Preventative care and behavioural science:

The emotional drivers of healthcare decisions

A report from Pfizer Vaccines
Written by The Economist Intelligence Unit

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Introduction

Preventative care and behavioural science: The emotional drivers of healthcare decisions is a report focusing on psychological factors — including emotional responses and cognitive biases — influencing consumers' decisions on preventative healthcare. The aim of this research is to improve understanding of preventative healthcare decision-making through the discipline of behavioural science.

A premise for this research is that decisions on preventative care — from simple safety steps, such as wearing seat belts, to more elaborate diet and exercise regimes, vaccinations, and medical screenings — are typically subject to a variety of psychological influences. Among these are emotional triggers, advice from friends and family, advertising campaigns, and consumers' personal experiences with particular diseases. These decisions are also subject to a variety of cognitive biases. To achieve the best results from prevention programmes, healthcare providers and public health policy makers should be aware of these influences when devising public health campaigns and making medical recommendations.

In addition to exploring the range of influences on consumers' preventative care decisions, this report outlines the types of messaging about preventative healthcare, and the types of policies and strategies aimed at influencing behaviour, that are most likely to be effective. The report includes examples of interventions that have supported preventative healthcare goals — and others that have failed — and offers advice on how to create interventions that deliver results.

The report is based on a combination of desk research and in-depth interviews with six scientists, physicians, and other experts in the field. We would like to thank the following interview participants (listed alphabetically) for their participation and insights:

Dr Chris Duke, *Co-Director, Consumer Engagement Programs, Altarum Institute, Ann Arbor, Michigan, USA*

Dr Caleb Ferguson RN PhD, *Senior Research Fellow, Western Sydney Nursing & Midwifery Research Centre, Western Sydney University, Australia*

Dr Alice Forster, *Senior Research Associate in the Department of Behavioural Science and Health at University College London, UK*

Dr Jennifer S. Lerner, *Experimental Social Psychologist and Professor of Public Policy and Management, Harvard University, Cambridge, Massachusetts, USA*

Professor Ivan Perry, *Head of Department of Epidemiology and Public Health, University College Cork, Ireland*

Dr Kevin Selby, *Chief Resident, Universite of Lausanne, Switzerland, and Post-Doctoral Researcher at the Kaiser Permanente Division of Research, San Francisco, California, USA*

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Executive summary

The concept of preventative healthcare rarely generates opposition, at least in theory: it is generally agreed to be a good thing to take steps to promote health and avert disease. So why is it so difficult to get patients to embrace measures that can prevent disease and improve their quality of life? Data suggest that despite evidence supporting the medical and cost-saving benefits of preventative healthcare measures, consumers regularly choose not to adopt them.

This research looks at the reasons for that discrepancy, and what methods might encourage people to follow better health practices. Here are the main findings of this research:

Despite the widely recognised benefit of preventative healthcare measures, consumers often fail to embrace them — leading to higher-than-necessary rates of illness.

Demographic factors influence the propensity to take preventive measures. For example, higher socio-economic levels correlate with greater use of preventative healthcare measures.

Age is also positively correlated with greater use of preventative measures. Moreover, some studies indicate that women are more likely than men in similar age and income brackets to take preventive care measures.

Beyond demographics, personal experience of a particular illness is also positively correlated with propensity to take preventative care measures.

Emotions also influence people's decisions on preventative care. For example, social psychologists have shown that people tend to focus on short-term rather than long-term outcomes of their behaviours, such as assigning more importance to the short-term benefits of pain-killers than the long-term risk of addiction, and also that individuals tend to assign great weight to the views of family and friends when deciding on medical matters.

Certain cognitive biases — such as a tendency to take no action under conditions of uncertainty, and a tendency to avoid making decisions when confronted with too many options — tend to reduce the likelihood of taking preventative care measures.

A different type of cognitive bias — the "nocebo effect" — can arise in individuals exposed to information of a negative nature about a particular drug or remedy; this exposure can lead to self-fulfilling prophecies of experiencing the same negative side-effects.

To address both the emotional and cognitive barriers to preventative care, healthcare providers and public health policy makers should use the following guidelines in devising and carrying out preventative care programmes:

- Balance data and anecdote when making the case for preventative care
- Take into account the range of sources people use for healthcare information, including physicians, affinity groups, and the internet
- Use appropriate spokespeople — relevant to the target group — to deliver messages
- Understand the role played by emotions such as fear or happiness in spurring action
- Adopt a personalised and respectful approach when advising patients
- Rely on shared decision-making with patients.

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Case examples show that successful preventative care programmes do the following:

- Anticipate listeners' potential objections
- Use multi-media communication channels
- Change key aspects of the listeners' environment
- Encourage peer-to-peer support
- Include endorsement by physicians.

Pfizer Vaccines View

Vaccination and healthcare decisions: an overview

Vaccination is considered one of the most effective preventative healthcare measures in terms of its prevention of infectious diseases[1] and its cost-effectiveness.[2] According to the World Health Organization, "without doubt, vaccines are among the most efficient tools for promoting individual and public health."[1] Immunisation helps to prevent six million deaths worldwide each year[1] and yet, vaccination coverage rates are frequently below set targets, varying by country and vaccine.[3]

Vaccine confidence is the belief that vaccination serves the best health interests of the public and its constituents.[4] The success of vaccination programmes depends in part on population perception of the benefits and risk of vaccines and related confidence in vaccination.[5]

Concerns and barriers to vaccination have been found to be vaccine, country and population-specific but include vaccine safety, perceptions of low likelihood of contracting vaccine-preventable diseases (VPDs), perceived low severity of VPDs, beliefs that vaccines do not work, and overall lack of information.[5]

Behavioural economics is a subfield of economics that can assist clinicians to better understand how individuals actually make decisions, and can assist their interactions with patients.[6] Behavioural economics research that focuses on healthcare and medical decision-making is becoming more widely known, and what has been reported suggests that these interventions can be effective in the medical realm.[6]

The boxed sections of this report entitled Pfizer Vaccines View draw on the topics discussed in the main report and apply them to the context of vaccination. These sections of the report are based on interviews with the following experts:

Professor Paolo Bonanni, *Professor of Hygiene in the Faculty of Medicine, University of Florence, Italy*

Dr Douglas Hough, *Associate Scientist & Associate Director, Master of Health Administration Program, Health Policy and Management, Johns Hopkins University, USA*

Professor Heidi Larson, *Director of the Vaccine Confidence Project (VCP), London School of Hygiene and Tropical Medicine (LSHTM), UK.*

[1] World Health Organization. Vaccination greatly reduces disease, disability, death and inequity worldwide. Available at: http://www.who.int/bulletin/volumes/86/2/07-040089/en/. [Accessed: June 2018].
[2] World Health Organization. Immunization. Available at: http://www.who.int/topics/immunization/en/. [Accessed: June 2018].
[3] World Health Organization. World Immunization Week 2017: Vaccination Works. Available at: http://www.who.int/campaigns/immunization-week/2017/event/en/. [Accessed: June 2018].
[4] Vaccine Confidence Project (VCP). Available at: http://www.vaccineconfidence.org/about/. [Accessed: June 2018].
[5] Karafillakisa E, Larson HJ. The benefit of the doubt or doubts over benefits? A systematic literature review of perceived risks of vaccines in European populations. *Vaccine*. 2017;35 (37) 4840-4850.
[6] Courtney M, Spivey C, Daniel K. Helping patients make better decisions: how to apply behavioural economics in clinical practice. *Patient Prefer Adherence*. 2014; 8: 1503–1512.

