



## Conference report

Vaccine acceptance: Science, policy, and practice in a ‘post-fact’ world<sup>☆</sup>Katie Attwell<sup>a,b</sup>, Eve Dube<sup>c</sup>, Arnaud Gagneur<sup>d</sup>, Saad B. Omer<sup>e</sup>, L. Suzanne Suggs<sup>f,g,h</sup>, Angus Thomson<sup>i,\*</sup><sup>a</sup> School of Social Science, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Australia<sup>b</sup> Wesfarmers Centre of Vaccines and Infectious Diseases, Telethon Kids Institute, Australia<sup>c</sup> Centre de recherche du CHU de Québec, Université Laval, Institut national de santé publique du Québec, 2400 D'Estimauville, Québec, QC G1E 7G9, Canada<sup>d</sup> Department of Pediatrics, Faculty of Medicine and Health Sciences, Université de Sherbrooke, 3001 12e Avenue Nord, Sherbrooke, Québec J1H 5N4, Canada<sup>e</sup> Hubert Department of Global Health, Emory University Rollins School of Public Health, Atlanta, GA, USA<sup>f</sup> BeCHANGE Research Group, Institute of Public Communication, Faculty of Communication Sciences, Università della Svizzera italiana, via G. Buffi 13, Lugano, Switzerland<sup>g</sup> Swiss School of Public Health (SSPH+), Zurich, Switzerland<sup>h</sup> Institute for Global Health Innovation, Imperial College London, United Kingdom<sup>i</sup> Sanofi Pasteur, 14 Espace Henry Vallee, 69007 Lyon, France

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## ABSTRACT

Suboptimal vaccination uptake may be associated with outbreaks of vaccine-preventable diseases in many parts of the world. Researchers and practitioners working on improving vaccine acceptance and uptake gathered together for the fifth annual meeting on vaccine acceptance, organized by the Fondation Mérieux at its conference centre in Veyrier-du-Lac, France, to share their experiences in building, improving and sustaining vaccine confidence and uptake. The importance and value of truly listening to people and seeking to understand the perspectives of vaccine hesitant people was emphasized throughout the meeting. The benefits of social marketing, which can be used to influence behavior that benefit individuals and communities for the greater social good, and its integration into strategies aimed at improving vaccine acceptance and uptake, were discussed. Healthcare professionals (HCPs) need tools and training to help them engage effectively in vaccination acceptance conversations with parents and other patients. Two potential tools, motivational interviewing (MI) and AIMS (Announce, Inquire, Mirror, Secure), were presented. Examples of MI approaches that have successfully improved vaccination acceptance and uptake included a project in Canada aimed at parents just after the birth of their baby. The role of mandates to increase vaccination uptake in the short-term was discussed, but to achieve sustainable vaccination uptake this must be complemented with other strategies. These annual meetings have led to the creation of an informal community of practice that facilitates cross-pollination between the various disciplines and different settings of those involved in this area of research and implementation. It was agreed that we must continue our efforts to promote vaccine acceptance and thus increase vaccination uptake, by fostering more effective vaccination communication, monitoring of the media conversation on vaccination, designing and rigorously evaluating targeted interventions, and surveillance of vaccine acceptance and uptake with pertinent, reliable measures.

## 1. Introduction

Suboptimal vaccination uptake is associated with outbreaks of vaccine-preventable diseases such as measles, whooping cough, rubella, and mumps in many parts of the world. For example,

between November 2016, and October 2017, 13,726 cases of measles were reported in 30 EU/EEA Member States, with the highest number of cases reported by Romania (5605), Italy (4973) and Germany (952) [1]. During this 12-month period 30 measles-associated deaths were reported in Romania (20 cases), Italy (4), and 6 other countries. Among the cases with known vaccination status 87% were unvaccinated and 8% had received only one dose of vaccine. Vaccination uptake for the second dose of measles-containing vaccine in 2015–2016 was below the 95% threshold in 20 of the 30 EU/EEA countries that submitted routine surveillance data to the European Surveillance System (TESSy) on a monthly basis [1]. In Romania the average vaccination rates have fallen from

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95% to 86% since 2007. Under- and non-vaccination can be partly attributed to vaccine hesitancy, defined by the World Health Organization SAGE Working Group on Vaccine Hesitancy as ‘delay in acceptance or refusal of vaccines despite availability of vaccine services’ [2].

