University Students Immunized and not Immunized for Measles

A Comparison of Beliefs, Attitudes, and Perceived Barriers and Benefits

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ABSTRACT

Objective: To compare students who were immunized or not immunized during the 1997 Simon Fraser University measles outbreak in British Columbia.

Methods: Descriptive comparative study using the Health Belief Model as a theoretical framework. A self-administered questionnaire was mailed to a stratified random sample of 400 immunized and 400 non-immunized SFU students.

Results: Perceived susceptibility, severity, barriers, cues to action, threat and student age were significantly related to being immunized. Logistic regression analysis achieved an overall correct prediction rate of 84.7% by including the contribution of the four variables of susceptibility, barriers, cues to action, and health motivation. Content analysis of the non-immunized students' descriptions of what it would have taken for them to be immunized indicated the influence of these four variables.

Discussion: The Immunization Health Belief Model Scale is a valuable tool for ascertaining attitudes and beliefs relating to immunization decision-making. Interventions targeted to significant beliefs may increase immunization coverage levels and result in improved disease prevention.

La traduction du résumé se trouve à la fin de l'article.

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In 1997, a measles outbreak began among students attending Simon Fraser University (SFU) in British Columbia (BC). Measles vaccine was offered to all SFU students, faculty and staff. Immunization clinic times and locations were widely advertised through posters, the campus radio station, and the university newsletter. Informed consent to be immunized was obtained from vaccine recipients, including informing them of the contraindications and non-indications for vaccine receipt. The 20% of the targeted population who were not immunized presented a public health concern as they remained potentially susceptible to a highly contagious, serious disease. The majority of students were susceptible as they had received only one previous dose of measles vaccine and two doses of vaccine are required for immunity.[1]

There is a paucity of research related to the immunization-seeking behaviours of the university-aged segment of our population, and specifically in response to a disease outbreak. Research has primarily examined immunization decision-making of health care workers as they pertain to the receipt of hepatitis B and influenza vaccines,[2,3] the elderly and pneumococcal and influenza vaccines,[4,5] and parents of children receiving the routine childhood immunization series.[6,7] Ascertainment of the beliefs related to immunization decision-making of this university-aged cohort would inform public health providers and enable the design of evidence-based immunization and education strategies for future outbreak events.

A good deal of the knowledge regarding the factors influencing immunization decision-making has been obtained from studies using the theoretical framework of the Health Belief Model (HBM). According to the HBM,[8-10] deciding to undertake a health-seeking behaviour will not take place unless a person is psychologically ready to take action relative to the particular threat. Readiness is influenced by the extent to which a person feels susceptible; regards the condition as having potentially serious consequences; believes the actions will reduce susceptibility to or severity of the condition should it occur; and believes that benefits outweigh the anticipated barriers (or cost) of taking action.[8-10] In addition, cues to action (e.g., mass media, advice from others, illness in others),

demographic, sociopsychological variables (e.g., personality, social class, peer and reference-group pressure, health motivation, confidence), and structural variables act as modifying factors that affect perception and indirectly influence a person's tendency to act.[8-10] Research with health care workers, the elderly, and with parents of small children about immunization decision-making and follow-up suggests the importance of perceived disease severity, personal susceptibility, cues to action, and barriers related to inconvenience of being immunized, vaccine cost, safety and side effects in decision-making.[2-7,11-17] This study was intended to determine the variables influencing immunization-seeking behaviours of university students. The purpose of this study was therefore: a) to compare immunized and non-immunized students in terms of age, perceived personal measles susceptibility, measles severity, benefits and barriers to immunization, cues to action, health motivation, confidence, knowledge of measles, prior measles contact, and perceived threat, and b) to describe what it would have taken for non-immunized students to be immunized.