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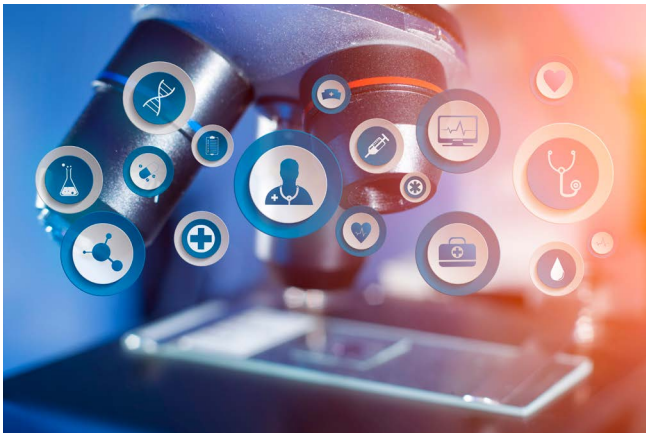
Circumstantial influences on preventative healthcare decision-making

Preventative healthcare, a series of measures aimed at averting disease and promoting health, is the backbone of an effective population healthcare system. "Preventative healthcare" encompasses a wide range of measures, from simple to complex. This report focuses on two types of preventative healthcare: primary and secondary.

Primary preventative healthcare aims to promote health and to prevent disease or injury before it occurs, through measures such as using seat belts and bicycle helmets, eating healthy foods, exercising regularly, avoiding hazardous products (tobacco, narcotics, excessive alcohol), and taking vaccinations. Secondary preventative healthcare aims to reduce the impact of a disease or injury that has already occurred, or is statistically likely to occur. It encompasses tools such as screening to detect disease in its earliest stages, modifying the environment to accommodate a weakness or promote better health, or taking daily low doses of aspirin and/or reducing cholesterol to decrease the risk of heart attacks or strokes.[7]

When done correctly, a primary and/or secondary preventative healthcare programme improves quality of life, increases productivity, and reduces the cost of care for individuals, insurers and other medical care payers. The measures involved typically are inexpensive compared to the costs of dealing with a larger burden of disease. Yet many people consistently fail to take advantage of these healthcare tools.



For example, obesity is rising across Europe. Currently 23% of European women and 20% of men are obese, and a third of children are either overweight or obese, according to the WHO Regional Office for Europe (WHO/Europe).[8] The European region of WHO also has the world's highest levels of alcohol consumption and alcohol related health damages,[9] as well as one of the world's highest rates of tobacco use among adults and adolescents.[10] Unhealthy lifestyle choices also increase the risks of Type 2 diabetes, cancers, and the spread of infectious diseases, including tuberculosis and HIV.[11] The World Health Organization (WHO) reports that 17.7 million people die every year from cardiovascular disease, which is linked to tobacco use, an unhealthy diet, and inactivity.[12]

[7] Cohen J, Neumann P, and Weinstein M. Does Preventive Care Save Money? Health Economics and the Presidential Candidates. *N Engl J Med* 2008; 358:661-663
[8] World Health Organization Europe. Obesity - Data and Statistics. Available at: http://www.euro.who.int/en/health-topics/noncommunicable-diseases/obesity/data-and-statistics. [Accessed: June 2018].
[9] World Health Organization Europe. European action plan to reduce the harmful use of alcohol 2012–2020.
Available at: http://apps.who.int/iris/bitstream/handle/10665/107307/E96726.pdf;jsessionid=00A22DA0DE38AF2038DE9937372E2990?sequence=1. [Accessed: June 2018].
[10] World Health Organization Europe. Tobacco - Data and Statistics. Available at: http://www.euro.who.int/en/health-topics/disease-prevention/tobacco/data-and-statistics
[11] World Health Organization. Alcohol Fact Sheet. Available at: http://www.who.int/en/news-room/fact-sheets/detail/alcohol. [Accessed: June 2018].
[12] World Health Organization. Cardiovascular Diseases Fact Sheet. Available at: http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds). [Accessed: June 2018].

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Such statistics indicate a major problem, both for individual health and well-being, and for systemic health-care costs. The rates of illness and the overall economic burdens of disease could be reduced through more widespread and systematic use of a variety of preventative healthcare measures. But to reach the goal of greater use of preventative care, policy makers and healthcare providers must first understand the barriers to adopting these practices.

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Demographic influences

Income and education

Individuals with high levels of education and income tend to be healthier than average, due to better nutrition, better access to healthcare, and a higher quality living environment. They are also more likely than average to take preventative health measures — thus widening the health gap between socio-economic classes. A study of population health in 14 European countries found that income and education are "significant determinants of access to all types of health services including preventative care," and that the probability of using health services is lowest for individuals with the lowest level of education.[13]

Similarly, university attendance is associated with a 5–15% increase in likelihood of using several types of preventative care, including vaccinations, and screening for breast, uterine and colon cancer, according to one US study.[14] Another study in Belgium found participants with no academic degree or only primary education are less likely to have received common preventative screenings, including cholesterol checks, compared to those with higher education. The authors suggest higher educated groups might have a greater awareness of the availability and benefits of preventative care services. They also say that general practitioners are less likely to inform lower-educated patients about these options.[15]

When low-income and low-education individuals do take advantage of preventative healthcare options, it is usually only after an illness or accident has occurred, according to a 2012 study of differences in use of preventative care in Europe.[16] The authors say the reason is a relative lack of knowledge among these groups about the benefits of preventative care. The authors also say such groups are less likely than well-off individuals to ask their physicians for information, and they find a lower likelihood that healthcare providers will recommend screenings and other preventative care to poorer patients.[16]

Similar trends appear in population research conducted in the US. "Trust of physicians and healthcare systems declines with lower income levels," says Dr Chris Duke, Co-Director of Consumer Engagement Programs for the Altarum Institute, a US-based non-profit research organisation. He attributes this result to poor experiences with healthcare systems and healthcare professionals, including low quality of care or denial of care due to inability to pay. This negative dynamic between low-income individuals and the US healthcare system also discourages the use of preventative measures in the affected populations, he says.

