Determinants of older adults' intentions to vaccinate against influenza: a theoretical application

Stephen Gallagher¹, Rachel Povey²

¹School of Sport and Exercise Science, The University of Birmingham, Edgbaston, Birmingham B15 2TT, UK
²Centre for Health Psychology, Staffordshire University, Stoke-on-Trent, Staffordshire ST4 2DE, UK
Address correspondence to Stephen Gallagher, E-mail: sxg598@bham.ac.uk

ABSTRACT

Background Despite many government initiatives, uptake of the trivalent influenza vaccine among the older adult population still remains suboptimal. If immunization rates are to be optimized, new approaches for identifying the determinants that facilitate or inhibit influenza vaccination decision making in this population are necessary.

Methods An extension of the theory of planned behaviour (TPB) provided the theoretical framework for the development of a multi-item questionnaire. One hundred and ninety-three white, independent living and city dwelling men (n = 77) and women (n = 116), completed the measure. The main outcomes of interest were future vaccination intentions.

Results Overall, the TPB predicted 48.2% of older adults' intentions to vaccinate next influenza season. Receiving the vaccine in the past and anticipating feelings of regret (the impact of missing a vaccination opportunity) contributed to increments of 10.7 and 13.7%, respectively, in explaining this intentional behaviour.

Conclusion Utility of theoretical frameworks is a useful resource tool for understanding the rationale behind the facilitating and inhibitory determinants of older adults' vaccination decision-making processes. The implications of this research are discussed with a view towards future directions for maximizing influenza vaccination uptake initiatives using theoretically driven applications.

Keywords decision-making, influenza vaccinations, older adults

Background

Efforts at maximizing the uptake of the trivalent influenza vaccine among older populations are not being realized. Although somewhat successful, low rates are still evident despite these efforts. For example, in one general practice in the north of England, 41.7% of people over the age of 75 years chose not to have an influenza vaccination for the winter 1999/2000.¹ However, another UK study² reported that vaccine uptake among persons aged 65 years in 2003/2004 was 72.1%, suggesting within country variation. In the Republic of Ireland, poor coverage has also been found. Here, a study by Bedford and Howell³ found that only 49.1% of older adults surveyed reported that they had been vaccinated and just over 63% had intentions to have it. Influenza causes an immense burden to the infected individual in terms of morbidity and mortality and to society in terms of economic strain. If this burden is to be reduced, then the poor and varied coverage that currently exists needs to be addressed.

Besides the health campaigns that are currently in operation, new methods are being employed to increase uptake. These efforts have included the utilization of television advertising and patient postcard reminder strategies, both of which had limited success.⁴ In one recent UK randomized control trial, an educational outreach programme set in primary care practices was tested as a means to improve vaccination rates in older adults;⁵ although pneumococcal rates improved, influenza rates did not. This intervention consisted of providing multi-disciplinary practice teams with information on the perceived barriers to vaccination within organizations, discussion of national targets, current practices, policy and techniques employed to improve adult vaccination rates. By attempting to delineate vaccination determinants from both physician and practice perspectives,
the researchers have neglected to consider the process from the older adult perspective; after all, it is they who have the final say in this decision-making process by choosing to vaccinate or not. Thus, with the limited success of these interventions, evidence now dictates that fresh approaches and new methodology are needed.

Applications of theoretical frameworks have been shown to be well suited for the design of behavioural change interventions. One framework is the theory of planned behaviour (TPB), and interventions based on its components have been very successful and inducing behaviour change, especially those targeting health behaviours (e.g. smoking cessation and cancer screening). The TPB (see Fig. 1) proposes that intention, the most important antecedent of behaviour, is based and guided by three constructs: attitudes towards the behaviour, subjective norms (influence of others) and perceived behavioural control (PBC; factors impeding or facilitating behaviour). As a general rule, the more favourable the attitude and subjective norm and the greater perceived control, the stronger the person’s intention to perform the behaviour in question (i.e. influenza vaccination). Evidence also demonstrates that this theoretical framework can be enhanced by the inclusion of additional factors. For example, studies have found that factors such as past behaviours and anticipating feelings of regret increase the prediction of behavioural intentions. Utilization of an extended version of TPB, as a means to elucidate fully the motivating factors underlying vaccination decision making has the potential to enhance influenza vaccination uptake in older adults.

The general aim of this study is to identify determinant factors that promote or inhibit influenza vaccination decision making in Irish adults aged 65 years and over using the theoretical framework of the TPB. In addition, it will investigate whether the additional variables of anticipated regret and past behaviour will contribute to a better understanding of this decision-making process.

