The intentions of Israeli nurses attending university programs to receive seasonal influenza vaccination

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Abstract

Background: Seasonal influenza vaccination (SIV) among medical personnel is a key factor in preventive medicine and patient safety.

Objective: To identify social-cognitive predictors of Israeli Registered Nurses' (RNs) intentions to receive SIV utilizing the Theory of Planned Behaviour (TPB) model, and to assess its predictive validity.

Methods: A cross-sectional study was conducted. A structured, self-reported, anonymous, 43-item questionnaire, based on an extended version of the TPB, was administered to 80 nurses attending Master's or Bachelor in Nursing degrees curriculums. A multivariable regression analysis was used to determine independent predictors of influenza vaccination compliance among nurses.

Results: A multivariable regression analysis indicated that two TPB model variables: control beliefs ($\beta = 0.277$, $P < 0.01$) and attitudes regarding SIV ($\beta = 0.441$, $P < 0.001$) contributed significantly to the prediction of RNs' SIV intentions.

Conclusions: The results of the current study indicate that the TPB may partially explain the intentions of RNs to receive SIV and illustrates the importance of beliefs and attitudes to health-related behaviours. It may direct us to seek interventions focusing on strengthening beliefs and attitudes to achieve higher intention levels to get vaccinated and thus affect the desired behaviours.

Keywords

Seasonal influenza vaccination, theory of planned behaviour, control beliefs, attitudes towards behaviour

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Background

Seasonal influenza vaccination (SIV) protects healthcare workers (HCWs) and their vulnerable patients from influenza infections. It may reduce staff absences and provide economic benefits (Music, 2012). The Advisory Committee on Immunization Practices, in collaboration with the US Centers for Disease Control and Prevention (CDC), recommended that all HCWs receive influenza vaccination annually (CDC, 2011). Similarly, vaccination policies of HCWs are published by the Israel Ministry of Health (IMH) national guidelines (2011).

However, despite the guidelines and the availability of an effective vaccine, influenza vaccination compliance of HCWs is lower than optimum (Hakim et al., 2011; Nativ et al., 2010).

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Figure 1. Theoretical framework of the extended version of the theory of planned behaviour. The figure was retrieved from the consulting services website (Ajzen, 2006) with the approval of I. Ajzen, the author of the theory of planned behaviour. Permission has been obtained for use of the copyrighted TPB model from the author, Icek Ajzen.

The objectives of this study were to identify social-cognitive factors that may promote SIV decision-making among registered nurses (RNs) in Israel, using the theoretical framework of the TPB. And to assess the reliability and validity of the TPB questionnaire constructed by this study according to the TPB model authors' guidelines to assess nurses' intentions to receive SIV and examining its predictive validity.

In the effort to increase influenza vaccination rates among HCWs, it may be beneficial to identify elements influencing HCWs' intentions to get vaccinated against seasonal influenza. The present study uses the theory of planned behaviour (TPB) (Ajzen, 1991; Fishbein and Ajzen, 2010) to better understand decision-making about influenza vaccination among RNs.

The TPB is a general model of human behaviour that examines the patterns of deliberate behaviour. The effectiveness of the TPB to predict health behaviours has been clearly established in many studies and, overall, results have strongly supported the theory as a suitable paradigm for examining anticipated manners and predictors of health behaviour (Bish et al., 2011; Blasi et al., 2012; Fishbein and Ajzen, 2010; Fisher et al., 2013; Werner, 2003).

According to the TPB, the major factor and the best predictor influencing an individual's actual behaviour is the intention to receive it in the future (Figure 1). The TPB postulates three conceptually independent determinants of intention to adopt the behaviour in question: (1) attitude toward the behaviour, referring to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question; (2) a social factor termed subjective norm, which refers to the perceived social pressure to perform or not to perform the behaviour (concerned with the likelihood that important referent individuals or groups approve or disapprove of performing a given behaviour); and (3) the degree of perceived

behavioural control (PBC), which refers to the individual's evaluation regarding the capacity to adopt the behaviour in question, even if confronted with certain barriers (Doll and Ajzen, 1992).

As a general rule, the more favourable the attitude and subjective norm with respect to a behaviour and the greater the PBC, the stronger should be an individual's intention to perform the behaviour under consideration (Ajzen, 2002; Ajzen and Madden, 1986; Doll and Ajzen, 1992).