Some outbreaks have been associated with clustering of vaccine hesitancy or refusal, including the measles outbreaks in Romania [3–5]. An outbreak of more than 23,000 cases of measles reported in the first six months of 2017 in Yobe, a state in Northeast Nigeria, may have also been due to mistrust of authorities and the ‘poor attitude of parents’ in terms of bringing their children for vaccination [6]. However, vaccine acceptance should always be seen in the context of other possible reasons for sub-optimal vaccination uptake such as access, affordability or awareness challenges [7]. Even when hesitancy is suspected, vaccine confidence may not be the primary reason for low vaccination uptake. In one study in Australia, where hesitancy was expected to explain the gap in vaccination uptake, research showed that the majority of incompletely immunized infants did not have a mother who disagreed with immunization [8].

Recently politicians in some countries, such as the USA and Italy, have used anti-vaccination stances in their manifestos. In contrast, various jurisdictions in Europe, Eurasia and North America have introduced or are considering the introduction of mandates for childhood immunization to address this increasingly worrying public health crisis [9,10].

At the same time, public confidence faces a threat from legal decisions. For example, in June 2017 the EU High Court ruled that vaccines may be associated with illnesses without any scientific evidence of causality if there is specific and consistent evidence relating to timeliness, a prior healthy status, lack of family history and multiple cases [11]. This ruling may lead to vaccination being judged responsible for adverse events following immunization in individuals without justification. The rise of vaccine mandates accompanied by this weakening of evidentiary requirements for lawsuits places policymakers and vaccine advocates in a dilemma, i.e., populations will be compelled by the state to vaccinate themselves and their children, while they may become more vaccine hesitant.

To address these concerns, researchers and practitioners working on improving vaccine acceptance and uptake gathered together to share their experiences with policies and practices that are working or could work to build and sustain trust in vaccines for a fruitful fifth annual three-day meeting at Fondation Mérieux’s Les Pensières, Center for Global Health in France [12]. The organizing committee chose to highlight the ‘post-fact’ world in the meeting’s title as the context for present and future work on vaccine acceptance and uptake. In a salient definition of the ‘post-fact’ concept, Farhad Manjoo stated ‘Increasingly, our arguments aren’t over what we *should* be doing . . . but instead over what is *happening*. Political scientists have characterized our epoch as one of heightened polarization . . . the creeping partisanship has begun to distort our very perceptions about what is “real” and what isn’t. . . [W]e’re now fighting over competing versions of reality [13].’ Ongoing debates about the safety and efficacy of mass vaccination programs – sporadically fueled by those in high office – epitomize such contestations. They render the work of encouraging vaccine acceptance both challenging and ongoing. Accordingly, the key themes of the meeting, representing the cutting edge of vaccination social research and policy questions, were:

- The role of social marketing in improving vaccination acceptance and uptake
- Enabling healthcare professionals (HCPs) to foster trust in vaccination
- The role of mandates in promoting and sustaining vaccination acceptance and uptake

- Alignment of research goals with public health needs
- Community of practice

Here we share a summary of our deliberations on these themes to communicate with the medical and public health communities and to encourage individuals to join our informal community of practice working on vaccine acceptance and uptake.