**Methods**

**Sample**

Three community centres, providing social clubs for older adults in a city in southwest Ireland were approached by the researchers and invited to help with the recruitment process. All agreed. Initially, the social club organizers recruited 12 participants for phase 1 of the study. These older adults were interviewed specifically to capture their beliefs towards vaccination; this information went on to inform the development of the questionnaire. For phase 2, a poster campaign was implemented with study details displayed within the centres. Following this, attendance by the researcher at the social clubs was necessary to facilitate recruitment and answer any questions. During this time and for 2 weeks afterwards, snowballing sampling techniques were being used to recruit. Data were collected from adults aged ≥65 years. All participants were white, community-based and independent living. Seventy-seven men and 116 women expressed interest in the study and completed the multi-item measure. Their ages ranged from 65 to 88 years (mean = 72.2 ± 5.87). Respondents’ average school-leaving age was 15 years. Fifty-six per cent were married, 8% single, 34% widowed and the remaining 2% divorced/separated. All patients provided written informed consent. Ethical approval for this study was given by the Psychology Research Ethics Committee at Staffordshire University, UK.

**Design and procedure**

Before developing the questionnaire, we wanted to assess the decision-making process from multiple-vantage points; therefore, beliefs were captured from the opinions of vaccinators, previous vaccinators and non-vaccinators. These beliefs were used to form the basis of questionnaire items measuring attitudes, subjective norms and PBC, using the standard format for TPB questionnaires. Additional variables included in the main questionnaire included patient demographics and a measure of past vaccination status over a 4-year period (0, 1, 2, 3 and 4). In line with previous studies, feelings of anticipated regret were assessed by two items ‘If I did not have the flu injection next year, I would feel regret’ and ‘If I did not have the flu injection next year, I would feel upset’, and this was answered by indicating on a 7-point scale from definitely no (~3) to definitely yes (+3), and high reliability ($α = 0.92$) was obtained for these items. The main outcome variable was intentions to vaccinate in the forthcoming year. These were captured by following three items: ‘I intend to have the flu injection next year’, ‘I plan to have the flu injection next year’ and ‘I will try and have the flu injection next year’. Older adults had to indicate their

![Fig. 1 The theory of planned behaviour](https://academic.oup.com/jpubhealth/article-abstract/28/2/139/1569760/fig1)
intentions on a 7-point ranging from unlikely (−3) to likely (+3). Internal consistency for these items was excellent, with a high Cronbach alpha being observed (α = 0.99). Over a 2-week period, the researcher was on site at the social clubs to facilitate participation. Those interested were given a consent form, a questionnaire and verbal instructions on how to complete the questionnaire. As expected, due to arthritic, visual and literacy problems, some participants needed assistance; in these instances, the researcher aided with the completion of the questionnaires. No differences in intentions to vaccinate next season were found between those who were assisted (n = 23) and those who were not (n = 170; t = −0.746, df = 190, P > 0.05).

Statistical analysis
Data were analysed by the statistical computer package SPSS version 12. Data were checked for assumptions of multiple regression, and one outlier was removed; all remaining analyses were performed on 192 cases. Inter-relationships between the questionnaire variables were analysed by Pearson’s product moment correlations. Hierarchical multiple regression analyses of the variables from the TPB, past behaviour and anticipated regret onto behavioural intentions were then computed. A P value of 0.05 (two-tailed) was selected as significant, and R² was used as a measure of effect size.

Results
From the data set, 46% of older adults received the vaccine every year over the 4-year period, 9% had it three times, 10% had it twice, 12% at least once and 23% of them reported that they never had the vaccine over this period; 77% self-reported positive intentions to vaccinate in the future. In addition, 13% of the sample visited their general practitioners (GPs) less than once a year, 18% once or twice and 69% several times a year. As can be seen in Table 1, slightly more men than women chose not to vaccinate against influenza over this time period. Similarly, it illustrates that more people who were married/living together in comparison to those not married (single, divorced and widowed; 46%) chose not to receive the vaccine.

Initially, descriptive and correlation statistics were obtained (see Table 2). From potential minimum (−3) and maximum (+3) ranging scores, respondents indicated positive intentions to vaccinate against influenza in the next year (M = 1.58, SD = 2.26). Results from Pearsons product moment correlations demonstrated that attitudes, subjective norms, past behaviour and anticipated regret all had significant positive relationships with intentions to vaccinate against influenza, while PBC had a non-significant relationship. These data suggest that attitudes (e.g. the vaccine protects and is effective) towards the vaccine, social influences (GPs and families) and having been vaccinated previously, as well as regretting one’s decision if one did not vaccinate, are influencing older adults’ vaccination intentions.