Age

Age is also a factor in the propensity to use preventative care, with the probability rising as individuals get older. This is due in part to older patients' increased interaction with generalists, who are more likely to recommend screenings, vaccinations, and other preventative care treatments, according to the study of 14 European countries.[13] The study shows for example, that the odds of having a vaccination at the age of 50–55 was eight times lower than at age 80 and above; and that all age groups were less likely to be recommended for colonoscopies and blood stool tests than the over-80 group.

[13] Jusot, F., Or, Z., Sirven, N. Variations in preventive care utilisation in Europe. *European Journal of Ageing*. October, 2011. 15-25.
[14] Fletcher, J., Frisvold, D. Higher Education and Health Investments: Does More Schooling Affect Preventive Health Care Use? *Journal of Human Capital*. 2009. 144.
[15] Hoeck, S *el al*. Preventive Care Use among the Belgian Elderly Population: Does Socio-Economic Status Matter? *International Journal of Environmental Research and Public Health*. January, 2014. 355–372.
[16] Carrieri, V., Wübker, A. Assessing Inequalities in Preventive Care Use in Europe. *RUHR Economic Papers*. September, 2012.

Gender

The influence of gender on the tendency to seek or receive preventative healthcare advice is inconclusive. In one large-scale study of adults over 40 in Poland, for example, researchers found that screening for alcohol consumption, tobacco use and body mass index was more frequently offered to men than to women, while women were more likely to have laboratory tests to measure cholesterol.[17]

A 2010 study of adults over age 65 in the US suggests that women are more likely than men in similar age and income brackets to take general preventative care measures. But that difference may be due to differences in the nature of ailments affecting men and women in this age bracket. The research, published in *The Journal of Women's Health*, concludes: "Women were less likely to have hospital stays and had fewer physician visits than men with similar demographic and health profiles. In contrast, the greater use of home healthcare among women was almost entirely explained by their greater health needs."[18] In short, other demographic factors, such as age, income and education, may have a greater influence than gender on the overall propensity to take preventative care measures, although gender may influence the specific types of preventative measures taken.

[17] Gowin, Emelina. "Gender makes the difference: the influence of patients' gender on the delivery of preventive services in primary care in Poland", *Quality in Primary Care* 2009;17:343–50.
[18] Cameron, Kenzie A., *et al.* "Gender Disparities in Health and Healthcare Use Among Older Adults", *Journal of Women's Health*, 2010 Sep; 19 (9): 1643–1650.

Personal experience

Apart from demographic factors, individuals' experience with particular illnesses clearly affects their propensity to take preventative care measures related to those illnesses. For example, parents who have never seen a case of measles may not think measles vaccination is important for their children, says Dr Alice Forster, a behavioural scientist and senior research associate at University College London: "If a disease is not prevalent in the population, or they have no personal knowledge of someone who's experienced that condition, they may decide the risks of vaccination outweigh the benefits."

A 2010 review of studies on barriers to HIV testing in Europe supports this conclusion. It finds that a perception of low risk due to absence of personal experience with HIV was a leading cause for refusing HIV testing in several at-risk populations, including an ethnically diverse group in South London, pregnant women in London, and Dutch homosexuals.[19] The authors of one of the studies emphasised the need for HIV testing campaigns targeting populations that appear to under-estimate their HIV risk.[20]

Demographic factors and patients' personal experiences with disease are important factors for health policymakers and healthcare providers to consider when devising preventative healthcare programmes, and when consulting with patients. Further significant elements are emotional and cognitive biases that influence people's decisions on preventative healthcare. The next chapter explores how emotional and cognitive factors shape healthcare decisions.

Pfizer Vaccines View

Demographic influences on vaccination: some examples

There are over 20 vaccines available globally,[21] helping to protect against a range of infectious diseases across the life span.[22]

Vaccinations against certain diseases such as measles and pneumococcal disease are broadly recommended across the world.[23] Other diseases, such as tick borne encephalitis (TBE)[24] and yellow fever[25] are endemic to certain regions — areas of Europe and Asia in the case of TBE.[24] Only inhabitants of these areas and those travelling there, should consider protecting themselves against these diseases.[25,26]

People are eligible for immunisation through adolescence and adulthood.[27] The immunisations required in adulthood depend on the individual's age, chronic diseases, pregnancy status, and travel plans, as well as who they are in close contact with, and which vaccinations they received during childhood.[28,29]

[19] Deblonde, J., *et al*. Barriers to HIV testing in Europe: a systematic review, *European Journal of Public Health*, Volume 20, Issue 4, August, 2010. 422–432.
[20] Stolte, I.G., *et al*. Low HIV-testing rates among younger high-risk homosexual men in Amsterdam. *Sexually Transmitted Infections*. 2007. 387-391.
[21] WHO. Vaccines and diseases. Available at: http://www.who.int/immunization/diseases/en/. [Accessed June 2018].
[22] World Health Organization. Immunization routine. Available at: http://www.who.int/immunization/policy/Immunization_routine_table1.pdf?ua=1. [Accessed: June 2018].
[23] World Health Organization. Vaccine-preventable diseases: monitoring system. Available at: http://apps.who.int/immunization_monitoring/globalsummary/schedules. [Accessed: June 2018].
[24] Centers for Disease Control and Prevention. Tickborne Encephalitis. Available at: https://wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/tickborne-encephalitis. [Accessed: June 2018].
[25] World Health Organization. Yellow fever vaccination. Available at: http://www.who.int/ith/ith_country_list.pdf. [Accessed: June 2018].
[26] European Centre for Disease Prevention and Control. Tick-borne encephalitis in europe.
Available at: https://ecdc.europa.eu/sites/portal/files/media/en/healthtopics/vectors/world-health-day-2014/Documents/factsheet-tick-borne-encephalitis.pdf. [Accessed: June 2018].
[27] Vaccine Scheduler. ECDE. Available at: https://vaccine-schedule.ecdc.europa.eu/. [Accessed June 2018].
[28] Centers for Disease Control and Prevention. Vaccine Information for Adults. Available at: https://www.cdc.gov/vaccines/adults/rec-vac/index.html. [Accessed June 2018].
[29] Immunization action coalition vaccinations for Adults. Available at: http://www.immunize.org/catg.d/p4030.pdf. [Accessed June 2018].

