# BRIEFING BOOK CONTENTS

<table>
<thead>
<tr>
<th>Meeting Information</th>
<th>Agenda</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VISAC Co-Chair Biographies</td>
</tr>
<tr>
<td></td>
<td>Moderator &amp; Speaker Biographies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Background Materials</th>
<th>VISAC Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The Distributional Effects of Nudges</td>
</tr>
<tr>
<td></td>
<td>Incentives for Immunity- Strategies for Increasing Covid-19 Vaccine Update</td>
</tr>
<tr>
<td></td>
<td>Changing Health Behaviors using Financial Incentives: A review from Behavioral Economics</td>
</tr>
</tbody>
</table>
Value Incentives & Systems Action Collaborative
December 2021 Meeting and Webinar

Leveraging Behavioral Economics as a Tool for Individual and Population Health

December 1, 2021  12:00 PM – 3:00 PM ET

Meeting Focus
Consider how emerging lessons from the field of behavioral economics can best be applied to foster individual and organizational actions that promote health system results that are more effective, efficient, equitable, and promote continuous learning.

Motivating questions
1. Organizational best practices: How much is known about the effectiveness of various incentive strategies to promote actions that benefit health and well-being? Have best practices been established for the health workforce?
2. Health system performance: What is the experience in aligning system-wide incentives to accelerate health transformation, in particular for using behavioral economics to facilitate positive, sustainable change during COVID-19?

Anticipated outcomes
Identify approaches that might be foundational for initiatives using incentive structures for health system efficiency, equity, effectiveness, and continuous learning.

Zoom Webinar
Please register here, to ensure we have your information for follow-on communications and to share the slides after the meeting. You will receive an email with instructions on how to join.

AGENDA

<table>
<thead>
<tr>
<th>12:00 pm ET</th>
<th>Welcome, Introductions &amp; Meeting Overview</th>
</tr>
</thead>
</table>

Welcome from the National Academy of Medicine
Michael McGinnis, National Academy of Medicine

Opening remarks and meeting overview by Collaborative Co-Chairs
Diane Holder, University of Pittsburgh Medical Center
James Madara, American Medical Association
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Details</th>
</tr>
</thead>
</table>
| 12:15 pm ET         | Keynote Session: Motivating Health System Transformation in the Pandemic Era | Remarks on the utility of behavioral economics for aligning the US health system, individuals, and the health system workforce with best practices and equity in the context of COVID-19  
Moderator: James Madara, American Medical Association  
Speakers: Cass Sunstein, Harvard University  
Kevin Volpp, University of Pennsylvania |
| 1:00 pm ET          | Incentives in Action for Individual- and Workforce- Driven Change | Presentations on the practical application of motivators for individuals, workforce, and the health system as a whole to improve individual/population health and well-being  
Moderator: Diane Holder, University of Pittsburgh Medical Center  
Panelists: Nancy-Ann DeParle, Consonance Capital Partners  
Brent James, Stanford University  
Mitesh Patel, Ascension |
| 1:45 pm ET          | Leveraging Behavioral Economics for a Healthier Future | Discussion on the alignment needed for incentive structures and performance motivators to integrate with health system transformation efforts to effect sustainable and accelerated change  
Moderator: James Madara, American Medical Association  
Panelists: Charlene Wong, Duke University  
Karl Ronn, Health2047  
Anaeze Offodile, MD Anderson Cancer Center  
Sachin Jain, SCAN Group and Health Plan |
| 2:55 pm ET          | Send-off and Closing Remarks                      | Concluding observations, highlighted action items, and final thanks to all invited speakers and participants  
Diane Holder, University of Pittsburgh Medical Center  
James Madara, American Medical Association  
Michael McGinnis, National Academy of Medicine |
| 3:00 pm ET          | Adjourn                                            |                                                                                                                                         |
Diane P. Holder
President and CEO
UPMC Health Plan

Diane P. Holder is executive vice president and president of the UPMC Insurance Services Division, and president and CEO of UPMC Health Plan. UPMC is one of the nation’s leading integrated delivery systems and through its health plans and affiliates, provides health coverage and benefit management for more than 4 million men, women and children in Pennsylvania. The Insurance Services Division includes the UPMC Health Plan, UPMC for You, Community Care Behavioral Health Organization and Work Partners. These health benefits companies manage benefits for Commercial, Medicaid, Medicare, Behavioral Health, EAP, Health Promotions and Worker’s Compensation programs. Ms. Holder has held a number of leadership positions in health care including the CEO of UPMC Western Psychiatric Hospital and the founding CEO of Community Care Behavioral Health Organization. Ms Holder is a faculty member of the University of Pittsburgh Department of Psychiatry and a faculty member of Pitt’s Graduate School of Public Health. She received her undergraduate degree from the University of Michigan and her master’s degree from Columbia University.
James L. Madara, MD
CEO and Executive Vice President
American Medical Association

James L. Madara, MD, serves as the CEO and executive vice president of the American Medical Association, the nation’s largest physician organization. He holds the academic title of adjunct professor of pathology at Northwestern University.

Since taking the reins of the AMA in 2011, Dr. Madara has helped sculpt the organization’s visionary long-term strategic plan. He also serves as chairman of Health2047 Inc., the wholly-owned innovation subsidiary of the AMA, created to overcome systemic dysfunction in U.S. health care and located in Silicon Valley. Working closely with the AMA, Health2047 finds, forms and scales transformative health care spinout companies in four fields: chronic care, data utility, radical productivity and health care value. Several companies have been launched to date.

Prior to the AMA, Dr. Madara spent the first 22 years of his career at Harvard Medical School, receiving both clinical and research training, serving as a tenured professor, and as director of the NIH-sponsored Harvard Digestive Diseases Center. Following five years as chair of pathology and laboratory medicine at Emory University, Dr. Madara served as dean of both biology and medicine, and then as CEO of the University of Chicago Medical Center, bringing together the university’s biomedical research, teaching and clinical activities. While there he oversaw the renewal of the institution’s biomedical campus and engineered significant new affiliations with community hospitals, teaching hospital systems, community clinics and national research organizations.

Dr. Madara also served as senior advisor with Leavitt Partners, an innovative health care consulting and private-equity firm founded by former Health and Human Services Secretary Mike Leavitt.

Having published more than 200 original papers and chapters, Dr. Madara has served as editor-in-chief of the American Journal of Pathology and as president of the American Board of Pathology.

In addition to Modern Healthcare consistently naming him as one of the nation’s 50 most influential physician executives, as well as one of the nation’s 100 most influential people in health care, Dr. Madara has been recognized with several national and international awards. These include the prestigious MERIT Award from the National Institutes of Health, the Davenport Award for lifetime achievement in gastrointestinal disease from the American Physiological Society, and the Mentoring Award for lifetime achievement from the American Gastroenterological Society.

