Motors of influenza vaccination uptake and vaccination advocacy in healthcare workers: Development and validation of two short scales

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ABSTRACT

Healthcare workers (HCWs) are an important priority group for vaccination against influenza, yet, flu vaccine uptake remains low among them. Psychosocial studies of HCWs' decisions to get vaccinated have commonly drawn on subjective expected utility models to assess predictors of vaccination, assuming HCWs' choices result from a rational information-weighing process. By contrast, we recast those decisions as a commitment to vaccination and we aimed to understand why HCWs may *want to* (rather than believe they need to) get vaccinated against the flu. This article outlines the development and validation of a 9-item measure of cognitive empowerment towards flu vaccination (MoVac-flu scale) and an 11-item measure of cognitive empowerment towards vaccination advocacy. Both scales were administered to 784 frontline NHS HCWs with direct patient contact between June 2014 and July 2015. The scales exhibited excellent reliability and a clear unidimensional factor structure. An examination of the nomological network of the cognitive empowerment construct in relation to HCWs' vaccination against the flu revealed that this construct was distinct from traditional measures of risk perception and the strongest predictor of HCWs' decisions to vaccinate. Similarly, cognitive empowerment in relation to vaccination advocacy was a strong predictor of HCWs' engagement with vaccination advocacy. These findings suggest that the cognitive empowerment construct has important implications for advancing our understanding of HCWs' decisions to vaccinate as well as their advocacy behavior.

1. Introduction

Infections from the Influenza virus, commonly known as "the flu", represent a hazard for healthcare facilities where sudden outbreaks of illness can lead to high morbidity and mortality in vulnerable patients [1,2]. Because they work in close proximity to these patients, healthcare workers (HCWs) are at risk of becoming infected themselves and of infecting other patients. Annual vaccination remains the most effective means to manage the spread of the flu and prevent nosocomial influenza [3]. HCWs are therefore considered an important priority group for vaccination against the flu by health organisations and government bodies [4–6]. In England, the national 2016/2017 Flu plan aims to achieve flu vaccination for 75% of HCWs with direct patient contact and primary care providers [7]. Despite this emphasis, flu vaccine uptake remains low among HCWs. In Europe, few countries actively monitored HCWs' uptake of the flu vaccination between 2010 and 2012. Those who did generally reported less than 50% uptake [8]. In England, only 50.8% of all HCWs with direct patient care were vaccinated against the flu during the 2015/2016 flu season, with wide variations in uptake between NHS Trusts from as low as 10.9% to as high as 83.5% [9].

Increasingly, focus has shifted towards a better understanding of the psychosocial determinants of HCWs' personal decision to receive the flu vaccine or not [10]. A number of studies have thus drawn on decision-making models to assess predictors of vaccination [11]. These models are derived from the concept of 'subjective expected utility' [12], and assume that HCWs' choices result from a rational analysis of risks and benefits associated with all possible choice alternatives. Among the most commonly used theories within this overarching approach, we find the Health Belief Model (HBM) [13] and the Theory of Planned Behavior (TPB, [14]). According to these models, uptake is driven by HCWs' belief that their susceptibility to contamination by the flu is high, and the

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belief that the flu is a severe disease while non-uptake is driven by HCWs' belief that vaccination comes with severe side effects (high costs) coupled with the belief that it is not effective (low benefits). Both the TPB and HBM models have been "augmented" over the years with socio-cognitive variables (e.g., perceived attitudes of significant others towards vaccination) and perceived control (e.g., confidence in one's ability to get vaccinated).

A limitation of such models is that they conceive decision-making as deliberate and rational information processing. They highlight why HCWs may feel they *need to* be vaccinated given their beliefs associated with vaccination, with a balance of benefits and costs. As such, they implicitly assume that HCWs who decline the flu vaccination do so because they hold "inaccurate" beliefs about the flu and its vaccine. This in turn, calls for interventions aimed at "debiasing" HCWs through educational interventions seeking to reestablish scientific facts. Yet, education aiming to reassure can be surprisingly unhelpful for those who are already doubting or challenging vaccination, leading instead to greater negativity towards vaccination [15,16].