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Older adults tend to be at an increased risk of vaccine preventable diseases, such as influenza, pneumococcal disease and herpes zoster.[30]

Vaccination rates vary by country and by vaccine.[31] In the case of influenza vaccination of older populations in countries in Europe, uptake generally remains suboptimal, despite the targeted 75 % recommended by bodies such as WHO and the European Council.[32,33] Reasons for adults to show hesitancy include concerns around vaccine safety and lack of information.[34]

[30] Gomensoroa E, Giudice G and Doherty T. Challenges in adult vaccination. *Annals of medicine*, 2018 vol. 50, NO. 3, 181–192.
[31] WHO. PCV3 coverage. Available at: http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tscoveragepcv3.html. [Accessed June 2018].
[32] European Commission. On seasonal influenza vaccination. Available at: http://ec.europa.eu/health/ph_threats/com/Influenza/docs/seasonflu_rec2009_en.pdf [Accessed June 2018].
[33] ECDC. Seasonal influenza vaccination in Europe. Available at: https://ecdc.europa.eu/sites/portal/files/documents/influenza-vaccination-2007%E2%80%932008-to-2014%E2%80%932015.pdf. [Accessed June 2018].
[34] ECDC. Rapid literature review on motivating hesitant population groups in Europe to vaccinate. Available at: https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/vaccination-motivating-hesistant-populations-europe-literature-review.pdf. [Accessed June 2018].

Emotional and cognitive influences on preventative healthcare decision-making

Aside from the influence of demographic factors and personal experience, the propensity of individuals to take preventative care measures depends on a range of emotional and cognitive factors. Built-in biases and emotional factors can have an outsized influence, often outweighing considerations based on facts and figures, says Dr Jennifer S. Lerner, an experimental social psychologist and professor of public policy and management at Harvard University. Emotional factors influencing preventative healthcare decisions include a tendency to focus on short-term rather than long-term outcomes, such as using pain-killers to excess to deal with an immediate problem despite the long-term risk of addiction.

Another type of emotional bias is a tendency of some consumers to rely on the views of family and friends concerning medical matters, or on advice gleaned from online sources, in preference to medical advisors who may be better informed. Research conducted by Dr Duke shows that when parents knew of families that had either positive vaccination experiences or negative experiences with the targeted disease, they were more likely to accept vaccination for their own children.

The plethora of information can pose a barrier to effective action on preventative care by generating confusion. Anecdotes from friends and family can have an outsized influence in this environment. Friends who have relevant healthcare experience are among the most valued sources because they are perceived as "doubly invested in the outcome," says Dr Forster of University College London.

"When people have a healthcare question, they have three oracles: their doctor, their friends and family, and Google," Dr Duke adds. According to the European citizen's digital health literacy report, 59% of European citizens used the internet to look for health information, and 10% used the internet to get a second opinion after visiting their doctor."[35]

[35] European Commission. European citizen's digital health literacy report. Available at: http://ec.europa.eu/commfrontoffice/publicopinion/flash/fl_404_en.pdf. [Accessed: June 2018].

Understanding cognitive bias

Amidst a daily barrage of messages concerning health measures, consumers often are confused about what works and what doesn't in preventative care. Social psychologists have identified at least two cognitive phenomena arising from that confusion: so-called "omission bias" and the "nocebo effect".

The tendency to avoid making a decision when confronted with complex and contradictory information is an "omission bias", says Dr Alice Forster of University College London. She describes a preference of patients, under conditions of uncertainty, to take no action rather than risk making the wrong decision--even if the "no action" choice may turn out to be incorrect as well.

She adds that this phenomenon often influences parents' decisions about their children's vaccination: parents say they would feel more at fault if their child were to have a negative reaction to a vaccination, than they would if their child were to contract an illness, such as measles, due to omitting the vaccination.[36] Omission bias may explain some European scepticism on vaccine safety, say researchers at Imperial College London. European parents are forgoing vaccines that have long been a cornerstone of childhood preventative care regimens.[37] The region has seen outbreaks of measles,[38] resulting in 35 measles-related deaths from July 2016 to July 2017.[39]

The *"nocebo effect"*, on the other hand, can arise from exposure to too much information. It is a tendency to experience exaggerated side effects after having read or seen material that creates negative expectations. A 2017 study published in *The Lancet*, a peer-reviewed medical journal, identifies this effect. The study focuses on users of statins, which are lipids (fat)-reducing drugs aimed at lowering the risk of cardiovascular disease. It finds up to 20% of patients taking statins reported side effects, including muscle pain, when they knew they were taking statins, whereas patients who did not know whether they were taking statins or a placebo reported little to no increase in side effects. "When they had no idea, there was no increase in muscle-related effects," the authors say.[40]

These behavioural phenomena have direct implications on the uptake of statins and other preventative medications, says Dr Kevin Selby, Chief Resident at the Universite of Lausanne in Switzerland. "Statins are cheap and effective, but people don't want to take them because of what they read in the media," he says.

[36] Forster, A. A qualitative systematic review of factors influencing parents' vaccination decision-making in the United Kingdom. *SSM - Population Health*. Volume 2, December 2016. 603-612.
[37] London School of Hygiene & Tropical Medicine. European region most sceptical in the world on vaccine safety. Available at: https://www.lshtm.ac.uk/newsevents/news/2016/vaccine_confidence_survey_2016.html. [Accessed: June 2018].
[38] European Centre for Disease Prevention and Control (ECDC). Epidemiological update: Measles - monitoring European outbreaks. Available at: https://ecdc.europa.eu/en/news-events/epidemiological-update-measles-monitoring-european-outbreaks-8-september-2017. [Accessed: June 2018].
[39] World Health Organization. Measles continues to spread and take lives in Europe. Available at: http://www.euro.who.int/en/media-centre/sections/press-releases/2017/measles-continues-to-spread-and-take-lives-in-europe. [Accessed: June 2018].
[40] Gupta, Ajay. Adverse events associated with unblinded, but not with blinded, statin therapy in the Anglo-Scandinavian Cardiac Outcomes Trial—Lipid-Lowering Arm (ASCOT-LLA): a randomised double-blind placebocontrolled trial and its non-randomised non-blind extension phase. *The Lancet*, Volume 389, Issue 10088. 2473-2481.

Pfizer Vaccines View

Emotional and cognitive influences on vaccination decision-making

"Omission bias is a significant factor. We need to make people understand that by making no decision, they are in effect deciding, whether for themselves or their child, and they're doing so in the least effective way," says Professor Paolo Bonanni, Professor of Hygiene at the University of Florence.

Professor Heidi Larson, Director of the VCP at LSHTM added, "Particularly pertinent to vaccination, people are more willing to take a perceived risk when they are ill than when they are healthy. People are also very good at blocking out relevant information when it makes them feel better to do so."

"For adult vaccination, particularly pneumococcal vaccination, there is also a patient awareness issue. Older people are not always aware of the need to get vaccinated, and if their doctor is not raising the issue, the lack of awareness persists," says Professor Larson.

"The challenge is that people are less likely to notice when vaccinations do their job. They never see what the vaccines prevent," adds Professor Larson.