Dr. Madara is an elected member of both the American Society of Clinical Investigation and the Association of American Physicians. He also co-chairs the Value Incentives & Systems Action Collaborative of the National Academy of Medicine (NAM), and is a member of NAM’s Leadership Consortium for Value & Science-Driven Health Care.
Nancy-Ann DeParle, JD, MA
Managing Partner and Co-Founder
Consonance Capital Partners

Nancy-Ann DeParle is a Managing Partner and Co-Founder of Consonance Capital Partners. Prior to CCP, she was Assistant to the President and Deputy Chief of Staff for Policy in the Obama White House from 2011-2013, and served as Counselor to the President and Director of the White House Office of Health Reform from 2009-2011. Before joining the White House, DeParle was a Senior Advisor and Managing Director at JPMorgan Partners and its successor, CCMP Capital, where she served as a director of several portfolio company boards, including CareMore, LHP Hospital Group, and MedQuest. She was also a Senior Fellow and Adjunct Professor of Health Systems Management at The Wharton School of the University of Pennsylvania and a trustee or director of Accredo, Cerner, DaVita, Guidant, Medco Health, Triad Hospitals, Boston Scientific and the Robert Wood Johnson Foundation. She served as a Commissioner of MedPAC, which advises Congress on Medicare policy matters, from 2002-2008. From 1997 to 2000, she served as the Administrator of the Centers for Medicare and Medicaid Services (CMS). DeParle currently serves on the board of directors of Sellers Dorsey, Psychiatric Medical Care, HCA Healthcare (NYSE: HCA), and CVS Health (NYSE: CVS). She is also a member of the Duke University Board of Trustees and the National Academy of Medicine. She served on the board of CCP’s portfolio companies Enclara, Turn-Key Health, and KEPRO prior to their sale. She received a B.A. from the University of Tennessee and a J.D. from Harvard Law School. She also received a B.A. and M.A. in Politics and Economics from Balliol College of Oxford University, where she was a Rhodes Scholar.
Sachin H. Jain, MD, MBA
President and CEO
SCAN Foundation

Sachin H. Jain, MD, MBA became president and CEO of SCAN Group and Health Plan on July 1, 2020. Most recently, Sachin was president and chief executive officer (CEO) of CareMore Health and Aspire Health, innovative integrated healthcare delivery companies. He led growth, diversification, expansion and innovation of these companies and they grew to serve over 180,000 patients in 32 states with $1.6B in revenues. Under his leadership, CareMore built and scaled industry-leading programs to address loneliness, deliver hospital and primary care at home, and address the clinical needs of the highest-risk, highest-need patients. Sachin was previously Chief Medical Information & Innovation Officer at Merck & Co. He also served as an attending physician at the Boston VA-Boston Medical Center and a member of faculties at Harvard Medical School and Harvard Business School. From 2009-2011, Sachin worked in the Obama Administration, where he was senior advisor to Donald Berwick when he led the Centers for Medicare & Medicaid Services (CMS). Sachin was the first deputy director for policy and programs at the Center for Medicare and Medicaid Innovation (CMMI). He has published over 100 peer-reviewed articles in journals such as the New England Journal of Medicine, JAMA and Health Affairs, and was an editor of the book, “The Soul of a Doctor” (Algonquin Press). Sachin is adjunct professor of medicine at the Stanford University School of Medicine and a contributor at Forbes. In addition, he serves on the National Board of Directors of America’s Health Insurance Plans and the Make-A-Wish Foundation of America. Sachin graduated magna cum laude from Harvard College with a BA in government and continued on to earn his MD from Harvard Medical School and MBA from Harvard Business School. He trained in medicine at Brigham and Women’s Hospital.
Brent C. James, MD, MStat
Clinical Professor, CERC
Stanford University School of Medicine

Brent James is known internationally for his work in clinical quality improvement, patient safety, and the infrastructure that underlies successful improvement efforts, such as culture change, data systems, payment methods, and management roles. He is a member of the National Academy of Medicine (formerly known as the Institute of Medicine), and participated in the seminal works on quality and patient safety. He is a Clinical Professor at the Clinical Excellence Research Center (CERC), Department of Medicine, Stanford University School of Medicine. He holds adjunct faculty appointments at several other universities: Visiting Lecturer, Harvard School of Public Health (Health Policy and Management); Adjunct Professor, University of Utah David Eccles School of Business; Adjunct Professor, University of Utah School of Medicine (Family Medicine; Biomedical Informatics). He is a Fellow of the American College of Physician Executives. He is presently a Senior Advisor at Health Catalyst, Salt Lake City, UT; Senior Fellow at the Institute for Healthcare Improvement (IHI), Boston, MA; and a Senior Advisor at the Leavitt Group, Salt Lake City, UT. He is was formerly Chief Quality Officer, and Executive Director, Institute for Healthcare Delivery Research at Intermountain Healthcare, based in Salt Lake City, Utah. Through the Intermountain Advanced Training Program in Clinical Practice Improvement (ATP), he has personally trained more than 5,000 senior physician, nursing, and administrative executives, drawn from around the world, in clinical management methods, with proven improvement results (and leading to over 50 “sister” training programs in more than 10 countries). For 8 of the first the 9 years it existed, he was named among Modern Physician’s “50 Most Influential Physician Executives in Healthcare.” He was named among the “100 Most Powerful People in Healthcare” (Modern Healthcare) for over 5 consecutive years, and among Modern Healthcare’s “25 Top Clinical Informaticists”. Before coming to Utah in 1986, he was Assistant Professor in the Department of Biostatistics at the Harvard School of Public Health, providing statistical support for the Eastern Cooperative Oncology Group (ECOG) and Cancer & Leukemia, Group B (CALG); and staffed the American College of Surgeons’ Commission on Cancer. He holds the following degrees; Bachelor of Science degrees in Computer Science (Electrical Engineering) and Medical Biology; an M.D. degree (with residency training in general surgery and oncology); and a Master of Statistics degree. He serves on several non-profit boards of trustees dedicated to clinical improvement and patient safety.
Anaeze C. Offodile II, MD, MPH  
Executive Director  
Clinical Transformation, University of Texas MD Anderson Cancer Center

Anaeze C. Offodile II, is concurrently the Executive Director for Clinical Transformation at The University of Texas MD Anderson Cancer Center and an Assistant Professor in the Department of Plastic Surgery. In his enterprise role, he is tasked with helping define, align and implement a high-level roadmap for clinical and economic transformation in support of MDACC’s vision to deliver high-value cancer care. Novel care delivery models that leverage cognitive computing and mobile-technology based approaches are an area of focus. His scholarship includes optimizing cancer symptom control, deepening our understanding of the organization of health care hospital markets, and characterizing the risk for financial toxicity following breast cancer care. He is also a non-resident scholar in domestic health policy at the Baker Institute, a non-partisan think tank on the campus of Rice University. He has received several national awards for his research work as well as competitive funding from the Doris Duke Charitable Foundation, Rising Tide Foundation for Clinical Cancer Research, University Cancer Foundation, and Blue Cross Blue Shield Affordability Cures Consortium. He has been published in esteemed journals such as Annals of Surgery, JAMA Network Open, Cancer, JAMA Surgery, and Health Affairs. He was the 2019-2021 Gilbert Omenn Fellow at the National Academy of Medicine (NAM).

A graduate of Columbia University College of Physicians and Surgeons, he completed surgical training at Brigham & Women’s Hospital (General Surgery), Lahey Clinic (Plastic Surgery) and MD Anderson Cancer Center (Microvascular fellowship). Dr. Offodile also received an MPH in health policy from the Bloomberg School of Public Health at Johns Hopkins University. Lastly, he previously served as a senior advisor to the Director of the Patient Care Models Group (Christina Ritter) at the Center for Medicare and Medicaid Innovation.
Mitesh S. Patel, MD, MBA
Vice President, Clinical Transformation and National Lead for Behavioral Insights
Ascension

Mitesh S. Patel, MD, MBA is a Physician Executive and Behavioral Scientist. He is currently Vice President for Clinical Transformation and National Lead for Behavioral Insights at Ascension. He is also the Ralph Muller Presidential Professor at the Perelman School of Medicine and The Wharton School at the University of Pennsylvania. Dr. Patel was previously the Founding Director of the Penn Medicine Nudge Unit, the world’s first behavioral design team embedded within a health system. In this role, he was a leading scholar who catalyzed the use of nudges and nudge units in health systems globally. His research focused on combining insights from behavioral economics with scalable technology platforms to improve health and health care. He has led more than 25 clinical trials in partnership with health systems, insurers, employers, and community organizations that tested ways to design nudges, incentives, and gamification to change clinician and patient behavior. This work includes digital health interventions using wearable devices and smartphones, and health system interventions using the electronic health record. In this role, he managed a 20+ person team, raised more than $10 million in funding including 6 R01 level grants, and published 100+ articles, many in leading journals such as NEJM, JAMA, Nature, and PNAS. Dr. Patel has received national recognition from AcademyHealth (Alice Hersh Emerging Leader Award), the Society of General Internal Medicine (Outstanding Junior Investigator of the Year; Quality and Practice Innovation Award), the American College of Physicians (Distinguish Contributions to Behavioral Medicine), the American Society for Clinical Investigation (Young Physician-Scientist Award; ASCI membership), and the Behavioural Insights Team (BX International Practitioner Award). His work has been featured in numerous media outlets including the New York Times, NBC Today Show, Wall Street Journal, Harvard Business Review, The Economist, Forbes, Time, NPR and CNN.
Karl Ronn  
Managing Director  
Health2047 Inc.

