosis. In addition to advances in DNA diagnosis, there has also been light shed on the genetic-behavioural interface, most recently by studying twins and obtaining a better understanding of the relative contribution of genetics and behaviour. In studies of twins two different sets of investigators have shown that genetic characteristics were more predictive of weight gain than what was actually eaten.^{(4),(5)} What are the implications of these types of findings for behavioural interventions?

In no medical speciality have genetic advances been so profound as they have been in the field of oncology, leading some to suggest that cancer and all neoplasia may be a genetic disease.⁽⁶⁾ It must be noted that when referring to cancer as a genetic disease, it is not necessarily meant that it is only inherited, but rather also resulting from changes in DNA that may occur due to environmental insult. Building upon the early discoveries from the relatively rare inheritable cancers (e.g. Wilm's tumour, retinoblastoma, etc.), rapid advances have been made in understanding the genetic basis of the leading causes of cancer mortality: lung, breast and colon. While not fully understood and not being able to account for all the cases of disease, the identification of specific chromosomal abnormalities has increased understanding of the carcinogenic process, opened up the possibilities of gene replacement therapy and thrown the entire area of behavioural interventions into question. Since the seminal work of Doll and Peto these high incident cancers were felt to be primarily associated with environment and/or lifestyle, and hence prevention recommendations were targeted at modifying individual behaviours. Not only were the interventions primarily behavioural, but most of the recommendations were provided irrespective of personal genetic history. This is not to say that behaviour change recommendations are not important; on the contrary, they are particularly important for those at the highest genetic risk. Perhaps those at highest risk should receive priority in the allocation of relatively scarce prevention resources. There is some evidence to suggest that individuals at high risk of colon cancer due to family history are more likely to participate in screening programmes than the general public.⁽⁷⁾ However, whether behavioural recommendations will continue to be priorities in the burgeoning field of medical genetics remains to be seen.

For example, the cessation of cigarette smoking is a universally accepted message which, if followed, would immediately and dramatically benefit all smokers (and those around them exposed to passive smoke). This is even true for cancer patients, particularly those with early stage upper aerodigestive malignancies.⁽⁸⁾ However, while recent research findings have increased understanding of the genetic basis of lung cancer, they have also called into question the universality of the smoking cessation recommendation. Researchers at the University of Texas M.D. Anderson Cancer Center in Houston⁽⁹⁾ have found chromosome sensitivity to be associated with an increased risk of developing upper aerodigestive cancer in heavy smokers. In other words, among smokers, the probability of developing cancer was associated with individual chromosomal characteristics. That is, because of their chromosomal profiles, certain smokers had a high probability of developing smoking-related cancers, while others could smoke with relative impunity (at least from cancer, but not necessarily from heart disease, emphysema or the myriad of other maladies known to afflict smokers).

Relatedly, British researchers found a changed form of the p53 gene in nearly all the tumour tissue from smoking-related lung cancer. The p53 gene controls cell multipli-

cation and, in the future, mutant forms of the p53 oncogene can be corrected with gene therapy, limiting cell multiplication and, if done early enough, perhaps interfering with the development of a lung carcinoma. In this scenario, the importance of smoking cessation for lung cancer prevention is unclear.

Given the increasing understanding of the causes of disease, especially cancer, the role of behavioural interventions is rapidly changing. From the provision of general messages, irrespective of risk, genetic advances are becoming able to identify who is at risk and the increased importance or irrelevance of behavioural recommendations for specific individuals. While there is need for continued improvement in public health measures, there is a greater need for additional research and understanding of how to modify the health behaviours of those at highest risk, and where these behaviours actually contribute to the expression of disease. Once we better understand when and where to apply behavioural interventions, we next need to know how to craft them in a way that they will result in change in a group which may be the hardest to reach because of denial, repression and a belief in the inevitability of disease.⁽¹⁰⁾

In retrospect, perhaps this paper should have been entitled 'Behavioural interventions: panacea or pitfall?' Clearly, behavioural interventions are here to stay. They are increasingly being accepted as a mainstream medical intervention and their effectiveness is being demonstrated in a variety of settings for an increasing number of health problems. However, before being labelled a panacea for the world's ills, we need to be humbled by its limitations and aware of the potential pitfalls. It must be remembered that we can explain and predict less than half of the behaviour that we observe. We must also remember that behavioural interventions can be misapplied and abused, particularly with reference to the right to privacy, confidentiality and victim-blaming. These risks are particularly well illustrated in the interface between the behavioural and genetic determinants of disease. This emerging area has vast implications for cancer prevention, control and treatment and has equally imposing challenges. It is incumbent upon each of us to become comfortable with these issues so that we unleash the power of behavioural interventions rather than the pitfalls.

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