Each of these three constructs is based on belief. Three kinds of salient beliefs are distinguished: (1) behavioural beliefs represent how an individual evaluates a given behaviour and its consequences; (2) normative beliefs represent perceived expectations of important referents; and (3) control beliefs represent the beliefs about factors that may facilitate or impede performance (Ajzen, 1991, 2002; Ajzen and Madden, 1986; Doll and Ajzen, 1992; Fishbein and Ajzen, 2010).

Vaccination-related behaviour is considered a health-related decision, which every HCW makes in his/her own way, and like any other behaviour, it can be examined within the framework of the TPB model. However, in spite of the many studies about SIV among HCWs, no examination has yet been conducted as to their readiness to choose this form of behaviour as a result of the three factors mentioned in the TPB. Utilisation of the TPB as a means to elucidate the motivating factors underlying decision making has the potential to enhance SIV uptake among RNs.

Methods

A cross-sectional study was performed using a 43-item structured self-administered questionnaire, based on an extended version of the TPB. Participants were recruited from a convenience sample of 80 RNs getting their Master's in Nursing or their Bachelor of Nursing degrees. The study questionnaire was provided to 40 students attending each study program during April 2014, which coincided with the end of the vaccination season and referred to the next vaccination season. The participants were provided a written informed consent.

The basic professional education programs for nurses in Israel range from a diploma, usually a three-year program, to a four-year academic program. Subsequently, a Bachelor's degree completion program for RNs who previously studied in a diploma program and a Master's in Nursing degree exist in most of the universities in Israel.

Eligible individuals were those who met the following criteria: (1) RN aged over 18 years; (2) fluent in Hebrew; and (3) active RNs, currently working as staff nurses in hospital wards with direct patient contact.

The study was approved by the institutional ethics committee. The questionnaire was developed in accordance with the methodology and recommendations for measurement of TPB components, published by the authors (Ajzen, 2002;

Ajzen and Madden, 1986). Permission to use the methodology for TPB questionnaire construction was obtained from the author, Icek Ajzen (<http://people.umass.edu/ajzen/consulting.html>).

The questionnaire was developed as follows: (1) TPB direct measures were developed with respect to influenza vaccination completion. All items were rated on a 7-point Likert scale, with 1 point being the lowest and 7 points being the highest score possible; scores were averaged within each domain to create a total score. Reverse-coding was used when appropriate; (2) the content validity of the questionnaire was approved by two experts on health promotion theories and by three experts in prevention and treatment of infectious diseases. Experts were asked to assess each item for relevance and clarity. Expert review revealed that the majority of items were relevant, clear and well understood. However, the team of experts found that the tool measures only part of the core content areas of the variables measured in this study. Questions that were not satisfactory were amended according to the experts' recommendations; (3) a pilot test was performed among ten RNs who did not participate in the next stage of the study, in order to evaluate the clarity of the questionnaire; and (4) reliability of the questionnaire was assessed using Cronbach's alpha coefficient after collecting data from the 60 participants.

The items comprising the constructs of the TPB study model (Figure 1) are described in Table 1. The internal consistency of the questionnaire constructs varying from Cronbach's α of 0.61 to 0.95.

Results

The characteristics of respondents and non-respondents did not differ with respect to age, sex and division categories. A total of 80 RNs were approached; 60 (75%) agreed to participate and completed the survey (Table 2). The mean age ($\pm$ standard deviation) of the participants was 35.4 ± 8.08 years and the population was predominantly women (83%). The distribution of RNs by field of work is shown in Table 2.

Descriptive and correlation statistics were obtained (Table 3). The nurses in the current study had a moderately positive intention to be vaccinated against seasonal influenza next year with a score of 4.34 and standard deviation of ± 2.22 , on a 7-point Likert scale. Likewise, they had moderately positive attitudes to SIV in general, with a mean of 4.97 and standard deviation of ± 1.72 , on a 7-point scale. The two constructs, attitude toward SIV and intention to get SIV, were significantly related, with a Pearson's correlation of 0.74 ($P < 0.001$). Similarly, behavioural beliefs and control beliefs regarding the SIV were significantly related to the nurses' intentions to get SIV next year ($P < 0.001$).