Karl is the CEO of First Mile Care and Managing Director of the Health2047 health care new venture firm. He is a globally successful entrepreneur and active advisor to CEOs and top management at Fortune 500 companies. During his 30-year tenure in management at consumer powerhouse Procter & Gamble, Karl rose to the post of Vice President of R&D and General Manager of New Business/Healthcare; in that position, he oversaw global R&D for pharmaceuticals and over-the-counter health care and was responsible for developing the company’s capability to create disruptive innovations. Karl created entirely new brands that are globally revered, including Swiffer, Febreze, and Mr. Clean Magic Eraser. As a result of his strategic insights and understanding of consumer behavior, the new categories rapidly grew to $1 billion in annual sales. Karl has helped found multiple startups and continues to help Fortune 500 companies create their own billion-dollar growth engines. His book on turning disruption into business through partnerships, “The Reciprocity Advantage,” has received accolades from CEOs and academics alike. Karl earned his BSChE in Chemical Engineering from University of Toledo.
Cass R. Sunstein, JD
Founder and Director
Program on Behavioral Economics and Public Policy,
Harvard Law School

Cass R. Sunstein is currently the Robert Walmsley University Professor at Harvard. He is the founder and director of the Program on Behavioral Economics and Public Policy at Harvard Law School. In 2018, he received the Holberg Prize from the government of Norway, sometimes described as the equivalent of the Nobel Prize for law and the humanities.

In 2020, the World Health Organization appointed him as Chair of its technical advisory group on Behavioural Insights and Sciences for Health. From 2009 to 2012, he was Administrator of the White House Office of Information and Regulatory Affairs, and after that, he served on the President’s Review Board on Intelligence and Communications Technologies and on the Pentagon’s Defense Innovation Board. Mr. Sunstein has testified before congressional committees on many subjects, and he has advised officials at the United Nations, the European Commission, the World Bank, and many nations on issues of law and public policy. He serves as an adviser to the Behavioural Insights Team in the United Kingdom.

Kevin Volpp, MD, PhD
Founders President Distinguished Professor
University of Pennsylvania

Dr. Volpp is the founding Director of the Center for Health Incentives and Behavioral Economics (CHIBE), Division Chief of Health Policy for the Department of Medical Ethics and Policy, and the Mark V. Pauly President’s Distinguished Professor of Medicine at the Perelman School of Medicine and Health Care Management at the Wharton School of the University of Pennsylvania. He has led CHIBE since its inception turning it into an entity that involves more than 90 faculty members and trainees across the University of Pennsylvania and which was 1 of 2 original NIH Centers nationally on behavioral economics and health. Dr. Volpp’s work focuses on developing and testing innovative ways of applying insights from behavioral economics in improving patient health behavior and increasing value in the health system by influencing provider performance. He has competitively been awarded more than $70 million to lead projects with a variety of employers, insurers, health systems, and consumer companies in testing the impact of different behavioral economic strategies on behavior.

Dr. Volpp has published more than 300 articles, book chapters, and commentaries, and his work has served as the foundation for numerous widely implemented programs such as benefit design initiatives using financial incentives for smoking cessation among GE and CVS employees, a prescription refill synchronization program for Humana members, a simple health insurance plan called “Humana Simplicity”, and an ‘enhanced active choice’ approach used among tens of millions of CVS members to increase the ease of receiving automated medication refills.

Dr. Volpp’s work has been recognized by a number of career achievement awards including the Matilda White Riley Award by the Office of Social and Behavioral Science at NIH, the John Eisenberg Award from the Society of General Internal Medicine, and the Association for Clinical and Translational Science Distinguished Investigator Award for Clinical and Translational Science. Volpp is an elected member of the National Academy of Medicine, an editorial board member for the NEJM Catalyst, and a principal of the behavioral economics consulting firm VAL Health.
Charlene Wong, MD  
Associate Professor  
Duke-Margolis Center for Health Policy

Dr. Wong serves as the Assistant Secretary for Children and Families at the North Carolina Department of Health and Human Services (NCDHHS). She is a practicing primary care pediatrician, specializing in adolescent and young adult medicine. She also serves as the Executive Director of North Carolina Integrated Care for Kids (NC InCK), an innovative model serving Medicaid-insured children in central North Carolina that integrates supports and data across health care, educational, and social sectors (e.g., schools, housing, food, early care and education, child welfare). Earlier in the COVID-19 pandemic, she served as the Chief Health Policy Officer for COVID-19 at NCDHHS.

Dr. Wong is also an associate professor of pediatrics and public policy at Duke University. Her work has focused on healthcare transformation that supports a more holistic approach to health and well-being, and she is a leader in value-based payment models for child and family health. Her research and policy training includes fellowships at the CDC and in the Robert Wood Johnson Foundation Clinical Scholars Program.
BACKGROUND MATERIALS
As one of four action collaboratives under the National Academy of Medicine’s Leadership Consortium, the Value Incentives & Systems Action Collaborative (VISAC) seeks to identify the most efficient distribution of resources that still incentivizes continuous improvement in population and patient-level health, and supports progress towards high-value payment models throughout the U.S. health system.

Health spending in the U.S. accounts for approximately 18 percent of the GDP and remains one of the leading causes of personal bankruptcy. Despite the high rate of spending on care, health outcomes in the U.S. lag behind other industrialized nations. To address this persistent gap between payment and value, the VISAC works with government leaders, industry executives, and clinicians—among other critical stakeholders—to identify payment methods that incentivize effective care at reasonable costs rather than relying on outdated payment models that promote the volume of care over the value to the patient. The VISAC aims to move the U.S. toward a health system that is affordable, efficient, and accessible to everyone.

VISAC’s priority is to support payment systems that incentivize value and population health.

The VISAC addresses issues of measurement, risk adjustment and other key factors associated with health costs. Projects stewarded by this collaborative aim to identify the highest impact strategies for reducing health care costs overall while improving total value for the patient.

The VISAC is co-chaired by Diane Holder of UPMC Health Plan and James Madara of the American Medical Association.

KEY FOCUS AREAS

- Transition away from payments that reward service volume and towards models that emphasize fee-for-value, improved patient experiences, and better population health.
- Refine and apply a finite set of core metrics to gauge the health of the nation and highlight the most critical areas for improvement in health and health care.
- Engage government leaders, industry executives, clinicians, and community organizers to identify innovative protocols that will lower the overall cost of health care while simultaneously improving health and health care for all.
The distributional effects of nudges

Nudges are tools to achieve behavioural change. To evaluate nudges, it is essential to consider not only their overall welfare effects but also their distributional effects. Some nudges will not help, and might hurt, identifiable groups. More targeted, personalized nudging may be needed to maximize social welfare and promote distributive justice.

