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## Motors of influenza vaccination uptake and vaccination advocacy in healthcare workers: A comparative study in six European countries <sup>☆</sup>

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### ABSTRACT

**Background:** Annual vaccination is the most effective way to prevent and control the health and economic burden caused by seasonal influenza. Healthcare workers (HCWs) play a crucial role in vaccine acceptance and advocacy for their patients. This study explored the drivers of HCWs' vaccine acceptance and advocacy in six European countries.

**Methods:** Healthcare workers (mainly general practitioners, specialist physicians, and nurses) voluntarily completed a questionnaire in Bulgaria ( $N = 485$ ), Czech Republic ( $N = 518$ ), Kosovo ( $N = 466$ ), Poland ( $N = 772$ ), Romania ( $N = 155$ ), and the United Kingdom ( $N = 80$ ). Twelve-item scales were used to analyse sentiment clusters for influenza vaccination acceptance and engagement with vaccination advocacy. Past vaccination behaviour and patient recommendation were also evaluated. All data were included in a single analysis.

**Results:** For vaccination acceptance, the main cluster (engaged sentiment: 68%) showed strong positive attitudes for influenza vaccination. A second cluster (hesitant sentiment: 32%) showed more neutral attitudes. Cluster membership was predicted by country of origin and age. The odds ratio for past vaccination in the engaged cluster was 39.6 (95% CI 12.21–128.56) although this varied between countries. For vaccination advocacy, the main cluster (confident sentiment: 73%) showed strong positive attitudes towards advocacy; a second cluster (diffident sentiment: 27%) showed neutral attitudes. Cluster membership was predicted by country of origin, age and profession, with specialist physicians being the least likely to belong to the confident sentiment cluster. HCWs characterised by confident advocacy sentiments were also more likely recommend flu vaccination. Again, this association was moderated by country of origin. **Conclusions:** These data show that there is room to improve both vaccination acceptance and advocacy rates in European HCWs, which would be expected to lead to higher rates of HCW vaccination. Benefits that could be expected from such an outcome are improved advocacy and better control of morbidity and mortality related to seasonal influenza infection.

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## 1. Introduction

In the European Union approximately 25–100 million individuals are infected by the seasonal influenza virus each year [1] and approximately 180 million individuals are at risk of serious complications if infected [1–3]. Vaccination is widely accepted by infectious disease specialists as being the most effective means of preventing seasonal influenza infection. The World Health

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Organisation (WHO) recommends annual vaccination for high risk groups as well as for healthcare workers (HCWs) [4]. However, specific recommendations and coverage rates may vary widely between countries in the EU [5–7].

Healthcare workers, particularly General Practitioners (GPs) and nurses, play a crucial role in vaccination decisions not only for themselves but also for their patients [8–10]. Recently there has been increasing awareness of hesitancy in the wider population towards vaccination in general and in seasonal influenza vaccination in particular, including by some HCWs [8,10–16]. People's willingness to engage in any activity is driven by both external motivations (what is required of them) and autonomous motivations (what they feel empowered to do). Previous studies have demonstrated the suitability of using questionnaires to evaluate HCW attitudes to seasonal influenza vaccination [17] as well as to a range of other infectious diseases (e.g., measles, pertussis) [18]. Similarly, questionnaires have been used to predict seasonal influenza vaccination rates among HCWs.

The present study departs from the traditional cognitive approach of behaviour change models such as the Health Belief Model (HBM, [19]) or the Theory of Planned Behaviour (TPB, [20]), which conceptualise vaccination uptake as a deliberate choice informed by a balanced consideration of cost and benefits where the decision-maker asks herself whether she needs vaccination. Instead, our theoretical framework seeks to better understand why HCWs may *want* to get vaccinated, and focuses instead on motivational factors driving behaviours [20]. The willingness of an individual to engage in any activity is driven by both external motivations (what is required from the individual) and autonomous motivations (based on the individual's own assessment of the activity). Building upon the Cognitive Model of Empowerment [21], we conceive of the willingness of an individual to engage in vaccination uptake and vaccination advocacy without external pressure as determined by four personal assessments: the value/importance of the act, its impact/effectiveness, HCWs' feeling of autonomy/choice regarding the activity, and their knowledge of the activity. The aim of this study was to gauge HCWs' level of engagement with influenza vaccination and vaccination advocacy and to assess whether engagement contributed to seasonal influenza vaccination uptake as well as advocacy behaviour across countries. To achieve this, we used two recently developed scales [22] and collected data from HCWs in 6 European countries, combined into a single analysis.