Furthermore, nurses' behavioural beliefs and control beliefs regarding the SIV were positively associated with

their attitudes towards receiving the vaccination ($P < 0.001$). The initial patterns of relationships identified by the bivariate analysis are evident in the final structural regression model, even though the patterns of prediction differed from those posited by the theory.

In testing the predictive utility of the TPB as a framework for understanding SIV motivating factors among RNs' attitudes, subjective norm and PBC were entered simultaneously in the first step of regression equation (Table 4). Overall, the TPB had an adequate fit with the data, with these variables explaining $> 58\%$ of the variance of intentions to vaccinate. Attitudes component had the only significant beta weight in the regression equation. A stepwise multiple regression analysis indicates that RNs' intentions to get vaccinated against seasonal influenza are a function of their attitudes toward being vaccinated ($F=25.554$, $P < 0.001$). However, their perceptions of social support for the vaccination (subjective norm) and the perceived ability to get vaccinated (PBC) do not sum to the explanation of variance in RNs' intentions to be vaccinated.

At step 2, the RNs' behavioural beliefs, normative beliefs and control beliefs were entered into the regression. The results indicate that both behavioural beliefs ($b = 0.50$) and control beliefs ($b = 0.36$) significantly predicted RNs' attitudes towards SIV, accounting for 55% of its variance ($F=22.50$, $P < 0.001$), with the values of standardised regression coefficients (β) indicating that behavioural beliefs have a greater contribution to the RNs' attitudes towards SIV than control beliefs. Finally, for the final full structural model (as visualised in Figure 2) all factors comprising the model were introduced into the regression model (step 3, Table 4) and the model fit improved to 66% ($F = 16.955$, $P < 0.001$).

The multiple regression indicates that RNs' attitudes towards SIV and their control beliefs contribute significantly to the explanation of the variance in their intentions to be vaccinated. The values of standardised regression coefficients (β) indicate that attitudes towards vaccination have a greater contribution to intentions than control beliefs.

Discussion

The main question of the current study was concerned with whether the motivating determinants influencing the SIV intentions among RNs could be identified using the TPB as a theoretical framework. In testing its predictive utility, the TPB model predictors accounted for 66% of vaccination intentions among RNs. This finding may indicate that TPB could provide a valuable framework to better understand motivational aspects of SIV uptake by RNs.

It was observed that two predicting constructs of the TPB—attitudes and control beliefs—were directly associated with intentions to get an SIV next year, with the attitudes being the most influential predictor. These imply that the positive attitudes about SIV exert a stronger influence

Table 1. Items, response scale and internal consistency for assessing measures of the model (n = 60).

Measures	Items	Response scale	Cronbach's α
Behavioural beliefs regarding SIV*	Vaccination against seasonal influenza, on a yearly basis, will improve my health status	1–7 agreement	0.74
	SIV will prevent me from getting infected in the future	1–7 agreement	
	I believe that SIV is an important tool for protecting the health of my patients	1–7 agreement	
Attitudes towards SIV†	Getting the influenza vaccination vaccine on a yearly basis would be ...	1–7 Not at all effective – very effective	0.89
	For me, to be vaccinated against influenza and prevention of the influenza disease development is a matter	1–7 Valueless – of a great value	
	For my health, SIV every year is	1–7 Not essential – essential	
Normative beliefs regarding SIV‡	Regarding the SIV decision, I would like to act in accordance with the opinion of my colleagues	1–7 agreement	0.82
	Regarding the SIV, how much would you like to resemble your colleagues' behaviour?	1–7 agreement	
Subjective norms regarding SIV§	Most of my co-workers get vaccinated against seasonal influenza every year	1–7 agreement	-
Control beliefs regarding SIV**	I believe that the supply of seasonal influenza vaccine by my employer will be available next year	1–7 agreement	0.62
	Availability of seasonal influenza vaccine will facilitate my decision to be vaccinated against seasonal influenza	1–7 agreement	
	Next year, I will get a seasonal influenza vaccine by my employer, without financial cost	1–7 agreement	
	Vaccination against seasonal influenza by the institution where I am employed without financial cost will facilitate my decision to be vaccinated	1–7 agreement	
	I believe that the risk of contracting seasonal influenza is low compared to the side effects of the vaccine	1–7 agreement	
	Complications and side effects of the vaccine against seasonal influenza affect my decision to get vaccinated	1–7 agreement	
Perceived behavioural control††	Getting vaccinated against the seasonal influenza every year, is solely up to me	1–7 agreement	-
The intention to get vaccinated against seasonal influenza‡‡	I will make every effort required to get vaccinated against the seasonal influenza, next year	1–7 agreement	0.95
	I plan to get vaccinated against seasonal influenza, next year	1–7 agreement	