Cass R. Sunstein

In recent years, both public and private institutions have shown a great deal of interest in ‘nudges’, understood as interventions that preserve freedom of choice but also steer people in particular directions. Nudges fall into two categories: the educative and the architectural. Educative nudges include warnings, reminders and disclosure of information (such as calorie labels, allergy warnings and fuel economy labels). Architectural nudges include automatic enrolment, mandatory choice, simplification or ‘sludge reduction’, and design of websites, forms or in-person shops to highlight and draw attention to certain options. Whether educative or architectural, nudges have often been found to have substantial effects on outcomes and to be highly cost-effective. For example, a shift from an opt-in to an opt-out design can greatly increase participation rates in relevant programmes (for example, involving retirement savings or consumer protection).

Disaggregating the effects of nudges

It is increasingly clear, however, that such aggregate effects will not tell public and private institutions everything that they need to know. To evaluate an increase in participation rates, we need to know whether participation is actually beneficial for the relevant population. Increased savings could reduce welfare if people need the money now. And without some kind of disaggregation, we might not know whether a nudge is helping or hurting identifiable groups, whether it is causing serious unintended harm to some or many, or whether it should be redesigned in some important way.

As an example, consider a case in which numerous workers have been automatically enrolled in a retirement plan with a high default contribution rate, and in which — as a result of automatic enrolment — participation rates have become very high, especially among low-wage workers. It is possible that with automatic enrolment, low-wage workers have been made worse off. They might benefit from having the money now, and despite that fact they might not opt out (perhaps because of inattention and inertia).

Whenever automatic enrolment increases participation rates across the board, there is at least a risk that some people will be hurt. This risk is especially troubling if an architectural nudge causes serious harm to identifiable categories of people: for example, people who are poor, elderly individuals, women, people of colour or people suffering from physical or mental disabilities. An appropriate response might be a more targeted approach, automatically enrolling only those groups whose members are likely to benefit.

For educative nudges, there are corresponding risks. Some evidence suggests that people with a good deal of self-control, and perhaps without much need to lose weight, value calorie labels and benefit from them — but that people who tend to lack self-control, and who may perhaps have a real need to lose weight, are less likely to value those labels at all and less likely to benefit from them (and may in fact be harmed by them). To that extent, it is at least possible that calorie labels may not be justified on welfare grounds; it is also possible that such labels, and other educative nudges, will have undesirable distributional effects, hurting the people they are intended to help.

Although there is limited evidence on this point, some educative nudges could increase the behaviour that they are designed to promote and for that reason harm members of identifiable groups. It is plausible to think that if people are informed that their behaviour will be observed and thus that they might receive reputational rewards, they will act in a more prosocial manner (not polluting, not driving while drunk or giving to charity), which suggests that observability can be an effective nudge. At the same time, an observability nudge has been found in some circumstances to be counterproductive, perhaps because of inequality concerns: if people are less well-off, knowledge that their behaviour is being observed might make them less likely, not more likely, to give to charity. It would be valuable to learn more about the circumstances in which an educative nudge reduces the behaviour it is meant to encourage (as, for example, when a warning backfires), has unintended and unwelcome distributional effects, or makes people less likely to engage in action that increases collective welfare.

Nudges can help those most in need

Importantly, many nudges turn out to be more, rather than less, desirable once we disaggregate their effects. Focusing on architectural nudges, Mrkva et al. find that nudges markedly reduce barriers that contribute to inequality; the relevant areas include COVID-19 health decisions, retail purchases and financial decisions. In this light, we can consider a situation in which an employer or an educational institution is examining the appropriate choice architecture for decisions involving, for example, health insurance or retirement. Smart defaults, nudging people towards options that are most likely to suit their situations, can have especially large benefits for low-income choosers, for choosers with less domain-relevant expertise and for choosers with lower numeracy.

Another example might be a case in which a government agency decides to automatically enrol homeless and migrant children in order to increase participation in a programme designed to provide free meals to children who are poor; on distributional grounds, such a nudge should be enthusiastically welcomed. More broadly, ‘sludge reduction’, in the form of efforts to reduce administrative burdens and barriers, can have substantial benefits for people who are old, sick, poor or otherwise vulnerable.

In the same vein, some educative nudges could disproportionately benefit people at the bottom of the economic ladder, especially in light of the challenge of cognitive scarcity; for example, warnings or reminders designed to help people to avoid late fees or overuse fees, or not to miss medical appointments. To the extent that warnings or reminders target people who are busy, occupied or inattentive, their
distributional effects might turn out to count in their favour\(^1\). Indeed, regulation of the credit card market, motivated in large part by behavioural findings, has been found to provide special help to people with poor credit ratings\(^2\).

**Achieving distributive justice**

For some behaviourally informed interventions, normative assessment of their distributional effects is not at all straightforward even if the evidence is clear. Let us return in this light to architectural nudges and in particular to automatic enrolment in savings plans, supposing once more (just for purposes of analysis) that one of its consequences is to produce especially high participation rates among low-income employees. It would not be obvious how to evaluate any such finding. A low opt-out rate provides at least some assurance that participation is in the interest of low-income employees, or at least not contrary to their interest. Because such employees may have a special need for retirement savings, a large increase in participation rates might suggest that, on distributional grounds, automatic enrolment in savings plans, supposing once more (just for purposes of analysis) that one of its consequences is to produce especially high participation rates among low-income employees. It would not be obvious how to evaluate any such finding. A low opt-out rate provides at least some assurance that participation is in the interest of low-income employees, or at least not contrary to their interest. Because such employees may have a special need for retirement savings, a large increase in participation rates might suggest that, on distributional grounds, automatic enrolment is a substantial success.

To evaluate this suggestion, it would be valuable to assemble evidence about the full set of consequences on the behaviour and welfare of those who end up with less take-home pay\(^3\). For both architectural nudges (such as automatic enrolment in green energy)\(^4\) or educative nudges (such as reminders or health warnings), it would also be valuable to be able to predict those consequences in advance, so as to increase the likelihood that nudges will be used only when we have reason to be confident that their effects will be beneficial. An appreciation of the lessons from the research outlined here, alongside an understanding of the relevant population (is it diverse and, if so, along what dimensions?) and the particular nudge at issue (is it architectural or educative?), can provide valuable insights.

The broadest lesson is that in evaluating nudges, it is essential for researchers, and for those in the public and private sectors, to consider their distributional effects and to focus in particular on questions of distributive justice. They should ask specific questions: (1) who is likely to be helped, and who is likely to be hurt? (2) What are the expected effects on the least well-off? Will the relevant nudges benefit those who are most in need of help? (3) Do the benefits to those who are helped exceed the costs to those who are hurt? In some cases, answers to those questions will actually strengthen the argument for nudges; in other cases, such answers will weaken that argument; and in still other cases, such answers will raise a set of new issues, normative and empirical. The most important implication might well involve the value of shifting towards more targeted or personalized nudging, which can often produce higher welfare benefits, and be far better on distributional grounds, than ‘mass’ approaches\(^5\).
The once-promising pace of Covid-19 vaccination in the United States has slowed, from a peak of 3.38 million shots on April 13, 2021, to fewer than 2 million doses per day in May. Until recently, Americans were competing for limited vaccination slots — a situation that raised equity concerns — but now supply exceeds demand in much of the country, and mass vaccination clinics are closing.

Yet the United States remains far from the herd-immunity target of roughly 80%: approximately 47% of Americans have received at least one dose of Covid-19 vaccine. What should we do to motivate millions more to participate?

Increasingly concerned that standard “information and education” approaches to encouraging vaccination are inadequate, some state governments and businesses are starting to pay people to get vaccinated. Incentives range from $100 savings bonds or gift cards in West Virginia, to free beer and other beverages in New Jersey and Connecticut, to daily Krispy Kreme donuts nationwide. The highest stakes are in New York, which is offering a lottery with a $5 million grand prize, and Ohio, where five lotteries will each award $1 million to a vaccinated adult and a full-ride college scholarship to a vaccinated child. Do such incentives represent a desirable path forward?