## 2. Key meeting themes

### 2.1. The role of social marketing in improving vaccination acceptance and uptake

In 2014 the WHO Sage Working Group on Vaccine Hesitancy reviewed approaches for changing vaccination behavior [14]. They suggested that social marketing could be useful in changing vaccination behavior by reducing vaccine hesitancy, as has been described previously [15]. Discussion focusing on social marketing played a central role at the meeting, with participants recognizing that when vaccination is voluntary, people need to be convinced of its value to them and their communities. Social marketing does just this, by understanding what barriers and benefits to vaccination are perceived by people and what are the real barriers and benefits, it can work at the individual, environmental and policy levels to make vaccination more desirable, accessible and perceived to be the social norm [16]. Social marketing, which was called responsible or ethical marketing prior to 1971, has been defined by the International Social Marketing Association, European Social Marketing Association, and Australian Association of Social Marketing as ‘seeking to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good. Social Marketing practice is guided by ethical principles. It seeks to integrate research, best practice, theory, audience and partnership insight, to inform the delivery of competition sensitive and segmented social change programmes that are effective, efficient, equitable and sustainable.’ [17].

Social marketing goes beyond communication (although communication does play an important role) since it examines the determinants of behavior and the causes of those determinants in the context in which people live. Thus, based on robust contextual and audience insight analyses, it aims to change modifiable determinants ethically and create demand and value for the desired behavior, which is vaccination in this case. In addition to being customer-oriented, driven by theory, insights, segmentation, equal exchanges, evidence-based and ethical, social marketing requires the use of a mix of methods to change behavior, at the individual, community and policy levels. Just like branding products in commercial marketing, branding behaviors and programs in social marketing has shown to be effective and is encouraged [18–20].

The social marketing marketing mix comprises the 6 Ps: product, price, place, promotion, policy and partnerships (Fig. 1). ‘Product’ includes core, actual and augmented products. For vaccination, the core product is not the vaccine itself, but the benefits from vaccination, i.e., the protection that the vaccine provides which differs for the various vaccines. The actual product is the act of getting vaccinated (i.e., behavior). An augmented product is not always necessary, as it is a tangible or service item used to make used vaccination uptake easier, e.g., a tailored vaccination calendar sent to new parents with dates for vaccination already inserted [21]. ‘Price’ refers to both monetary costs of being vaccinated and non-monetary costs, which can cover a range of psychological, emotional, cultural, social, and behavioral concerns. ‘Place’ includes both the place where vaccines are obtained as well as where vaccination is promoted. ‘Promotion’ covers the persuasive

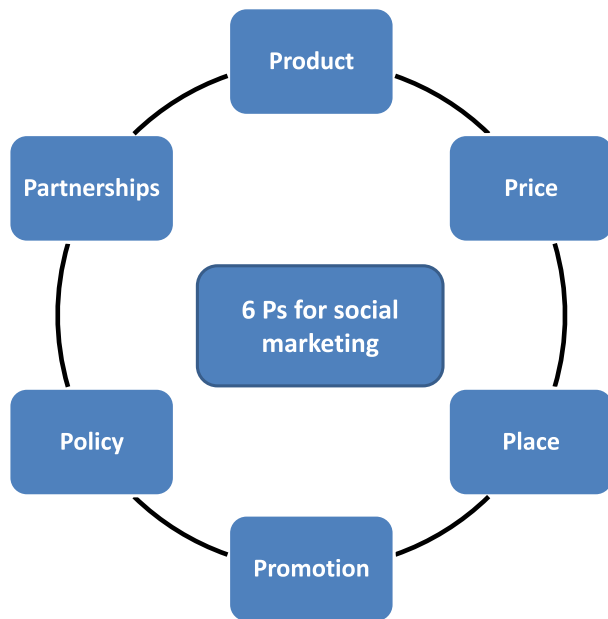


Fig. 1. The six Ps of the social marketing marketing mix.

strategies that make vaccination appealing and convincing. 'Policy' includes policies that influence vaccination uptake, such as reimbursement, location (access), mandates for vaccination and exemption rules. 'Partnerships' encompasses the involvement of partner stakeholders (e.g., HCPs, schools, parents) and the importance of their engagement in campaigns to add credibility, access, and to provide reliable, accurate information about vaccination.