In testing the predictive utility of the TPB as framework for understanding immunization motivating factors, attitudes, subjective norm and PBC (e.g. facilitating/inhibiting factors such as fear of needles and distance to GP surgery) were entered simultaneously in the first step of the regression equation (Table 3). Results showed that, overall, the TPB had an adequate fit with the data, with these variables explaining 48.2% of the variance of intentions to vaccinate. The subjective

<table>
<thead>
<tr>
<th>Variables non-vaccination status by gender and marital status</th>
<th>Men</th>
<th>Women</th>
<th>Not married</th>
<th>Married</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants (n)</td>
<td>23</td>
<td>21</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Difference (%)</td>
<td>52.3</td>
<td>47.7</td>
<td>44.2</td>
<td>56.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.58 ± 2.26</td>
</tr>
<tr>
<td>Attitude</td>
<td>0.429**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.78 ± 4.50</td>
</tr>
<tr>
<td>Subjective norms</td>
<td>0.691**</td>
<td>0.568**</td>
<td></td>
<td></td>
<td></td>
<td>10.82 ± 7.38</td>
</tr>
<tr>
<td>PBC²</td>
<td>0.085</td>
<td>0.186*</td>
<td>0.184*</td>
<td></td>
<td></td>
<td>4.52 ± 3.32</td>
</tr>
<tr>
<td>Past behaviour</td>
<td>0.610**</td>
<td>0.329**</td>
<td>0.456**</td>
<td>0.050</td>
<td></td>
<td>2.43 ± 1.67</td>
</tr>
<tr>
<td>Anticipated regret</td>
<td>0.804**</td>
<td>0.465**</td>
<td>0.600**</td>
<td>0.072</td>
<td>0.640**</td>
<td>1.05 ± 2.29</td>
</tr>
</tbody>
</table>

²PBC = perceived behavioural control.
Correlation is significant at **P < 0.01, *P < 0.05 (two-tailed).
norm component had the only significant beta weight in the regression equation. These results imply that it is the encouragement by older adults’ GPs, clinic nurses and their families that exert a stronger influence over this decision-making process than their attitudes towards or perceived control over the behaviour.

At Step 2, participants’ past vaccinating behaviour was entered into the regression. This was found to be significant in the equation and accounted for a considerable increment in variance in vaccination intentions (F change = 44.01, \( P < 0.001 \), \( R^2 \) change = 0.107). For older adults, being vaccinated against influenza in the past was a significant predictor of intentions to immunize against influenza in the future.

Finally, the variable-anticipated regret was entered at the final stage of the regression (Step 3, Table 3), and the model fit improved to 72.6% (F change = 88.71; \( R^2 \) change = 0.137). Older adults who anticipate post-behavioural feelings of regret, if they missed the opportunity for having the vaccine, had higher intentions to vaccinate in the future.

**Discussion**

**Main findings**

The central question of this study was concerned with whether the motivating determinants inhibiting or facilitating influenza vaccination intentions among older Irish adults could be identified using the TPB as a theoretical framework. In testing its predictive utility, the TPB components accounted for 48.2% of vaccination intentions among older adults. This indicates that TPB does provide a useful framework to base any future interventions on. It contributes to a better understanding of the determinants and the motivations as well as the processes involved when older adults are deciding to vaccinate against influenza. Results also indicated that two components of the TPB (attitudes and subjective norms) were associated with intentions to vaccinate, with the subjective norm construct being an independent predictor of intentions. That is, those older adults who had more positive attitudes towards the vaccination had higher intentions to vaccinate than those who did not. Also, older adults, who are motivated to comply with and seek the approval of significant others such as family members and general practitioners, have stronger intentions to vaccinate. This confirms the facilitating effect of healthcare providers on older adults’ vaccination status, which has been documented in recent research. When relating our findings to the existing TPB literature, one also sees that the figure reported here (48.2%) compares favourably with the 39% reported elsewhere across a variety of health behaviours.

As hypothesized, and in line with existing research, the additional variables of anticipated regret and past behaviour also increased the prediction of intentions. Older adults, who had received the influenza vaccination repeatedly or more than once in the last 4 years, had a higher intention to vaccinate in the forthcoming influenza season than those who had not. Additionally, anticipated regret also provided a significant contribution to the prediction of intentions. This variable, when added to the regression model, increased the variance by almost 14%. This would suggest that older adults who either suffered from influenza in the past or now realize from past vaccinating experience that it is safer to have the vaccine, and therefore wish to have no regrets, would be more highly motivated to get vaccinated.