Pfizer Vaccines View

Practical, emotional and cognitive influences on doctors' decision-making around vaccination

"Doctors themselves are not immune to emotional and cognitive influences on decision-making and they are coupled with more practical considerations," as Professor Larson describes.

Lack of training for healthcare professionals

"Vaccination forms a very small part of formal medical training. In recent years, as more vaccines have been approved, there is an increasingly 'busy' vaccination schedule. Doctors being trained now need more education around immunisation," says Professor Larson.

"Training for health professionals on how to deal with difficult patient conversations is another area needing attention. Doctors and other health professionals are not used to the extent they are being questioned by the public," says Professor Larson.

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Professor Bonanni adds, "doctors are not taught the principles of behavioural economics, which would help them both understand and communicate with their patients. They learn on the job but it is difficult without being taught the foundations."

Why recommendations are not always happening

According to Professor Larson, where doctors are not recommending vaccination to eligible adults, there are broadly two sets of circumstances--doctors either consider vaccination but choose not to recommend it, or, it is not even a consideration.

"Some doctors are so focused on treating the patient's condition that they do not consider vaccination — they need some form of trigger. For others, those who consider offering it but do not, it can be for reasons of not wanting to risk the relationship with the patient."

Consequences of the lack of training

"One consequence is that clinicians may be more likely to be affected by negative publicity around vaccination and can in turn, become part of the problem. If the doctor is not pushing for vaccination, patients may be unaware that vaccination is an option or assume that it is not critical. If the clinician is not convinced of the value of vaccination, the patient will pick up on it — enter the power of non-verbal communication — a patient will respond differently to a 'soft' recommendation of vaccination rather than a strong recommendation," says Professor Bonanni.

Professor Larson concludes, "With more and more people going online in search of health and medical information, doctors are increasingly having their knowledge challenged. If they do not feel convinced themselves of the right course of action, or do not feel confident in dealing with potential challenges to their advice, they may not raise the issue of vaccination."

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Addressing the circumstantial and cognitive influences on preventative healthcare decision-making

How can public health policy makers and individual physicians best address the emotional and cognitive barriers to using preventative care? This chapter considers the findings of various studies on success factors in programmes and messages aimed at encouraging disease prevention and promoting health.

Balance data and anecdotes

Sticking to the facts when appealing for preventative care is clearly important, but which facts should be emphasised when medical practitioners disagree? Experts interviewed for this report recommend transparency: sharing the data in a readily understandable form, and encouraging behaviour that is known to produce good results. On the other hand, when false information circulates, it can be risky to try to set the record straight, notes Dr Forster: "You can reinforce the belief by repeating it."

A separate type of risk arises when legitimate practitioners disagree about the benefits of certain types of preventative care for certain populations, as has been evident in debates over breast cancer screening for women and prostate cancer screening for men. The confusion created is likely to diminish participation in preventative care programmes, on the basis that even the experts cannot agree amongst themselves. "When we flip-flop every few years it creates a problem," Dr Selby says. "It teaches people to question both the advice and the source."

In the face of conflicting claims and contradictory data, Dr Selby suggests that promoters of preventative care recognise the value of anecdotes in influencing decisions. "As physicians we are often taught to disregard anecdotal evidence and to only trust large-scale studies, but patients are influenced by anecdotes," he says. "Doctors can use individual — true — stories to reinforce the findings in large blocks of data, though they must be backed up by facts or [the message] will appear coercive."

Pfizer Vaccines View

"Balancing data with stories is key. Patients may be swayed by data but more likely a good story! I'd suggest doctors show pictures...aim to really bring it home to the patient or the patient's parent."

Dr Douglas Hough, *Associate Scientist & Associate Director, Master of Health Administration Program, Health Policy and Management, Johns Hopkins University, USA*

Take competing information sources into account

To be effective, public health messaging and individual communications between doctors and patients should take into account the range of information sources to which patients and consumers are exposed, including family and friends, medical websites, social media forums, and affinity groups. Instead of ignoring these sources, public officials and medical practitioners should acknowledge their influence, and try to correct false information to the extent possible.

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"To be successful, preventative care interventions need to operate in the environment where people get their information," Dr Duke says. "The more socially relatable it is, the better." So, for example, messaging via online health forums sponsored by a trusted physician can encourage more productive conversations between patients and doctors.[41] Research shows that people seeking information online are more willing to ask their doctors' advice on preventative care than those who don't do their own research.[41]

Use appropriate spokespeople

Messaging on preventative care is best delivered by people with cultural, ethnic and community backgrounds similar to those of the target audience, says Dr Duke. Moreover, the closer the speaker is to the listener, in terms of geographic location as well as background, the better. "Local leaders are far more persuasive than outsiders," he says. Engaging trusted community leaders in the messaging, therefore, can help to build trust and promote uptake of preventative measures. "Health messages are more likely to resonate if the spokesperson is relatable or trusted within the community."

Consider efforts to tackle the spread of tuberculous among nomadic Roma groups in Slovakia, who have that country's highest rates of the disease. Rather than sending in international healthcare teams, the European Centre for Disease Control (ECDC) trained local Roma health assistants to promote tuberculosis treatment and prevention. The assistants monitored treatments, traced individuals with whom patients came into contact, accompanied patients to medical appointments, and kept records of all activities and interventions. Local assistants were more accepted since they better understood the Roma culture, the ECDC reports.[42] By the end of 2015, more than 80% of the adult Roma population with tuberculosis had completed treatment. Since that time, new tuberculosis outbreaks were more promptly identified and contained.

In another compelling example of using familiar faces, a 2003 experiment with using teenaged-peer educators to deliver sex education in England showed better results than when adult teachers delivered the information. The results showed pupils were more satisfied with the peer-led sex education, and that significantly fewer girls in the intervention group than the control group reported intercourse by age 16. Girls in the intervention group also reported fewer unintended pregnancies, although the difference was of borderline significance.[43]

The same principle applies to individual communications between doctors and patients. As noted in the previous chapter, the authors of a study on the influence of age on taking preventative care measures found that adults over 80 are more likely to take preventive care measures due to their higher-than-average interaction with general practitioners. The implication is that preventative care programmes aimed at older adults should focus on communicating via general practitioners: "Generalists are key actors for assuring both appropriate primary prevention… and adequate referral for secondary prevention," the authors say.[44]

[41] Cangelosi, D., Kim, D., Ranelli, E. An Attitudinal Analysis of Preventive Health Care Information Users: With Insights from Social Media. *Atlantic Marketing Journal*, Vol 4, Issue 2, Article 4: 2015.
[42] Interventions in vulnerable groups are the key to eliminating tuberculosis in Europe. ECDC.
Available from: https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/tb-interventions-vulnerable-populations-policy-briefing.pdf. [Accessed: June 2018].
[43] MacDonald L, Cairns G, Angus K, Stead M. Evidence review: social marketing for the prevention and control of communicable disease. Stockholm: *ECDC;* 2012. 6.
[44] Jusot, F., Or, Z., Sirven, N., Variations in preventive care utilisation in Europe, *European Journal of Ageing*, October, 2011. 15-25.