Response scale 1–7 agreement, not at all effective – very effective. *The items were averaged to form a single behavioural beliefs score for each participant, with reverse-coding where appropriate, with low score (1) indicating a strong belief and high score (7) indicating a low level of belief that SIV is essential for the HCW and his/her patients.

†Responses to these items were averaged, with reverse-coding where appropriate, to form a single attitude score for each participant, with low score (1) indicating a negative attitude and high score (7) indicating a positive attitude towards undergoing SIV.

‡Normative beliefs regarding SIV was assessed by respondents' agreement with three statements asking about their generalized tendency to adopt behaviour demonstrated by others encountered in daily life regarding SIV performance. The items were averaged to form a single normative beliefs score for each participant, with reverse-coding where appropriate, with low score (1) indicating a strong will and high score (7) indicating not willing to adopt the behaviour regarding SIV performance in accordance with the intention of peer group members.

§Subjective norms were assessed by respondents' agreement with two statements measuring perceived social support regarding SIV performance. The internal consistency for these two items was weaker, with $\alpha = 0.31$, which suggests each item appropriately measures different social influences. The reliability analysis suggested the internal consistency of the Subjective norms regarding seasonal influenza would be greatly enhanced by omitting the item: 'Most people who are important to me approve of my getting vaccinated against seasonal influenza next year ... (1) agree ... (7) don't agree' from the Subjective norms scale. Therefore, subjective norm was assessed by one item with low score (1) indicating very negative perception and high score (7) indicating very positive perception of social support for undergoing SIV.

**Control beliefs were assessed with six statements asking about respondents' beliefs about the difficulty and ease to perform vaccination against seasonal influenza and their belief in the existence of factors that facilitate or impede its implementation. The items were averaged to form a single normative beliefs score, with reverse-coding where appropriate, with low score (1) indicating a belief in the relative ease and the absence of barriers to perform the SIV and high score (7) indicating a belief in the difficulty to perform the vaccination.

††Perceived ability to get vaccinated was assessed by respondents' agreement with two statements measuring perceived ease or difficulty of undergoing SIV. The internal consistency for these two items was weaker, with $\alpha = 0.24$. Therefore, PBC was assessed by one item with low score (1) indicating perceived difficulty and high score (7) indicating perceived ease of receiving SIV.

‡‡Individual intention to get SIV was assessed by respondents' agreement with how likely it was that they would get vaccinated against seasonal influenza during the next winter season. The items were averaged to form a single intention score for each participant, with reverse-coding where appropriate, with low score (1) indicating a strong intention and high score (7) indicating a low level of intention to get vaccinated against seasonal influenza.

SIV, seasonal influenza vaccination; PBC, perceived behavioural control.

Table 2. Demographic characteristics of the survey participants (n = 60).

Characteristics	Total n = 60 (%)
Mean age (years)	35.4 (31–40)
Female	50 (83)
Country of birth	
Israel	25 (42)
United States	2 (3)
Former Soviet Union	28 (46)
Other	5 (9)
Education level completed	
RN Diploma or Associate Degree	35 (58)
Bachelor of Nursing degree	25 (42)
Field of work	
Obstetrics and Gynaecology	9 (15)
Department of Internal Medicine	31 (52)
Psychiatry	1 (2)
Public Medicine	4 (7)
Paediatric Department	6 (10)
Surgery	5 (8)
Intensive Care Unit	4 (7)

over this decision-making process than the social influences or PBC. Our findings are consistent with several published reports (Gerend & Shephard, 2012; Prematunge et al., 2012), indicating that attitudes of HCWs towards influenza vaccination is the most important determinant of the vaccination decision-making process. The current findings are in line with those of Corace et al. (2013), which showed a strong association between evaluative attitudes and perceptions of SIV. Most HCWs who had a more

positive attitude towards receiving the influenza vaccine had a high intention to obtain the vaccination.