Some examples of social marketing used to influence vaccination uptake are summarized in Table 1 [22–24]. An excellent example of good partnerships, shared at the meeting, was the community immunity initiative in Washington State, USA [25]. This initiative was developed to ensure that the voices of the majority of parents who vaccinate their children that are usually not heard could be heard. This public-private partnership piloted their initiative over three years and showed a 38% reduction in vaccination hesitancy among parents. During the 2014 Fondation Mérioux meeting, the results from the 'I Immunise' social marketing campaign from Fremantle, Western Australia, were shared [26]. These results demonstrated that a 'values and identity' framing of vaccination resonated positively with a third of survey participants who had previously refused a vaccine. There is clearly scope to extend and enhance the role of social marketing to promote vaccine acceptance.

## 2.2. Enabling healthcare professionals to foster trust in vaccination

A growing body of evidence indicates that human communication is far more than simply a means of conveying information but it is bioactive, having an impact on both our psychology and physiology [27–29]. Hence, *how* a HCP speaks with people about vaccination may be as important as *what* they say in terms of

behavioral, emotional and even physiological outcomes [30]. Thus, during discussions about vaccination, the interaction is thus more likely to generate trust in vaccines if the person is spoken to in a way that fosters receptivity rather than reactivity [27,28,30]. Since HCPs are the most trusted source of information about vaccines, even among vaccine-hesitant people, they need tools and training to help them engage effectively with people and enable them to recognize and generate receptivity [31–33].

Motivational interviewing (MI), a promising tool discussed during the meeting, was originally developed in the context of substance abuse, and has also been effectively used for behavior change in several health-related fields [34,35]. MI is particularly effective and recommended for ambivalent or hesitant clients. An intervention to educate parents of newborn infants about vaccination called PromoVac, was developed in Quebec and delivered to parents during their postpartum stay in maternity wards by research nurses who had been trained in the theory and techniques of MI [36–38]. This educational intervention took about 15–20 min and used simple, understandable language to encourage discussion and questions from parents rather than providing prescriptive, direct information. The strategy was first pilot-tested in a regional cohort study involving more than 1000 mothers [37]. This study showed that parents' intention to vaccinate their infant at 2 months old increased by 15% (72–87%,  $p < 0.001$ ), vaccination uptake at 7 months increased by 7% (69–76%,  $p < 0.001$ ), and there was a 9% higher likelihood that infants whose parents received the intervention in the maternity ward completed 0–2 year vaccination schedule (RR = 1.09 [1.05; 1.13]) [37]. The effectiveness of the strategy was also demonstrated in a provincial RCT involving more than 2700 families, with a 12% increase (78–90%,  $p < 0.0001$ ) in parents' intention to vaccinate and a 40% decrease (27/100–16/100,  $p < 0.0001$ ) in vaccination hesitancy scores following the intervention [39]. The intervention is now being implemented in maternity wards throughout Quebec in a program called EMMIE (In French: *Entretien Motivationnel en Maternité pour l'Immunisation des Enfants*, in English: Motivational Interviewing in Maternity wards for Infant Immunization). Another study in the USA that assessed a 5-component health care professional HPV vaccine communication intervention, that included an MI component, concluded that the intervention significantly improved HPV vaccine series initiation and completion among adolescent patients [40].

AIMS, another method for managing vaccination conversations also discussed during the meeting, involves the following four steps:

- **Announce:** Announce vaccination will happen, assume people are ready to be vaccinated (or vaccinate their children);
- **Inquire:** Use open-ended questions to understand the person's concern;
- **Mirror:** Reflect back what you have understood to make the person feel heard;
- **Secure:** Consolidate each conversation by securing trust.