There is a certain logic to providing financial incentives, which may be used to offset the indirect costs of vaccination — including time spent planning appointments, traveling, or waiting; lost income for workers paid hourly; or expenses such as child care. These costs disproportionately deter low-income people from getting vaccinated, and payments could ensure that vaccination is indeed “free” to all.

Moreover, economists typically acknowledge that there is a role for government intervention in the face of externalities — effects of individuals’ actions on other people. A classic negative externality is a factory polluting the air: absent government sanctions, many factories would “overproduce” pollution, since dirtier technology is cheaper. Vaccination confers a positive externality, protecting other people as well as the vaccinee. In a free market, people may undervalue the beneficial effect of their actions on others; goods with positive externalities may therefore end up being underproduced. Subsidies and incentives are a logical policy approach in the presence of positive externalities.1

In addition, incentives are useful in situations where behavior...
changes can reduce future health expenditures.\textsuperscript{2} In the case of Covid-19 vaccination, the positive return on incentives may be considerable: in the United States alone, the cumulative financial costs of the pandemic are estimated at more than $16 trillion.\textsuperscript{3}

Finally, incentives can shift even intractable health behaviors, such as cigarette smoking and physical inactivity, though people may revert to those behaviors when the incentives end. Incentives are thus particularly effective in changing one-time behaviors — such as obtaining cancer screening and vaccinations.\textsuperscript{4}

Given flagging vaccination rates and the societal imperative to end the pandemic, financial incentives hold appeal, especially if an incentive-based program were focused on groups with persistently low vaccination rates. Some people who are reluctant to be vaccinated might opt to get the vaccine “because of the incentive,” thereby overcoming inertia or resistance from their peer group.

Even if incentives can produce a short-term bump in vaccination, however, multiple strategies will be necessary to increase population immunity. Campaigns will have to identify sources of resistance, including safety concerns (e.g., for pregnant women), and communicate transparently to build public trust. Vaccination policies will also have to be coordinated with efforts to address the systemic racism that suppresses access and uptake in Black and Brown communities.

With more than 100 million Americans now fully vaccinated, rewarding “late adopters” with incentive payments may seem unfair — so an incentive program might have to compensate previously vaccinated people. Suppose 60\% of adults have been vaccinated, and a program sets the goal of reaching 80\% by using a $100 incentive per vaccinee. If incentives were offered to everyone, the program would cost $400 per incremental vaccinee. To manage costs, programs could be targeted to recalcitrant young people or people living in ZIP Codes with low rates of vaccine uptake or high rates of illness, but there are important trade-offs between the efficiency of such offerings and equity.

Furthermore, although many Americans clearly recognize the value of Covid-19 vaccination and have freely pursued it, vaccination incentives could be seen as signaling that the vaccine is somehow undesirable or unsafe, and could thereby generate a backlash.\textsuperscript{5} And given the political divide in vaccine uptake, government-sponsored incentives could breed further resistance.

It’s important to consider that booster shots will probably be required down the line. Offering incentives now may set a costly and undesirable precedent, causing people to expect — and wait for — an incentive the next time around.

Ultimately, though a well-designed incentive program could boost vaccination rates in the short term, there are likely to be significant hiccups in implementation, and delivering timely rewards flawlessly would be key to program effectiveness and credibility. We believe that three alternative strategies should be considered wherever feasible, since they present more sustainable solutions than incentives for boosting vaccination.

First, organizations that take care of patients could mandate Covid vaccination for their employees, just as many of them have long required influenza vaccination. No intervention strategy is more effective than requiring vaccination,\textsuperscript{4} and our institution, Penn Medicine, recently announced that all health system employees will be required to be vaccinated. U.S. health care workers are declining Covid-19 vaccination at alarming rates. In one nursing home, although 90\% of the residents had been vaccinated, only half of the employees had followed suit; one of the unvaccinated employees infected multiple residents, and one vaccinated and two unvaccinated residents died (https://nyti.ms/3w6bUvJ). Such preventable lapses in safety should be unacceptable to anyone in the health care profession. Vaccination mandates in schools and workplaces — especially in high-contact settings such as meat-packing plants and prisons — could substantially reduce the future toll of Covid-19 in the United States.

Second, access to activities that involve close person-to-person contact could be granted only to vaccinated people. Thus far among Americans, this approach has opened doors to largely elite pursuits, such as live attendance at the National Football League draft, summer travel to the European Union, or residential college and university enrollment this coming fall. Some educational institutions have highlighted the fact that by making full in-person participation in higher education contingent on getting vaccinated, they will also be lowering risk in the surrounding community. Recently some restaurants, gyms, and sports stadiums have begun either limiting access to only those who have been vaccinated or creating special seating sections.
Such contingent access is a social incentive, rather than a financial one, and the desire to “return to normal” is likely to be a powerful motivator. The broader the range of organizations that adopt such policies, the bigger the proportion of the population that will opt for vaccination.

A third option is to raise health and life insurance premiums for people who forgo vaccination. This approach could redistribute the higher expected health care costs in a way that is fair to people who have already been vaccinated.

Incentives alone are unlikely to deliver the population immunity that will end the pandemic. The series of million-dollar jackpots that is being deployed in Ohio is an intriguing alternative to test, but it is unclear whether this will be a widely embraced approach. We need to go further in adopting a combination of behaviorally informed policies that will protect our health and the health of the economy for years to come.

Disclosure forms provided by the authors are available at NEJM.org.

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Changing health behaviors using financial incentives: a review from behavioral economics

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Abstract

Background: Incentives are central to economics and are used across the public and private sectors to influence behavior. Recent interest has been shown in using financial incentives to promote desirable health behaviors and discourage unhealthy ones.

Main text: If we are going to use incentive schemes to influence health behaviors, then it is important that we give them the best chance of working. Behavioral economics integrates insights from psychology with the laws of economics and provides a number of robust psychological phenomena that help to better explain human behavior. Individuals' decisions in relation to incentives may be shaped by more subtle features – such as loss aversion, overweighting of small probabilities, hyperbolic discounting, increasing payoffs, reference points – many of which have been identified through research in behavioral economics. If incentives are shown to be a useful strategy to influence health behavior, a wider discussion will need to be had about the ethical dimensions of incentives before their wider implementation in different health programmes.

Conclusions: Policy makers across the world are increasingly taking note of lessons from behavioral economics and this paper explores how key principles could help public health practitioners design effective interventions both in relation to incentive designs and more widely.

Keywords: Behavior change, Healthcare, Incentives, Behavioral economics, Nudge

Background

The effect of individual behavior on health outcomes is considerable with estimates that up to 40% of premature deaths in the developed world are attributable to unhealthy behaviors, such as smoking, poor diet and sedentary lifestyle [1]. Reducing morbidity and mortality losses in the future is likely to depend as much on motivating changes in behavior as on developing new treatments or technologies and many countries and health systems are now directing resources to this end [2, 3].

A range of tools are at the disposal of policy makers seeking to influence behavior including legislation, price signals (taxes and subsidies) and information campaigns. Although the use of incentives in wider public policy is nothing new, their role in encouraging health behaviors is a relatively recent phenomenon [4]. Incentives can take a number of forms including cash or alternatively vouchers that can then be exchanged for desirable items. The apparent enthusiasm for using incentives to influence health behaviors has come about as the full economic and social costs of unhealthy behaviors have become apparent and with the finding that health behaviors can be significantly affected by the structure of economic incentives that individuals face [5, 6]. Examples of incentive schemes recently implemented in the United Kingdom include the ‘Give It Up For Baby’ programme in Tayside, Scotland to encourage pregnant smokers to quit the habit and the ‘Pounds for Pounds’ scheme in Kent, England to influence weight control [7]. In diabetes care, incentive programs directed at patients show promise as a means to influence patient behavior and intermediate outcomes such as weight loss [8].