Among the determinants influencing attitudes toward SIV, we found behavioural beliefs regarding the vaccination, indicating that RNs who believe in a positive outcome of the SIV have a favourable attitude towards the vaccination. Similar results were found in other studies assessing the relationship between beliefs and attitudes toward SIV uptake among HCWs (Bish et al., 2011; Godin et al., 2010; Hollmeyer et al., 2009).

The study of factors associated with the decision to receive a vaccine among HCWs is vital, especially in an era when mandatory vaccination of HCW becomes common in many countries (Maltezou and Poland, 2014). It is essential to learn other options of engaging HCWs into getting voluntary vaccinations rather forcing them to get vaccinated, a practice that may be still controversial.

Despite the fact that the RNs participating in the current study came from different hospital settings, they can only represent actively working nurses who attend university education programs. The convenience sample is limiting the ability to generalise the findings.

An additional limitation is the small sample size, which does not allow testing multivariable structural equation models, such as path analysis, in order to examine the relationship patterns among the factors constructing the TPB model and their predictability of vaccination intention among RNs. It is desirable to explore the issue on the basis of a wider sample, in order to improve generalisability of conclusions arising from the study.

Furthermore, construct and content validity need to be further evaluated. Some items were excluded based on the results of Cronbach's alpha reliability testing. Thus, some of the constructs contained only one item. The use of one item to predict behaviour is problematic and should be reassessed. One-item construct hindered our ability to conduct a factor analysis for determination of a strong construct

Table 3. Descriptive for the constructs of the theory of planned behaviour with inter-correlations* among variables (n = 60).

Variable	1	2	3	4	5	6	7	Mean $\pm$ SD [†]
Intention (1)	-	0.74 [‡]	0.16	-0.17	0.63 [‡]	0.12	0.64 [‡]	4.34 $\pm$ 2.22
Attitude (2)		-	-0.02	-0.65	0.67 [‡]	0.00	0.60 [‡]	4.97 $\pm$ 1.72
Subjective norm (3)			-	-1.10	0.13	0.08	0.10	3.85 $\pm$ 1.83
PBC (4)				-	-0.16	-0.25	-0.07	5.40 $\pm$ 1.87
Behavioural beliefs (5)					-	-0.05	0.48 [‡]	4.61 $\pm$ 1.58
Normative beliefs (6)						-	0.14	3.20 $\pm$ 1.72
Control beliefs (7)							-	4.59 $\pm$ 1.20

*The Pearson Correlation coefficient test was used.

[†]Mean and standard deviation on a 7-point Likert scale

[‡]Correlation is significant at $P < 0.001$ (two-tailed).

PBC, perceived behavioural control.

Table 4. Multiple regression analysis of theory of planned behaviour variables (attitudes, subjective norm and PBC; step 1); behavioural beliefs, normative beliefs and control beliefs (step 2); and the final full structural model – all factors comprising the TPB model (step 3) (n = 60) on intentions to vaccinate against seasonal influenza next year.

Variable	B	B	t	R	R ²	Sig
<i>Step 1 – Constant: Intentions</i>						
Attitude	0.937	0.726	8.325	0.763	0.582	0.000*
Subjective norm	0.189	0.155	1.767			0.083
PBC	−0.149	−0.124	−1.413			0.163
<i>Step 2 – Constant: Attitude</i>						
Behavioural beliefs	0.540	0.495	4.820	0.74	0.547	0.000*
Normative beliefs	−0.038	−0.038	−0.413			0.681
Control beliefs	0.524	0.366	3.514			0.001*
<i>Step 3 – Constant: Intentions</i>						
Attitude	0.569	0.441	3.643			0.001*
Subjective norm	0.105	0.086	1.027			0.309
PBC	−0.105	−0.088	−1.030			0.308
Behavioural beliefs	0.264	0.189	1.666	0.081	0.0662	0.102
Normative beliefs	0.0072	0.056	0.659			0.513
Control beliefs	0.0511	0.0277	2.685			0.010†

* $P \leq 0.001$.

† $P \leq 0.01$.