In the present study, we propose and test a complementary theoretical framework, namely the cognitive model of empowerment (CME) [17] to study HCW flu vaccination behaviors. The CME conceives empowerment as an intrinsic motivation to engage in a purposeful behavior. These positive experiences are assumed to arise from four distinct cognitive assessments of the behavior:

(1) the feeling of *value*, or how much one cares about the purpose of the behavior;
(2) the feeling of *impact*, or the belief that the behavior makes a difference in achieving its purpose;
(3) the feeling of *knowledge*, or the belief that one has the skills and knowledge to perform the behavior when he or she tries; and
(4) the feeling of *autonomy*, or the belief that the initiation of the purposeful behavior is self-determined.

We recast the decision to get vaccinated as a commitment to vaccination (rather than a rational information-weighing process) as we aim to understand why HCWs may *want to* get vaccinated. To our knowledge, this is the first attempt to apply and empirically evaluate the CME in the context of HCWs flu vaccination. Our primary aim was to develop a reliable measure of levels of empowerment towards flu vaccination for HCWs. A secondary aim was to examine whether this framework could also be extended to vaccination advocacy. Finally, a third, conceptual aim was to test whether the CME could be successfully applied to both vaccination decisions and vaccination advocacy.

2. Methods

2.1. Overview

The project involved the development of an online questionnaire to gather information on HCWs views on the flu vaccination. The questionnaire measured their intrinsic motivation to get vaccinated against the flu through four components: the extent to which they felt vaccination was (a) important, (b) impactful, and the extent to which they felt (c) knowledgeable about vaccination and (d) autonomous in their decision to get vaccinated.

2.2. Measures

2.2.1. Motors of influenza vaccination acceptance (MoVac-flu) and motors of engagement with vaccination advocacy (MovAd)

We measured each of the four dimensions of cognitive empowerment based on the CME (value, impact, knowledge, and autonomy) with three survey items, resulting in a 12-item scale for flu

vaccination (MoVac-flu) and a 12-item scale for vaccination advocacy (MovAd) (see Supplemental materials). Items were initially generated by the first author and reviewed by the research team as well as two subject matter experts (one medical doctor and one industry specialist) for clarity and sound language structure. The content validity of the items was initially confirmed by a pilot study with a small sample of HCWs [18].

2.2.2. Other predictors of vaccination behavior

Participants' perceptions of the threat posed by the flu virus were measured using three items: the perceived severity of the flu, the susceptibility to be negatively affected by the flu, and the subjective likelihood of contracting the flu without the flu vaccine. Subjective perceptions of the threat posed by the flu vaccine were measured using three items: the perceived (lack of) safety of the flu vaccine, the fear of vaccination, and concerns for side-effects (see Supplemental materials for item wordings).

2.2.3. Behavioral measures

Participants were asked whether they had been vaccinated against the flu in the 2013/2014 flu season, the extent to which they agreed they had encouraged their patients to get vaccinated against the flu, measured on a 7-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree), and whether they knew if their line manager within the hospital was vaccinated against the flu.

2.3. Procedure

Data collection took place between 19th June 2014 and 11th July 2014 at a single metropolitan hospital group. The study was introduced as aiming to find out healthcare professionals' thoughts about vaccination, emphasizing there were no right or wrong answers to the survey. Participation was voluntary and participants were free to withdraw at any time, without giving any reason. Duration to complete the questionnaire was estimated to be about 5–7 min. Participants were invited to take part in the study through emails, hospital newsletters, and posters. The questionnaire included a brief introduction and 40 survey questions. Participants could answer questions in their own time. Upon answering all questions, they were offered a voucher for a free coffee from a nearby coffee shop or 1 in 200 chances to win an £80 gift voucher. The study protocol was submitted to a research ethics committee and approved prior to the data collection.

2.4. Statistical analyses

Statistical analyses were undertaken using SPSS for Mac Version 23 Release 23.0.0.2. Parallel analyses were used to determine the number of components to retain in an Exploratory Factor Analysis for both the MoVac and MovAd scales. Principal Component Analysis with oblimin rotation was used to examine item loadings and reliability analyses based on Cohen's alpha were used to explore the dimensionality and internal consistency of the scales.

The incremental validity of the MoVac-flu scale was assessed using hierarchical binary logistic regression analysis to determine odds ratios and 95 per cent confidence intervals with 2013–14 influenza vaccination status (1 = vaccinated, 0 = not vaccinated) as a discrete outcome measure. Demographics were entered in the first step, risk perception measures of the flu and the flu vaccine were entered in the second step, and knowledge of line manager's vaccination against the flu in the third step of the analysis as per standard practice. Finally, the MoVac-flu score, computed as the average across the individual MoVac-flu items, was entered in the fourth and final step. To allow comparison of coefficient