AIMS thus combines a presumptive approach with tested and teachable methods to foster receptivity and trust in conversations [41,42]. Irrespective of the approach used, it is important to put

Table 1  
Examples of the use of social marketing to improve vaccination uptake behavior.

Vaccine(s)	Setting	Results
Childhood vaccination [22]	Colombia	Children < 1 year: increase from 20% in 1979 to 60% in 1984 Children < 4 years: increase from 20% in 1979 to 80% in 1984
Childhood vaccination [22]	Philippines	Full vaccination by 1st birthday: 32.2–56.2% in 1 year (1990)
HPV vaccination [23]	USA (primarily rural), mothers of pre-teen girls	Uptake increased by 2% in 6-months
HPV vaccination [24]	USA (primarily rural), parents and HCP of pre-teen boys	Probability of vaccination increased by 34% in 3-months

human relationships at the heart of vaccine acceptance conversations to help HCPs foster trust in vaccination.

How communication about vaccination is designed is as important as how the message is delivered. A good communication strategy aimed at behavior change involves understanding people and the context in which they live, establishing a respectful partnership and helping them to change their behavior according to their willingness and capacity. The PromoVac strategy, discussed above, is a powerful example of the use of MI techniques in an educational intervention that successfully improved parents' intention to vaccinate, increased vaccination uptake rates in infants, and reduced vaccine hesitancy [43].

### 2.3. The role of mandates in promoting and sustaining vaccination acceptance and uptake

The mere mention of mandatory vaccination often sparks intense emotional debate from individuals, communities, organizations, and policy makers. While there is no consensus definition of 'mandatory', according to ethicist Mark Navin, 'Mandatory vaccination exists when vaccine refusal is legal, but when the state withholds from vaccine refusers social goods to which they would otherwise be entitled.' [44]. Mandates can be viewed as acceptable policy for behavior change when evidence clearly demonstrates a societal benefit that can not be achieved through voluntary behavior, e.g., speeding, violence, smoking. However, unless all those who influence the policy-making process believe the evidence about vaccination and the value of vaccination, mandating vaccination could be met with opposition, as we have recently seen in California (2015), Australia (2016), Italy (2017) and France (2018) [45]. As in other situations, the new mandates introduced in these four jurisdictions were motivated by concerns around vaccine refusal and, in some cases, outbreaks of vaccination preventable of disease [46–49]. While mandates may provide short-term boosting of vaccination uptake, for sustained uptake it is essential to address people's and HCPs' vaccine hesitancy and help them understand why vaccination matters. An effective vaccine communication strategy is required to do this, even when mandates are implemented. The mandates in Italy and France were recently announced at the time of the current meeting, and public support both for and against the mandates was reported [50]. How the mandates have been or will be implemented varies according to cultural, economic and political contexts. Their impact, including on vaccination uptake, vaccination hesitancy rates, and public support, remains to be seen, and will be the subject of future research by presenters and participants who attended the meeting.

### 2.4. Alignment of research goals with public health needs

To align research goals with public health needs, researchers need to have a good understanding of the public health needs and priorities in their particular setting. At the same time, governments need to be open to new ideas and opportunities proposed by researchers. Both these factors will help to establish successful partnerships between academic researchers and government. One limitation in the current efforts to enhance vaccine acceptance and address vaccine hesitancy is the difficulty of integrating evidence-informed strategies into vaccination policies and programs.

As discussed during one of the meeting workshops, if the knowledge gained from research is to be successfully translated into practice, key stakeholders (decision-makers and end-users, e.g., parents) should be involved from the very beginning of the research project development, thereby enabling them to have input into the research objectives and methods used. It is important to nurture collaboration and to develop trust between the

individuals in different organizations. The 'vaccine acceptance, confidence and uptake' research field has a lot to learn about translational research by looking at research on other health issues, e.g. work in HIV/AIDS. During our annual meeting in 2016 (also organized by the *Fondation Mérieux*) a presentation on implementation science highlighted one of its important features, process mapping, which involves managing engagement with all stakeholders in the institution or setting that the intervention aims to enhance and transform [51].