PBC, perceived behavioural control.

Figure 2. Structural model: the contribution of the significant constructs of the TPB model to prediction of RNs' SIV intention according to multiple regression analysis. SIV, seasonal influenza vaccination.

** = p value

validity of the research tool. Therefore, the construct validation is limited and needs to be further developed.

The results of this study offer some support for the TPB as a theoretical model to explain SIV uptake and suggest

that vaccine acceptance among RNs can be partially explained using supported social-psychological theory. Although the current study did not assess actual influenza vaccinations, the findings have important implications for future SIV interventions with RNs. Our results suggest that future influenza vaccine campaigns should target RNs' attitudes and beliefs regarding SIV. Interventions should thus target changing beliefs and building positive attitudes, in addition to general knowledge dissemination and availability of the SIV. HCWs need to believe in the efficacy and safety of the SIV, so they will be able to develop a positive attitude toward the vaccine. This, in turn, will evolve into an intention to get SIV.

Certain limitations need to be mentioned. First, specific groups were targeted (e.g. nurses). This particular sample cannot be extrapolated to other HCWs who have unique characteristics, compared to other professional sectors. The generalisability of the results of this study to different institutions or sites, in which HCWs are employed, is also limited by this study's participants, since the data collection was confined to the RNs getting their Master's in Nursing degree or completing their Bachelor of Nursing degree at the Department of Nursing, Ben-Gurion University of the Negev. The samples of this study cannot be said to reflect the entire nursing population in Israel. It may be instructive to obtain data by administering similar surveys to other types of HCW and to those employed in other settings.

Another factor limiting the generalisability of our results is that the researchers used a convenience sample to recruit participants; therefore, selection bias is a concern. It is possible that those who participated had different views about SIV than those who did not participate. The third limitation concerns the small sample size, which does not allow testing multivariable structural equation models, such as path analysis, in order to examine the relationship patterns among the factors constructing the TPB model and their predictability of vaccination intention among RNs. It is desirable to explore the issue on the basis of a wider sample, in order to improve generalisability of conclusions arising from the study.

Additionally, the survey relied on self-reported data, and it is possible that respondents gave socially desirable responses or did not accurately recall information. The fifth limitation concerns its cross-sectional design, in which baseline attitudes/beliefs and vaccination intentions were assessed at the same time point. Furthermore, data collected from cross-sectional study represent only a small fraction of the target population at a fixed time. This type of design does not allow an examination of the change patterns in health-related behaviour among HCWs such as vaccination intentions, attitudes, perceptions and beliefs for over time or for a certain period, over the years. Another limitation that has to be discussed is the unassessed relation between intentions and actual behaviour. In the present study, we did not include actual behaviour into our analyses, but rather focused on the antecedents.

The results of the current study indicate that the TPB may explain, at least partially, the intentions of RNs to receive SIV and illustrates the importance of beliefs and attitudes to health-related behaviours. It may direct us to seek interventions focusing on strengthening beliefs and attitudes to achieve higher intention levels to get vaccinated and thus affect the desired behaviours.

Findings of the present study present a complex of various factors—cognitive, affective and emotional—that affects the intention of nurses to receive SIV and reveals insights regarding the factors affecting the RNs' decision-making of SIV implementation. These factors serve as a basis for establishment of intervention programs directed to SIV culture improvement among HCWs, both as a means of empowering and promoting patients' health.

Since the process of creating behavioural change is based on different layers, it is important to direct the resources of the health system as in Israel as internationally to the construction of programs that are intended to change the perception of HCWs regarding seasonal influenza prevention. In addition, imparting empirical knowledge about the efficacy and safety of the influenza vaccine as a means of ensuring the health of patients who come in contact with healthcare professionals, constitutes an important element in the conceptual framework for change implementation in the health system worldwide.

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References

- Ajzen I. (1991) The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50: 179–211.