But widespread concerns do exist and tend to center on the potentially coercive impact of using incentives...
and the ‘unfairness’ of rewarding people for doing things that are already in their own interest [9, 10]. We share some of those reservations, but rather than adding further to this normative debate, we will focus herein on positive ways in which we might give incentives the best opportunity to work if and when they are considered appropriate.

We will look to see whether it is possible to provide further guidance on how best to configure and implement incentive schemes using evidence from behavioral economics. Behavioral economics has come to prominence following the publication of Richard Thaler and Cass Sunstein’s book Nudge [11], but the science underlying it is built on decades of applied research by the likes of Daniel Kahneman and Amos Tversky [12, 13]. In contrast to economic models of rational choice suggesting that we respond to information and price signals, insights from across the behavioral sciences suggest that human behavior is actually influenced greatly by the context or environment within which many of our decisions are taken. Nowadays ‘dual process’ theories can be found in social, personality, cognitive, clinical and health psychology [14]. Two general paradigms for behavior change have emerged over the years. The first type aims to change high-order cognitions such as beliefs and attitudes as a route to influencing deliberate responses by using persuasion and education campaigns. The second approach aims to influence lower-order mental processes, thus triggering spontaneous responses, by changing the context or environment within which the person acts without necessarily changing underlying higher-order cognitions such as beliefs and attitudes. In other words, the distinction is between behaviors resulting from internally cued, reflective, and intentional changes versus behaviors resulting from externally cued, automatic and (often subconscious) reactive changes [15].

Governments around the world are taking notice of the potential role behavioral economics could play in designing more effective public policy. A prominent example is the coalition Government in the United Kingdom, who have so far made recommendations on how public behavior around charitable giving and preventive health could be influenced using the Mindspace framework for behavior change [16–19]. Intelligent design of incentive schemes is one of the key tools in this new ‘behavioral’ approach.

Financial incentives in healthcare

It is well established that a higher price reduces consumption [20]. So, we see that smoking consumption in Europe has been seen to decrease by about 5% for every 10% increase in the real price of cigarettes and that increasing the price of alcohol is among the most effective options for reducing consumption [21, 22]. Price signals to influence behavior in healthcare can take forms besides traditional ‘sin taxes’ for example by subsidising healthy behaviors or rewarding adherence to a treatment programme. The increase in the last decade of schemes aimed at changing the health-related behavior of the public has been accompanied by evidence that even small incentives can positively influence choices [23–25]. Having said that, a recent review of the evidence for the effects of economic instruments (prices or income) on dietary and physical activity behaviors and corollary outcomes [26] revealed that evidence is limited in terms of the potential for causal inference and yields ambiguous or inconsistent findings (the evidence is also mostly about impacts on diet, with very limited evidence for impacts on physical activity). Those findings highlight the need to implement robustly designed interventions and evaluations of the logic models and programme theories involved.

In clinical psychology, the contextual-change route has taken a substantial share of research, because classical behavior therapy and cognitive-behavioral therapy focus on underlying learning processes and environmental contingencies of reinforcement [27, 28]. Schedules of contingent reinforcement are also a key to the success of rewards (materialised incentives) and often used in behavioral psychology circles. For example, providing contingent rewards is used in interventions developing constructive habits. This reinforcement principle has been successfully employed to treat drug addiction and substance misuse (including smoking and alcohol consumption) and to improve medication compliance [29]. Such interventions usually include earning money or points contingent on the patients’ specific behaviors.

The effectiveness and long-term sustainability of behavioral change when incentives are targeted at the more challenging and complex behaviors such as smoking and obesity is less well known [30–33]. Also, given the opportunity costs of the changed behavior is the same across income groups, we may also expect to see that as £1 to a poor person is worth more than £1 to a rich person, small incentives are also likely to be more effective in low-income groups [34].

A review from behavioral economics

We identified interesting examples from the literature through a search strategy of electronic databases including (PubMed, EMBASE, PsychInfo) using keywords. We reviewed Longitudinal, cross-sectional and retrospective studies of interventions using incentives to change health behaviors, including patients and/or providers of healthcare. We also included systematic reviews of such interventions. Our team independently reviewed articles and compared and discussed interpretations. Results were synthesized under thematic classification and abstraction.
Because this is a debate article, we have not provided a review of all those studies. We do no aim to synthesize the evidence. Rather, in our manuscript we offer a theoretical investigation of incentive design and behavior change.

Although success has been seen with a number of financial incentive schemes targeting preventive health behaviors, some financial incentives have not worked at all well, or even at all in the case of reducing levels of obesity [33]. It may be that incentives are unlikely to work at a cost-effective level in changing certain complex behaviors. Another contributing factor could be that too little thought has been put into the design of incentive schemes previously implemented. Roland Fryer has demonstrated how important design is when thinking about how financial incentives can be used to improve educational achievement [35]. In a series of school based randomized trials, incentives were only found to be effective when they were given for inputs to the educational production function. Incentives tied to educational outputs were not effective. Qualitative data suggested that because students do not understand the education production function, they were not able to ‘turn their excitement about rewards’ into meaningful achievement. The same may be true for people offered incentives to lose weight or stop smoking.

Those choosing the format of incentive schemes will have many options available to them when thinking about design. Let us take a theoretical example of an incentive scheme to encourage participation in a weight-loss programme. The reward may be given for attending classes and it could be given at the beginning of the programme, at its completion or in increasing or decreasing increments as classes are attended. Alternatively, the incentive could be given dependent on actual weight loss targets that result from following the programme. Different scheme designs are likely to lead to different outcomes.

It is important to think about the most effective design of incentive schemes, as our responses can be shaped by a range of predictable biases and heuristics [12, 13, 36]. Behavioral economics provides us with a number of robust psychological phenomena that help explain the decisions we make in a range of settings, including savings, health and education [15, 19]. Evidence suggests that human behavior is led by our very human and fallible brain and the context or environment in which many of our choices are taken. The finding being that small changes in context (nudges) can affect behavior as much as large price changes [11, 37]. Such effects or ‘nudges’ can be applied to the design of more effective incentive schemes and include the following.

**Losses loom larger than gains**

It has been demonstrated that we react more to losses than to gains of equivalent magnitude [38], which is embedded into the well-known (Nobel prize winning) Prospect Theory of risky choice. Loss aversion implies that someone who loses £10 from his or her pocket will lose more satisfaction than another person would gain satisfaction from a £10 windfall. Most incentive schemes tend to offer rewards to participants but inducing some feeling of loss if they fail to do something may be more motivating than rewarding them by the same amount. So, instead of providing a £10 reward for each of the ten sessions of a weight loss programme, it may be more effective to provide £100 at the end of the programme, with all missed sessions attracting a more salient and painful £10 loss. Using a behavioral economics framework, one randomised study has shown the short-term effectiveness of such a scheme. Individuals in this programme contributed to a matched deposit contract that rewarded them if they met or exceeded their weight loss goal but led to the loss of the reward if they failed [39]. Loss aversion is one of the most robust phenomena from behavioral economics and could be used more widely across incentive schemes.

An interesting intervention tested the impact of financial incentives framed as a gain or loss to promote Chlamydia screening in students, mimicking the standard outreach approach to student in halls of residence [40]. This was a in a cluster randomized trial (N = 1060; age 18–24 years). The students were offered (depending on condition) £5 voucher vs. £200 lottery. In the control group the screening rate was 1.5%, while the lottery increased screening to 2.8% and the voucher increased screening to 22.8%. Incentives framed as gains were more effective than loss-framed incentives (10.5% vs. 7.1%, respectively). This work contributes to the literature by testing the predictive validity of Prospect Theory to change health behavior in the field.