Understand the role of emotion

Some healthcare experts suggest borrowing a page from the advertisers' handbook — if not the entire handbook — to understand how different emotional charges added to healthcare messaging will influence consumers to take preventative measures. "Emotions are powerful and primary, and when it comes to preventative healthcare, they matter," says Harvard's Dr Lerner. "Emotional response is not always a bad thing." While she doesn't advocate relying on fear, for example, as a tool of persuasion, she encourages healthcare professionals to inform consumers about the risks of disease, and to take into account the role that emotions play in their decisions.

She adds that emotional reactions to messages occur faster than cognitive responses and directly influence behaviour. For example, research shows that sadness slows the impulse to take action, and anger can make people feel invulnerable to risks, including health risks. On the other hand, happiness tends to create a sense of empowerment that leads to action, and fear generates a sense of vulnerability, making people more likely to pursue preventative care options.[45]

These results suggest that using sad images and stories to encourage people to care for their health will likely not work. Similarly, messaging intended to outrage an audience about a potential risk might backfire by promoting a sense of invulnerability.

Using fear to encourage preventative healthcare, on the other hand, can be a successful — albeit controversial — strategy. Consider the 2010 "It's Never Just HIV" campaign in New York, which used ominous music and images warning that HIV can lead to osteoporosis, dementia and anal cancer, even for those receiving medical treatment.[46] While many criticised the campaign as fear-mongering, activist Larry Kramer, founder of AIDS Coalition To Unleash Power (ACT UP), supported it. He told the New York Times: "HIV is scary, and all attempts to curtail it via lily-livered nicey-nicey 'prevention' tactics have failed."[47]

Adopt a personalised and respectful approach

Consumers who turn to their doctors for advice on preventative care matters are likeliest to trust guidance that is delivered in a personalised and respectful way. The obverse is also true: shaming or berating patients for making poor healthcare choices will be counterproductive, says Dr Duke of the Altarum Institute. His research shows that consumers who feel disrespected by healthcare providers are three times more likely to disbelieve doctors as accurate sources of information than consumers who feel respected.[48] "It's not a matter of whether people are told the right thing to do, it is how they are told that determines their response," Dr Duke says.

Part of that respect is accepting the patient's circumstances, including his or her current readiness to change behaviour. "You have to meet people where they are, and acknowledge what they are prepared to do," Dr Selby says. So, for example, if a patient isn't ready to stop smoking or lose weight, a constructive approach would be to focus on the barriers to change, and perhaps agree on a plan for starting a smoking-cessation or weight-loss regimen on a specific future date.

[45] Lerner, J., *et al.* Emotion and Decision Making. *Annual Review of Psychology*. September, 2014. Vol. 66:799-823.
[46] Knowles, Z., Challacombe L., Fear-Based Campaigns: The Way Forward or Backward? *The Body*. Fall, 2011.
[47] Hartocollis, A. City's Graphic Ad on the Dangers of HIV is Dividing Activists. *New York Times*. Jan3, 2011.
[48] Right Place, Right Time Improving access to healthcare information for vulnerable patients, Consumer Perspectives. *Altarum:* January 17, 2017. 4.

When preventative care programmes take patients' attitudes and circumstances into account, even brief interventions from trusted sources can have a positive impact, says Dr Selby. One 2013 review of smoking cessation efforts shows that even a few minutes' conversation with a doctor increased cessation rates among smokers.[49] Similarly, a study of patients seeking advice for overweight/obesity at healthcare centres in Sweden found that patients who received specific advice and more frequent follow-ups with physicians were more successful in losing weight than those who did not.[50]

Rely on shared decision-making

An approach involving shared decision-making with patients promotes uptake of preventative care measures. Well-informed patients are better placed to share decision-making on medical matters, and patients who have helped to choose a course of action are more likely to implement it, says Dr Caleb Ferguson, a postdoctoral research fellow at the Centre for Cardiovascular and Chronic Care of the University of Technology in Sydney, Australia. "Shared decision-making can be more time-consuming than a prescriptive approach, and may even require a few visits," says Dr Ferguson, who studies prevention strategies for patients at risk of cardiac disease. But, he adds, "Shared decision-making promotes buy-in from patients, greater adherence to care regimes, and better health outcomes."

In practice, preventative healthcare campaigns succeed or fail due to a variety of individual, local circumstances, in addition to the factors outlined in this chapter. In the next chapter, we turn our attention to some real-world preventative care interventions, and the factors that determined their success or failure.

Pfizer Vaccines View

Addressing cognitive influences on patient and parent decision-making around vaccination

Dr Douglas Hough highlights the importance of framing — a concept which describes how decision-makers respond differently to different but objectively equivalent descriptions of the same problem.[51]

"How you present options affects the decisions people make. Doctors may not be trained in psychology and behavioural science but they do use the principles either knowingly or unknowingly. As an example, doctors are required to present both the benefits and side effects of medications but if they present the benefits first, it is the benefits over the side effects that will be most salient in the mind of the patient."

[49] Siu A. Behavioral and Pharmacotherapy Interventions for Tobacco Smoking Cessation in Adults, Including Pregnant Women: U.S. Preventive Services Task Force Recommendation Statement. *Ann Intern Med*. 2015 Oct 20;163(8):622-34. doi: 10.7326/M15-2023. Epub 2015 Sep 22.
[50] Jansson SP, Engfeldt P, Magnuson A, PT GL, Liljegren G. Interventions for lifestyle changes to promote weight reduction, a randomised controlled trial in primary health care. *BMC Research Notes*. 2013. 6: 213.
[51] Gong J, Zhang Y, Yang Z. The framing effect in medical decision-making: a review of the literature. *Psychology, Health & Medicine*. 2013;18(6):645-53. Available at https://www.ncbi.nlm.nih.gov/pubmed/23387993.

Pfizer Vaccines View

Increasing vaccination coverage rates – what needs to happen?