## 2. Materials and methods

### 2.1. Participants

Participants were HCWs from 6 European countries (Bulgaria, Czech Republic, Kosovo, Poland, Romania, and the United Kingdom). Participants were recruited via opportunity sampling with a minimum overall target of 250 HCWs per professional category (general practitioner, specialist physician, or nurse).

### 2.2. Design and procedure

Data collection took place between October 2014 and December 2015. A total of 2541 participants voluntarily completed the survey in either via an online questionnaire or a paper-based version of the questionnaire. The data were screened for outliers on both the MoVac-flu and the MovAd scales. Cases with missing values ( $n = 18$ ) or flagged as multivariate outliers based on Mahalanobis distances ( $n = 47$ ,  $p < 0.001$ ) were excluded from the analysis as this is an indication of careless responding [23]. The final sample included data from 2476 respondents. Bulgarian participants were

recruited using paper questionnaires distributed at GP and preventative medicine conferences; Czech Republic participants were recruited using paper questionnaires distributed at seminars for GPs and inserted with a pre-paid return envelope in a magazine (Practicus) that is distributed to all GPs; Kosovan and Polish participants were recruited either online or using paper questionnaires; Romanian participants were recruited using paper questionnaires; UK participants were recruited via a HCWs' study day in London.

### 2.3. Measures

#### 2.3.1. Motors of influenza vaccination acceptance: MoVac-flu

The 12-item MoVac-flu scale [22] measured the following sentiments: the sentiment that influenza vaccination is important, the sentiment that it is impactful, the feeling of knowing how influenza vaccination works, and the sentiment of autonomy regarding influenza vaccination decisions. Vaccine acceptance sentiments were measured on a 7-point scale (1 = strongly disagree, 4 = neither disagree nor agree, 7 = strongly agree) to measure the participants' thoughts about influenza vaccination (Cohen's  $\alpha = 0.860$ ).

#### 2.3.2. Motors of engagement with vaccination advocacy: MovAd

The 12-item MovAd scale [22] measured the following sentiments: the sentiment that vaccination advocacy is important, the sentiment that it is impactful, the feeling of knowing how to advocate vaccination, and the sentiment of autonomy regarding the decision to advocate vaccination. Vaccine advocacy sentiments were measured on the same 7-point Likert scale (Cohen's  $\alpha = 0.864$ ).

#### 2.3.3. Behavioural measures

Participants were asked whether they had received the influenza vaccine during the 2014/2015 season (autumn/winter) (immediate past behaviour). They were also asked to report how often they recommended the influenza vaccine to eligible patients (advocacy behaviour).

#### 2.3.4. Demographics

Demographic data included participants' age, gender, and professional category (general practitioner, specialist physician or nurse). Table 1 summarises the demographic data.

## 3. Results

### 3.1. Preliminary analyses

Descriptive statistics and correlations for the MoVac-flu and MovAd scales are reported in Table 2. Normality assumptions were met as most kurtosis and skewness scores were below the upper threshold of 3.29 for large samples [24]. The only exception was the MoVac-flu item 4.1 of the Autonomy dimension (kurtosis = 4.11). This deviation was corrected by using power transformation ( $\lambda = 2$ ).

#### 3.1.1. Motors of flu vaccination acceptance: MoVac-flu

Responses to the MoVac-flu scale were analysed using the Two-Step Cluster procedure from IBM SPSS 23.0, with 7 inputs: Importance (items 1, 2, 3), Impact (items 1, 2, 3), Feeling of Knowledge (items 1, 3), Depth of Knowledge (item 2), Choice (Autonomy item 1), Extrinsic Pressure (Autonomy item 2), Intrinsic Motivation (Autonomy item 3). To minimise order effects, cases were randomly ordered and cluster solutions were replicated using cases sorted in a different random order to confirm their stability.

A first solution identified two clusters with an average silhouette measure of cohesion and separation of 0.30, suggesting a "fair"

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