In another domain, such a framing manipulation was used to increase factory worker productivity in a field experiment [41]. They find conditional incentives framed as both “losses” and “gains” increase productivity for both individuals and teams. In addition, teams more acutely respond to bonuses posed as losses than as comparable bonuses posed as gains. The total team productivity is enhanced by 1% purely due to the framing manipulation. Another interesting intervention tested the power of loss aversion to improve teacher performance [42]. During the 2010–11 Chicago school year teachers were randomly asked to participate in a pay-for-performance program with “gain” and “loss” treatments. The “gain” group received traditional financial incentives at the end of the year in the form of bonuses linked to student achievement. Those teachers in the “loss” group were paid a lump-sum in advance and asked to give back the money if their students did not meet performance targets. Teachers in both conditions received the same monetary bonus if they reached the same performance targets. This approach resulted in increases in math test scores for the loss condition by an
equivalent of increasing teacher quality by more than one standard deviation. The gain treatment yields smaller and statistically insignificant results. The authors attribute the significant difference between the loss and gain condition to the loss aversion framing. Those intervention techniques could be used to improve the productivity of the healthcare workforce too.

Overweighting of small probabilities
There is good evidence that people place more weight on small probabilities than standard economic theory would suggest [43], which is another essential element of Prospect Theory. This helps explain the widespread popularity of lotteries and insurance. Although the tendency to overweight the probability of unlikely but salient outcomes can lead to problem gambling [44], it can also be used to positive effect using lottery based public policy interventions. Lottery based financial incentive programs have been seen to be effective in a weight loss intervention and in improving warfarin adherence and anticoagulation control [45].

Patel et al. [46] tested the effect of different types of lottery-based financial incentives in increasing physical activity among University of Pennsylvania Employees with body mass index ≥27. All participants used smartphones to track their steps per day and received daily feedback on performance for 26 weeks (financial incentive for 13 weeks and then were follow up for 13 weeks without incentives). Daily lottery incentives were designed as a "higher frequency, smaller reward" (1 in 4 chance of winning $5), "jackpot" (1 in 400 chance of winning $500), or "combined lottery" (18% chance of $5 and 1% chance of $50). The outcome measure was the mean proportion of participants who achieved the daily goal of 7000 steps. During the intervention, only the combined lottery incentives was significantly greater than control (0.38 vs. 0.26 mean proportion of participant days that goal was achieved); and there were no significant differences during follow-up. This study shows that interventions need to experiment with designing different types of lottery schemes.

Living for today at the expense of tomorrow
The third phenomenon is hyperbolic discounting also known as ‘present bias’ [47, 48]. Economists assume that our preferences over today versus tomorrow are the same as those over this time next week and this time in eight days. Although standard discounting simply says that we use the same discount rate in each period, evidence tells us that today looms much larger so that we discount very heavily from the present and less heavily once we think about any time into the future. So given the option, some people would choose to take £18 today rather than £20 tomorrow but would be much less inclined to take the £18 in a week’s time than £20 a day later. It has been demonstrated that the immediacy of an incentive can influence outcome of voucher-based incentive programmes for substance misuse [29], and an understanding of hyperbolic discounting should lead those designing schemes to think more carefully about when the actual incentive is given.

The immediacy of financial incentives also show potential for supporting smoking cessation in pregnancy. A review of evidence found that providing vouchers contingent on testing for smoking were effective in reducing smoking rates in late pregnancy, compared to vouchers without testing [49]. Specifically, linking the incentive to the desired outcome was clearly an important feature of the incentive design.

Similarly, an immediate financial incentive has been shown to improve adherence to anti-psychotic medications [50]. This trial offered a £15 incentive to one group of patients for each medication taken, whilst a second group received usual care. The majority of patients and clinicians felt positive about the use of incentives, and the costs were relatively low. Patients receiving the incentive were more likely to take the medication (85% vs 71%). When the incentives stopped, adherence returned to the same level as those who had not received the incentives.

Increasing rather than decreasing payoffs
Incentives have generally been seen to be more effective for one off behaviors like vaccinations [25]. An understanding of hyperbolic discounting is particularly useful for incentive schemes where only a one-off reward is offered. For complex behaviors, multiple incentives may need to be offered at intervals but how should they be given? It has been seen that people respond more to increasing payoffs, as opposed to decreasing or constant ones [51]. This principle has been used to develop successful interventions to treat drug addiction and substance misuse and to improve medication compliance [29]. In those interventions, the patients earn points contingent on submitting urine specimens that are drug-negative or substance-negative. The reward points (incentive) usually begin at a low value and increase with each successive negative test result. If the patient fails to provide a scheduled specimen or provides a drug-positive result, then the voucher's value is reset back to the initial low value from which it could begin to increase again. Such incentive contingency scheme can be used to improve outcomes across a wide range of different behaviors and populations.

Reference points matter
A study from the developing world provides a further phenomenon which is that reference points matter when
offering incentives. Evidence from the field, suggests that people care more about what they gain or lose around what they already have rather than what they may end up with. It is known that many people tested for human immunodeficiency viruses (HIV) in the developing world do not pick up their results. This is a major challenge to prevention campaigns and has led to a variety of ‘know your status’ campaigns. A programme in Malawi has shown that offering incentives can encourage people to pick up their HIV result [52]. The biggest increase in uptake, by around 50%, is observed when the incentive changed from zero and one-tenth of a day’s wage. Offering more money still positively affects behavior but to a much lesser degree. This finding is consistent with a ‘concave’ utility function in economics known as ‘diminishing marginal utility of income’ (more income impacts us less), but the rate at which utility declines when income rises would have to be extremely steep which is not what traditional economic models would predict. The results suggest that the utility of money is judged relative to reference points that are very contextually and narrowly defined. This finding also suggests that such locally defined reference points could influence decisions around price and the cost-effectiveness of offered incentives.

**Ethical concerns**

Motivating behavior change in health is much more complex than can be accomplished with a single strategy and offering incentives (both positive and negative) are just one route to achieving improvements in health outcomes. Financial incentives are increasingly seen as an important vehicle to bring about changes in behavior that lead to healthier lifestyles and supporters and critics alike can be passionate about their use. Supporters of incentive schemes generally believe that people should be encouraged where possible into behaviors that promote improved health outcomes and that appropriately targeted incentives can reduce inequalities in health outcomes [4, 25, 53]. Incentive programmes can be seen as an example of symmetric or libertarian paternalism that steer people towards better choices without limiting what those choices are [54]. But there are also legitimate ethical concerns. Monetary compensation has the potential to lead to intrinsic motivation being ‘crowded out’ or partially destroyed [55], so that when an activity is associated with an external reward, a person may be less inclined to do the activity in the future without further rewards. However, this concern is related to the efficacy of incentives rather than the ethics. More concern comes from the perception that incentives can be seen as a form of bribery and/or coercion and inconsistent with shred social values [56].

Marteau et al. [9] suggest a psychological perspective that can help us think about the appropriateness of using incentives for encouraging participation screening tests. It is known that individuals do not always act according to their long-term goals and interests. We also know that in hindsight people often would prefer to have acted differently. For example, most of us would like to eat more healthy food, drink less, and stop smoking. Still, our behaviours do not match such intentions. Offering people a reward/incentive helps them to align their actions with such preferences. In this way, incentives enhance their autonomy to act according to their true underlying preferences. This may help explain why governments and private organisations increasingly apply financial incentives, or other extrinsic motivations, to improve health [57]. There is also evidence that the public supports incentive schemes that are cost-effective [58, 59].