Healthcare professionals play a central role in vaccination uptake. To feel confident in carrying out their responsibilities, they need the support of health authorities and they also need to be sufficiently informed about vaccine-related issues and problems.[52]

Behavioural economics serves as a potential new tool to help clinicians improve their interactions with patients.[5] Aside from the medical community, it is time for policymakers around the world to put life-course immunisation at the top of their agendas.[53]

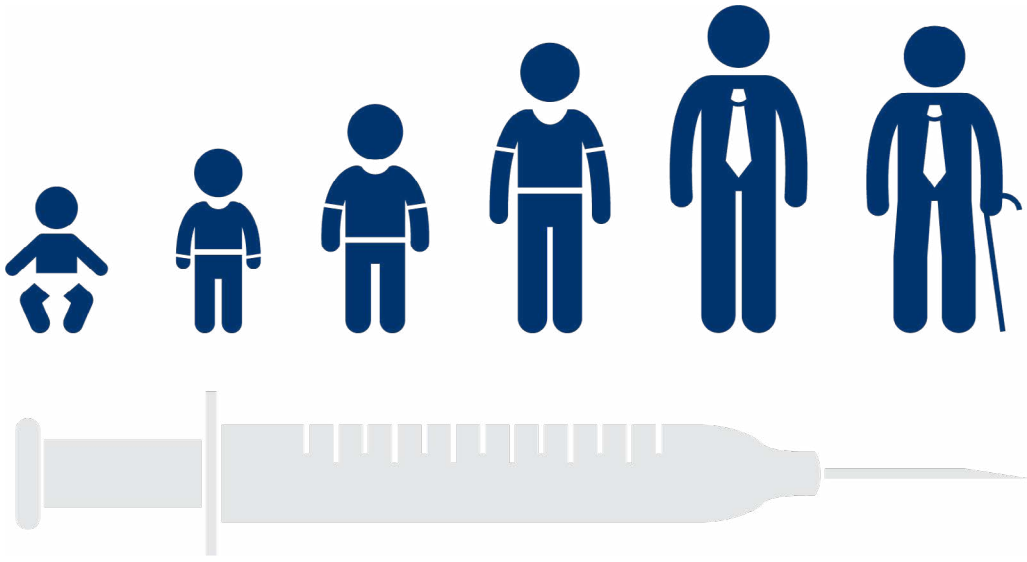
Professor Bonanni says,

"I would like to see a strong commitment from health authorities to promote vaccination among the elderly, and support healthcare professionals in their critical role. Healthcare professionals need to be educated on the principles of behavioural economics so they are able to apply them during their consultations with patients."

A change in mind-set – "vaccines for life"

Professor Larson *explains,*

"We need vaccines at different stages of life for different things hence the term 'vaccines for life'."



[52] Schmitt HJ, Booy R, Aston R *et al.* How to optimise the coverage rate of infant and adult immunisations in Europe. *BMC Med.* 2007; 5: 11.
[53] Health Policy Partnership. A life-course approach to vaccination: adapting European policies. Available at: http://www.comomeningitis.org/media/131769/life_course_vacc_policy_report_interactive-1-.pdf. [Accessed June 2018].

Shaping behaviour: What interventions work, and why?

Messaging aside, what can champions of preventative healthcare do to craft effective programmes to achieve aims such as fighting obesity and reducing HIV risks? Doctors, hospitals, governments and community groups have tried a variety of approaches over the years to achieve such goals. Some have succeeded, while others have failed and even backfired. This chapter looks at some of the factors contributing to success (or failure) in prevention outreach programmes.

Anticipate potential adverse reaction
The DARE and "Beat Bullying" campaigns

As an example of what to avoid, consider America's long running Drug Abuse Resistance Education (DARE) programme, in which local police officers exhorted students to "just say no" to drugs, and advised them on building self-esteem. After running for 18 years and reaching 75% of the country's children in the 1980s and 1990s, the programme not only failed to reduce teen drug use, but may have actually lowered students' self-esteem, according to a follow-up study.[54] The programme failed by oversimplifying the "just say no" message, and by exaggerating the claim that "drug abuse is everywhere."

Similarly, England's 2004 government-sponsored Beat Bullying campaign, which encouraged children to wear blue wristbands indicating they oppose bullying, was found to actually make the wearers targets for bullies. One 13 year old girl wrote to the BBC that in her school bullies assumed kids wearing the wristbands were afraid of them, so they targeted these children for bullying. "It's made a difference, but not a good one," she wrote.[55]

Both examples illustrate the same point: Designing an effective programme requires anticipating potential negative side effects and taking steps to minimise the chances these will occur. The US programme assumed teenagers would go along with the self-esteem exercises and accept the simple "just say no" mantra. The UK programme failed to anticipate the potential for creating a backlash on the part of bullies. A better thought-out approach could have avoided these outcomes.

Use multi-media
Alcohol awareness in Norway

Norway's "Alcohol-free pregnancy" campaign, which the Norwegian Health Directorate launched in 2008,[56] ran for several years via online videos, brochures, posters, FAQs, and a short animated film highlighting the harms of drinking during pregnancy. Animation was used to lighten the tone and thereby improve acceptance.

The multi-media approach appears to have had a measurable impact. Survey data from the general population show that in 2009, 40% of people thought that pregnant women could safely drink some alcohol with dinner, but that this number dropped to 20% by 2013.[57] Moreover, a separate 2017 study of 7,000 women in 11 European countries shows that Norway now has the lowest proportion of women who drink alcohol during pregnancy.[58]

[54] Lynam, DR, *et al*. "Project DARE: No effects at 10-year follow-up", *Journal of Consulting and Clinical Psychology*. August 1999 Vol. 67, No. 4. 590-593.
[55] Taylor, M. Bullying victim speaks out as campaign backfires. *The Guardian*. December 8, 2004.
[56] Norway's new education campaign "Alcohol-free pregnancy". *European Alcohol Policy Alliance*. February 12, 2010.
[57] Schölin, L. Prevention of harm caused by alcohol exposure in pregnancy: Rapid review and case studies from Member States. *WHO Europe*. 2016. 18-19.
[58] Norwegian women drink least while pregnant, British women drink most. *Norwegian Institute of Public Health*. April 11, 2017.

Change the environment
Weight loss in Ireland and France

As part of a healthy eating intervention study, a team at University College Cork, School of Public Health, provided workers at four Cork-based manufacturing plants with nutrition information on the food in the canteens, as well as consultations and group nutrition sessions. The real change, however, came not from receiving this mass of information, but from the companies' changing the food options offered at the canteens and reducing portion size. "It's a nice example of how changing the environment in relation to food changes behaviour," says the principal investigator, Professor Ivan J. Perry.

Similarly, EPODE International Network, a non-governmental organisation fighting childhood obesity, rolled out a programme in 2004 targeting five to 12 year olds in 10 selected cities in France. The programme included hosting breakfasts highlighting proper nutrition, but also tried to change the environment by promoting physical activity and developing safe walking routes to school, among other measures.

A year later, several of the cities recorded noticeable reductions in the percentage of overweight children. The town of St Jean in southwest France, for example, reported a sharp decline in the proportion of overweight children in a single year, from 19% in 2004 to 13.5% in 2005. Programme developers believe its success is due to introducing activity programmes and keeping them running over a long period.[59] In this instance, as in the Irish example, the environment — i.e. availability of activity programmes — was modified to promote a specific outcome.