- Ajzen I. (2002) Perceived behavioral control, self-efficacy, locus of control and the Theory of Planned Behavior. *Journal of Applied Social Psychology* 32: 665–683.
- Ajzen I. (2006) Theory of Planned Behavior Diagram. Available at: <http://people.umass.edu/ajzen/tpb.diag.html> (accessed 2 April 2018).
- Ajzen I and Madden TJ. (1986) Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology* 22: 453–474.
- Bish A, Yardley L, Nicoll A and Michie S. (2011) Factors associated with uptake of vaccination against pandemic influenza: A systematic review. *Vaccine* 29: 6472–6484.
- Black CL, Yue X, Ball SW, Donahue SM, Izrael D, de Perio MA, Laney AS, Williams WW, Lindley MC, Graitcer SB, Lu PJ, Bridges CB, DiSogra C, Sokolowski J, Walker DK and Greby SM. (2015) Influenza vaccination coverage among health care personnel-United States, 2014–15 Influenza season. *Morbidity and Mortality Weekly Report* 64: 993–999.
- Blasi F, Aliberti S, Mantero M and Centanni S. (2012) Compliance with anti- H1N1 vaccine among healthcare workers and general population. *Clinical Microbiology and Infection* 18: 37–41.
- Centers for Disease Control and Prevention. (2011) *Immunization of health-care personnel: Recommendations of the Advisory Committee on immunization practices (ACIP)*. Atlanta, GA: CDC. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/rr6007a1.htm.
- Corace K, Prematunge C, McCarthy A, Nair RC, Roth V, Hayes T, Suh KN, Balfour L and Garber G. (2013) Predicting influenza vaccination uptake among health care workers: What are the key motivators? *American Journal of Infection Control* 41: 679–684.
- Doll J and Ajzen I. (1992) Accessibility and stability of prediction in the theory of planned behavior. *Journal of Personality and Social Psychology* 63: 754–765.
- Fishbein M and Ajzen I (2010) *Predicting and changing behavior: The reasoned action approach*. New York, NY: Taylor & Francis.
- Fisher W, Kohut T, Salisbury CM and Salvadori MI. (2013) Understanding human papillomavirus vaccination intentions: comparative utility of the theory of reasoned action and the theory of planned behavior in vaccine target age women and men. *Journal of Sexual Medicine* 10: 2455–2464.
- Gerend M and Shepherd JE. (2012) Predicting human papillomavirus vaccine uptake in young adult women: comparing the health belief model and theory of planned behavior. *Annals of Behavioral Medicine* 44: 171–180.
- Godin G, Vezina-Im LA and Naccache H. (2010). Determinants of influenza vaccination among healthcare workers. *Infection Control and Hospital Epidemiology* 31: 689–693.
- Hakim H, Gaur AH and McCullers JA. (2011). Motivating factors for high rates of influenza vaccination among healthcare workers. *Vaccine* 29: 5963–5969.
- Hollmeyer H, Hayden F, Poland G and Buchholz U. (2009). Influenza vaccination of health care workers in hospitals – A review of studies on attitudes and predictors. *Vaccine* 27: 3935–3944.
- Israel Ministry of Health. (2011) *Vaccination of Health Care Workers*. Available at: www.health.gov.il/hozer/mk28_2011.pdf [in Hebrew].
- Maltezos HC and Poland GA. (2014) Vaccination policies for healthcare workers in Europe. *Vaccine* 32: 4876–4880.
- Music T. (2012) Protecting patients, protecting healthcare workers: a review of the role of influenza vaccination. *International Nursing Review* 59: 161–167.
- Nativ T, Paz A, Peterfreund I. and Potasman I. (2010) Influence of knowledge and attitude on the uptake of influenza vaccine by healthcare workers. *Harefuah* 149: 626–629 [in Hebrew].
- Polgreen P, Septimus EJ, Parry MF, Beekmann SE, Cavanaugh JE, Srinivasan A and Talbot TR. (2008) Relationship of influenza vaccination declination statements and influenza vaccination health workers in 22 US hospitals. *Infection Control and Hospital Epidemiology* 29: 675–677.
- Prematunge C, Corace K, McCarthy A, Nair RC, Pugsley R and Garber G. (2012) Factors influencing pandemic influenza vaccination of healthcare workers – A systematic review. *Vaccine* 30: 4733–4743.
- Werner P. (2003) The theory of reasoned action and the theory of planned behavior: Conceptual, methodological and application issues. In: Bredow T (ed.) *Middle-Range Theories in Nursing Research*. Philadelphia, PA: Lippincott Williams & Wilkins, pp. 125–147.