Consequently, alongside further exploration of the appropriateness of using incentives in health we also need to determine whether or not they work and are cost-effective. At present we do not know what impact different incentive schemes have on various health behaviors or what impact they may have on different socioeconomic groups invited for appointments. If we learn that incentives are unsuccessful and/or are not cost-effective then more broadly implementing these interventions would be considered unwise and would not be advised. Researchers have explored the use of such incentive schemes in a range of settings, and with different populations. The results have varied, suggesting that incentives are context-dependent, and need to be planned carefully according to the needs and preferences of different groups. For example, offering small financial incentives – such as £10 in cash, or the opportunity to win £1000 in a lottery – did not improve attendance at eye screening for people with diabetes [60]. This study recruited people who had not attended their eye screening appointment in the last two years. Patients in the two incentive groups were actually less likely to attend their appointments than those who received the standard invitation. The reasons for this unexpected result were not clear, but all the patients involved were from relatively deprived groups with a history of non-attendance. The researchers also suggested that the offer of an incentive may cause a negative reaction, if the recipient believes that the screening must be unpleasant if they have to be paid to do it. This is supported by the finding that the lottery offer – to win a much larger sum – was associated with the lowest levels of attendance.

Given the promise of incentives to positively motivate behavior, we should not necessarily use legitimate concerns about their wider use in public policy prevent us from studying them in earnest. This article seeks to do this while recognising the concerns about their use. If incentives are shown to be a useful strategy to influence health behavior, a wider discussion will need to be had
about the ethical dimensions of incentives before their wider implementation in different health programmes.

**Conclusions**

Financial incentives are increasingly seen as an important vehicle by which to bring about changes in behavior that can lead to healthier lifestyles. Limited evidence also suggests that appropriately targeted incentives could reduce inequalities in health outcomes [53, 61]. There are lessons that can be learned from a range of disciplines and we have focused on those from behavioral economics in this article.

**Policy implications**

We cannot give specific advice to policy makers for all individual circumstances, but there are some clear examples of policy and program applications of the general ideas presented in this article.

Financial incentives have been seen to be more effective in increasing performance of infrequent behaviors (e.g., vaccinations, screening) rather than in more sustained behaviors (e.g., smoking, dieting) [62]. Therefore, the incentives-related lessons from behavioral economics should be more readily applied to infrequent behaviors in the first instance. In relation to ‘overweighting small probabilities,’ for example, policy makers and program designers could set up vaccinations incentive programs as lotteries, that is, ‘if you vaccinate your child, we will enter your name into a lottery, and you just might win a lot of money’.

Financial incentives for healthy behavior are already being used by large employers or health insurance providers [63, 64]. For example, patients in some states in USA have some benefits reduced or eliminated if they do not participate in health care screenings, keep their medical appointments, take their medications and adhere to health improvement programs as directed by their health care providers [65].

The United States administration also issued a rule that employers can use financial rewards and penalties for workers worth up to 50% of the health insurance premium as an incentive to quit smoking, exercise, eat healthier food, lose weight, and lower cholesterol and blood pressure [66]. In particular, the rule allows, as part employee wellness programs, employers to reward or penalize employees who meet specific standards related to their health (e.g., rewarding employees who do not use tobacco or who achieve a specific cholesterol level, weight or body mass index). In order to avoid wasting public resources, such programs will provide evidence how such incentives schemes work in the longer-term and which method is most cost-effective. Employers can improve the effectiveness of such programs by incorporating the behavioral economics principles discussed in this article.

Evidently, incentive programs directed at both providers and patients have become increasingly widespread. Although we have focused on patients and the public in this article, incentives are also frequently used to target provider behavior as a means to improve quality of care [67]. For example, in 2004 in the United Kingdom, a significant proportion of general practitioners’ pay became tied to a quality and outcomes framework [68]. The behavioral principles described here may also be applicable to incentive design on the provider side and have the potential to alleviate some of the problems identified with current programs [67]. Pay-for-performance (P4P) where providers receive financial incentives to carry out specific care or improve clinical outcomes (i.e., performance targets at which the incentive is targeted) has been widely implemented. There is emerging important evidence on P4P, which reveals a mixed picture so far. Studies in both United States [69] and United Kingdom [70] have found that initially positive effects were short lived. In diabetes care for example, the existing literature indicates P4P incentives stimulate initial gains that later tend to level off, while withdrawing the incentives partially reverts the gains [8]. We believe that behavioral re-design of some of those P4P programs is very likely to improve their effectiveness.

Finally, behavioral economics also provides some arguments against using incentives in specific circumstances. Some economists claim that offering monetary incentives may lead to destroying (‘crowding-out’) genuine (‘intrinsic’) motivation [55]. There is some evidence from a meta-analysis of experimental studies, which revealed that after a behavior is associated with an external reward, people are less willing to enact the behavior without further external rewards; in other words, extrinsic rewards undermined motivation [71]. So, when designing behavior change interventions, we must consider that badly designed policies can exacerbate the challenges we currently face and lead to unintended consequences, such as when financial incentives crowd-out/suppress intrinsic motivation for healthy behaviors [72, 73].

**Future directions**

This is a debate article, so the presentation of the data is fundamentally descriptive and qualitative, because we do no aim to synthesize the evidence. Rather, we offer a theoretical investigation of incentive design and behavior change. Incentives and behavior change perhaps present the best examples of where genuine attempts have been made to span the divide between behavioral science and health policy, because incentives is the ‘tool’ most often used by the policy makers to influence behavior. However, despite the recent flurry of scientific theories and reports, there are not enough examples of successful transition from science to policy. This article aims to demonstrate that the evidence now exists where the
behavior incentive design’ can stimulate intervention projects informed by a scientific understanding of behavior.

This approach is useful in social sciences but is limited. For example, nudges or economic interventions that show strong effect on the collective behavior of populations are put at the same level with others that show only a tiny, and probably statistically insignificant, trend. At present, we do not have a complete enough picture of which configuration of incentives works best. So, it is worth pinpointing areas which need more research and areas where plenty of robust studies support a given recommendation.

After reviewing the mounting evidence on the uncertain effect of financial incentives to improve health behaviors, Thirumurthy, Asch and Volpp [74] conclude that the principle that individuals respond to incentives has considerable empirical support, but the devil is in the detail, because the magnitude of effects differs substantially based on the nature of the behavior, the size of the incentive, the population involved, the social context, and the design (subtle design choices in how incentives are situated, framed, or deployed can have substantial effects on their success). Therefore, investigating different ways of joining up some of the psychological mechanisms of action – loss aversion, hyperbolic discounting, and increasing payoffs – may lead to real improvements in the efficiency and effectiveness of existing and novel incentive designs. Incentives based on combinations of individual and group goals have also shown promising results. Furthermore, a potentially powerful approach is combining both patient and provider incentives, but whether this is cost-effective has yet to be determined [8].

Further insights from the behavioral sciences could allow us to combine incentive schemes with other policy tools to ensure long term effectiveness. One example are commitment devices [15], which involves individuals making a public decision about the future that results in some additional (social and/or financial) cost if they fail to follow through with that decision (or additional benefit if they successfully do so). As many people revert to past behaviors once the incentive is withdrawn, combining commitment devices with incentives may be useful in ensuring long-term behavior change. There is limited evidence from a Cochrane review that commitment contracts can potentially contribute to improving adherence to diagnostic procedures, therapeutic regimens or health promotion and illness prevention initiatives [75].

The only real way to test further interventions of this ‘joined-up’ kind is through the proper design and use of field experiments [76]. We would encourage those designing incentive schemes to consider how some of the lessons learnt from smaller scale and more experimental studies can be examined in a more naturalistic setting, thereby avoiding randomisation bias. Rigorous evaluation and dissemination of the outcomes from current and future schemes is also necessary to add to the limited evidence that tells us what does and does not work when using incentives. The ultimate criterion by which to judge the merit of such interventions is whether they improve the health and well-being of the individual; and the more is the latter, the merrier is the incentive scheme [77, 78].

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References
56. Shaw J. Is it acceptable for people to be paid to adhere to medication? No. BMJ. 2007;335:233.

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