Encourage peer-to-peer support
HIV prevention in Ukraine

Ukraine has among the highest HIV rates in Europe, according to national and international statistics.[50] The World Health Organisation and other UN agencies suggested a multifaceted approach that includes an innovative use of peer-to-peer counselling. Under this approach, which was implemented with the help of a range of government agencies and non-governmental organisations, each HIV patient (or client at risk of contracting HIV) recruits and trains further clients, enabling outreach to hard to-access subpopulations. For those clients who declined to attend counselling sessions or harm-reduction activities, the programme offered online platforms providing advice from social workers.

After these and other interventions were initiated, the rate of new HIV cases fell by almost a factor of four in the Ukraine, according to the World Health Organisation's 2014 report, Good practices in Europe: HIV prevention for People Who Inject Drugs implemented by the International HIV/AIDS Alliance in Ukraine.[61]

Include physician endorsements
Colorectal cancer screening in the UK

After testing various means of encouraging at-risk individuals to be screened for colorectal cancer, Cancer Research UK came up with a clear answer: A letter from one's own doctor is highly persuasive. The cancer research and awareness charity tracked response rates to leaflets, telephone outreach, advertising, and face-to-face promotions, along with letters signed by individuals' primary care physicians endorsing the screening programme.[62]

[59] Borys, J.M., *et al*. EPODE approach for childhood obesity prevention: methods, progress and international development. *Obesity Reviews*. April, 2012. 299-315
[60] Ukrainian Centre for Socially Dangerous Disease Control (UCSDDC). National HIV/AIDS estimates.
[61] Good practices in Europe: HIV prevention for People Who Inject Drugs implemented by the International HIV/AIDS Alliance in Ukraine. *WHO*. July, 2014.
[62] Evidence on increasing bowel screening uptake. *Cancer Research UK*.

Patients who had received such a letter, and patients who had received a screening kit together with a leaflet explaining how to spot early signs of colorectal cancer, were the most likely to take action. Each of these measures separately boosted participation by around 6%. Uptake increased by 12% when these interventions were combined with other messaging efforts.[63]

[63] Hewitson, P., *et al.* Primary care endorsement letter and a patient leaflet to improve participation in colorectal cancer screening: results of a factorial randomised trial. *British Journal of Cancer.* August 9, 2011. 475-480.

Conclusion

The advice that an ounce of prevention is worth a pound of cure — attributed to American statesman and inventor Benjamin Franklin — is as true today, and as widely accepted, as it was when first popularised in the 18th century. And yet health statistics show that unhealthy behaviours persist, resulting in higher burdens of illness than would otherwise occur.

This report focuses on the reasons for that gap between theory and practice, and on what healthcare providers and policymakers can do to narrow it. Among the influences causing the gap are demographic factors such as age, education and income, as well as imponderables such as individuals' own experiences with illness. Beyond those factors are a range of emotional influences and cognitive biases that can create barriers to taking action to improve health. These emotional factors and biases include a tendency to avoid or postpone a decision in the face of uncertainty, adverse reactions to messages perceived as disrespectful, or messages delivered by sources perceived to be untrustworthy.

This report considers factors influencing participation in preventative healthcare, and outlines some of the ways that healthcare providers and policy makers can improve the participation rate. This process involves using some of the information and tools that have been developed by behavioural science. Experts interviewed for this report offer this advice on using behavioural science to create preventative healthcare interventions that work:

Understand built-in biases. Factors such as "omission bias" in the face of conflicting information and the "nocebo effect" in response to negative publicity about health measures should be countered directly in public health campaigns.

Balance data and anecdote. Prevention programmes should be based on hard evidence, upon which there is general agreement in the medical community. Use clear communication involving both data and anecdotes, and leave consumers room to relate the information to their own circumstances.

Acknowledge the range of information sources. Consumers receive healthcare information from a variety of sources, many of them outside the medical system (family, friends, and internet). Messages should acknowledge these sources, and should also try to reach consumers through a variety of channels, including online platforms, to ensure they are heard.

Choose appropriate "messengers". Consumers are most likely to accept healthcare advice from those with cultural, ethnic and community backgrounds similar to their own.

Consider the influence of an emotional charge. Research shows that happy messages promote a sense of empowerment that leads to action. At the other end of the spectrum, messages warning of dire outcomes can create a sense of vulnerability leading to preventative measures.

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Be respectful and positive. A collaborative approach, and a focus on the positive results of taking preventative measures, is more likely to inspire use of preventative care than one-way communication or berating people for bad behaviour.

Promote shared decision-making. Patients who are well-informed and involved in deciding a treatment path are more likely to adhere to it. Giving patients the space and respect to participate in choosing among preventative care options leads to better medical outcomes.

Change the environment, where possible. Community-based weight-loss programmes in France, and workplace-based healthy eating programmes in Ireland, show that changing the environment in which individuals make health-related decisions ultimately can be more effective than plying them with large amounts of information.

Finally, in preventative care, as in most other areas of activity, there is no single approach that will sway consumers to make good decisions. In the words of Professor Perry of University College Cork, "We need to emphasise multi-level interventions to have the greatest effect."

Pfizer Vaccines View

Vaccination and healthcare decisions: an overview

Vaccination is considered as one of the most effective preventative healthcare measures in terms of its prevention of infectious diseases[1] and its cost-effectiveness.[2]

Vaccination coverage rates are frequently below set targets, varying by country and vaccine,[3] and people are eligible for immunisation through adolescence and adulthood.[27]

Vaccination hesitancy is the delay in acceptance or refusal of vaccines despite availability of vaccination services.[64] Vaccination refusal is an increasing challenge and threatens to jeopardize community protection against infectious disease.[65] Vaccine hesitancy has also been found to exist among healthcare providers – their vaccine confidence and vaccination behaviour has been found to affect their vaccination recommendations to others.[66]

Behavioural economics is a subfield of economics that can assist clinicians to better understand how individuals actually make decisions, and can assist their interactions with patients.[5]

A range of stakeholders need to take action to understand and address low vaccination coverage rates. Behavioural economics presents a way of aiding such efforts.

[64] World Health Organization. Addressing Vaccine Hesitancy. Available at: http://www.who.int/immunization/programmes_systems/vaccine_hesitancy/en/. [Accessed June 2018].
[65] McKee C and Bohannon K. Exploring the Reasons Behind Parental Refusal of Vaccines. *J Pediatr Pharmacol Ther.* 2016; 21(2): 104–109.
[66] Paterson P, Meurice F, Stanberry L. Vaccine hesitancy and healthcare providers. *Vaccine*. Volume 34, Issue 52, 20 December 2016, Pages 6700-6706.

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