## 3. Community of practice

Annual meetings on vaccine acceptance and confidence organized by the *Fondation Mérieux* at their conference center near Annecy in France since 2011 have effectively nurtured an informal global community of practice [52–54]. The field of vaccine acceptance and confidence is interdisciplinary – for example, the authors of this article come from fields as diverse as political science, anthropology, medicine, public health and communication science, and the annual meetings have aimed to stimulate cross-pollination between the various disciplines. They have provided the opportunity to learn from each other's disciplines and settings and, thereby, enrich the research and contributions of our own disciplines. Additionally, the meetings offer valuable opportunities to exchange with and learn from peers in other countries, and for knowledge exchange and collaboration between researchers, practitioners and policymakers.

Hearing about strategies to improve vaccine acceptance and uptake that have been tested in settings other than our own enables us to learn and try to translate and adapt effective strategies to our local settings, building on what we know has already worked. The informal community of practice that has grown thanks to the *Fondation Mérieux* meetings has facilitated these collaborations by providing the opportunity for regular interactions between its members, resulting in the development of many projects. For example, community of practice members from Australia are employing learnings from trials in Canada testing the efficacy of vaccine communication interventions with parents of newborns, and the P3s approach employed in the USA to address uptake at parent, provider and practice levels to develop interventions for the Australian setting [36,37,55].

## 4. Conclusions: keep on keeping on

"Keep on keeping on," as stressed by Jo Yarwood of the UK Health Protection Unit in the keynote address entitled: '*Turmoil, trust and truth: Immunizing today's 'post-fact' world*', emphasizes the fact that we must continue our efforts to promote vaccine acceptance, along with access, affordability (both financial and opportunity costs) and awareness, to ensure high vaccination rates. The emphasis on sustaining such work reflected the attention the speaker's own country, the UK (where vaccination remains voluntary) is already putting into ensuring high rates of uptake. We suggest that for those countries introducing or considering mandatory vaccination, the argument for continuing 'acceptance work' is even stronger, given the concerns that governments may pull back on such initiatives and instead rely solely upon mandates to shape vaccination behavior. Maintaining public confidence in vaccines and stimulating vaccine 'demand' requires that vaccination communication be effective and sustained, the media conversation monitored, and vaccine acceptance and uptake assessed [56,57]. The key take-home message from the whole meeting was not just to carry on with our work – crucial in shifting political and legal contexts – but to continually develop better ways of doing it.



The second key take-home message was that understanding and securing acceptance and uptake should be addressed with the same rigor and resources as surveillance of vaccine safety, evaluating the incidence of vaccine-preventable diseases and measuring vaccine effectiveness to ensure the long-term success of immunization program.

The third take-home message was that vaccine acceptance and uptake interventions should be evidence-based. The meeting was a platform for not only bringing together interdisciplinary stakeholders, it was a medium for encouraging development and dissemination of high quality evidence in this field. Increasing vaccine acceptance science, policy, and practice in a 'post-fact' world requires a clear and honest understanding of individual, social, political, and institutional aspects that determine vaccination acceptance and uptake. At the next Fondation Merieux meeting, to be held 24–26 September 2018, we will share more examples, evidence, and continue our mutual learning about how to increase vaccination uptake [58].

#### Disclaimer statement

The views expressed in this article are those of the authors only and not of their respective institution or company. Sanofi Pasteur provided an unrestricted grant to Fondation Mérieux for the meeting and Angus Thomson who is employed by Sanofi Pasteur was a member of the organising committee. Sanofi Pasteur paid for medical writing and editorial services provided by Margaret Haugh, MediCom Consult, Villeurbanne, France. Sanofi Pasteur did not influence the content of the meeting or this manuscript.

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