**What is already known on this topic**

Applications of theoretical frameworks have been shown to be well suited to identifying barriers and facilitators to pneumococcal immunization among physicians and patients. Moreover, successful behavioural change interventions based on such theoretical frameworks, especially those targeting health behaviours (e.g. smoking cessation and cancer screening), have been very effective at inducing behaviour change.

Furthermore, when using theory-driven methodology, our understandings of the processes involved in vaccination decision making at the level of the individual are increased. It also serves to organize empirical knowledge, as well as guide research into designing effective interventions towards changing behaviour (i.e. increasing vaccine uptake). The TPB is a well-established theoretical framework used to predict a variety of health behaviours. Some of these behaviours include the uptake of cancer-screening services and exercise.
However, utilization of the TPB in any type of vaccination research has yet to be determined.

In the past, interventions designed to increase uptake have focused on patient information leaflets and posters, and training workshop for physicians and postal reminders have had limited success.\textsuperscript{4,5} These and others like provision of financial incentives for physicians, and system-orientated factors (vaccination clinics) have all led to improvements in immunization rates.\textsuperscript{12,15} However, much more need to be done if the morbidity and mortality burden associated with influenza is to be reduced, and this can only be possible if vaccination coverage is optimized in those most affected by the virus—older adults. For this to happen, alternative strategies and methodologies need to be tested, developed and applied. In addition, it is the individual that has the final say when deciding to vaccinate; therefore, a shift away from physician-orientated strategies to more patient and individual-based ones may prove to be pivotal if current immunization targets are to be realized.

**What this study adds**

Theoretical frameworks are key to the design of successful behaviour-change interventions.\textsuperscript{7,8} Moreover, our data add to the growing body of evidence that theoretical frameworks provide effective and useful resource tools for understanding the decision-making processes involved in the practice of health behaviours. As older adults are self-selecting vaccinators, their own personal reasons for deciding to have or not have the vaccine are essential and have been examined and captured in this study. The results showed that GPs and family members appear to be key social facilitators of vaccination for older adults, when they decide to get vaccinated. Therefore, health-care providers, significant others and family members should be targeted to play a pivotal role in encouraging older adults who are at risk of influenza to receive the annual vaccine. This may involve encouraging older adults to speak to their families and visit their GP or clinic nurse, to seek advice and be given reassurance about the efficacy and benefits of the vaccine.

Additionally, we have shown that the post-behavioural feelings that are normally associated with having missed the opportunity to be vaccinated led to the variable ‘anticipated regret’ adding substantial percentage increments in explaining older adults’ future vaccination intentions. Exploitation of these feelings has the potential for effective intervention strategies. Governments and health researchers could manipulate these in large-scale interventions but also at an individual level. GPs could be trained to use verbal persuasion techniques, or media messengers could use the beliefs associated with these feelings by highlighting the perils and dangers associated with ‘missing out’ on the opportunity to be vaccinated.

Finally, another additional variable that added to our understanding of this decision-making process was the inclusion of past vaccinating behaviour. Older adults, who have received the influenza vaccination repeatedly or more than once in the last 4 years, had a higher intention to vaccinate in the coming year. One can speculate that for these individuals, having the vaccine has now become a part of their healthy lifestyle behaviours and one which they are willing to perform annually.

**Limitations of this study**

One must acknowledge the limitations of this study. First, this particular sample cannot be extrapolated to different cultural groups, as the entire sample was white and Irish. Ireland has only become ethnically diverse in recent times, the majority of ethnic minorities being of a younger age group. Therefore, the findings from this study may only be generalizable to the older Irish population at large. Furthermore, our sample was drawn from a socially disadvantaged area; so any correlations found for this sample may not be reflected in a higher social class. A third limitation of this study is that it only measured intentions and not actual behaviour. Therefore, the assumptions to be made about actual vaccinating behaviour are limited; one cannot guarantee that intentions to vaccinate in the future will correspond with vaccinations, even though previous investigations have found vaccination intentions to be reliable predictors of immunization status.\textsuperscript{12}

**Acknowledgements**

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**References**


5 Siriwardena AN, Rashid A, Johnson MR et al. Cluster randomised controlled trial of an educational outreach visit to improve influenza