METHODS

A descriptive comparative design was used. The theoretical framework of the HBM was used to guide the comparison for differences between students who were immunized and those not immunized during the measles outbreak. Following ethics approval from SFU and the University of British Columbia, SFU released a copy of its computerized student database to the BC Centre for Disease Control. Questionnaires were mailed to a random sample of 400 immunized and 400 non-immunized students obtained from the database. The sample was only stratified for receipt of immunization and was not stratified for age, as age was one of the variables to be compared for the two groups of students. A final sample size of 400 students was based on a power analysis given an expected return rate of 50%; an anticipated population proportion of 0.95 for immunized students and 0.10 for non-immunized students; and a confidence level of 95%.[18] Student anonymity was preserved in the mailout procedures. The self-administered questionnaire included the 44-item Immunization Health Belief Model Scale (IHBMS) developed by the investigator based on Champion's Breast Self Examination-Related Health Belief Model Scales,[19] demographic questions, and an open-ended question asking non-immunized students what it would have taken for them to be immunized. Evidence for Champion's scale was satisfactory for content validity, construct validity, predictive validity, internal consistency reliability and test-retest reliability.[19] The IHBMS measured perceived susceptibility, severity, threat, benefits, barriers, cues to action, health motivation, confidence, knowledge of measles, and prior contact with measles. The Cronbach alpha coefficient for the total IHBMS was 0.63 and ranged from 0.49 to 0.66 for its subscales, thereby reflecting moderate internal consistency, although an additional two-item subscale about knowledge of measles had an alpha of only 0.004.

RESULTS

Of the 800 questionnaires mailed, after one reminder letter, 244 questionnaires were returned from students (33.5%): 175 from immunized students (71.7%) and 69 from non-immunized students (28.3%) (30 were returned as undeliverable and 42 were sent to faculty/staff who had inadvertently been included in the student database). Table I summarizes the demographic information and measles immunization status of the sample and specifies the SFU student population demographics close to the time of the measles outbreak.[20] Comparison of the sample's demographics to those of the SFU student population determined that the sample was representative of the SFU student population for age, gender, and faculty of study. Table II includes the mean and standard deviation of the variables and differences based on immunization status. A lower overall mean for a variable indicates more agreement with the questionnaire statement and reflects a greater perceived level or influence of the variable.

Six variables were significantly related to being immunized: perceived susceptibility, perceived severity, perceived barriers, cues to action, threat, and age. Backward stepwise logistic regression was done to determine the probability that students made the decision to be immunized based on age and each of the 10 variables of the Immunization Health Belief Model Scale (see Table III). The best logistic regression model included perceived susceptibility, perceived barriers, cues to action, and health motivation. While health motivation was not significant on its own, it added to the prediction. An overall correct prediction rate of 84.7% was achieved in the logistic regression analysis by including the extra information from these four variables.

In terms of what it would have taken for non-immunized students to be immunized, content analysis was done on the 79 responses received from 66 of the 69 students who were not immunized. The majority of responses related to the perception of little or no risk or need to be immunized (67%). Of the remaining responses, 11% related to a perceived lack of accessibility to the immunization clinics; 10% to a need for more information, awareness, or direction; 5% to misconceptions about vaccines and immunization; 4% to aspects about the immunization clinic environment; and 3% to immunization being contraindicated due to pregnancy.

Related to the perception of little or no risk or need, 28% indicated they felt no need because they were not on campus much. Another 21% (17 students) had received a measles vaccine booster the previous year or had received a second dose prior to Grade 12 and therefore saw no need. Another 15% had measles as a child or had prior contact with measles without contracting it and believed they had immunity. Others said they were too old to be at risk (13%). Several others (11%) said they would need to feel a greater risk for getting measles to be immunized. Comments about accessibility of clinics indicated that more clinics needed to have been offered with longer hours and at more convenient locations and times. In terms of needing more information, students said that more publicity about the program was needed and they wanted health professionals to tell them that they should be immunized and why. They wanted more information about measles and its seriousness. Several students had serious misconceptions about vaccines and immunization such as, "The side effects of

TABLE I

Characteristics of Sample

Demographic	Frequency (%)	Immunized		Characteristics of SFU Student Body (Oct/97)
		Yes Frequency (%)	No Frequency (%)	
Age (years)	n=243	n=174	n=69	
18-27	175 (72)	137 (79)	38 (55)	
28-37	40 (16)	25 (14)	15 (22)	
38-47	19 (8)	9 (5)	10 (14)	
48-57	7 (3)	2 (1)	5 (7)	
58-74	2 (1)	1 (1)	1 (1)	
Means (SD)				
Overall: 26.7 years (8.72)				
Undergrad: 24.9 years (7.5)				23.7 years
Graduate: 34.7 years (8.9)				33.6 years
Level of Study:	n=239	n=171	n=68	
Undergraduate program	198 (83)	148 (87)	50 (74)	90%
Graduate program	41 (17)	23 (13)	18 (26)	10%
Gender	n=243	n=174	n=69	
Female	148 (61)	108 (62)	40 (58)	56%
Male	95 (39)	66 (38)	29 (42)	44%
Ethnicity	n=244	n=175	n=69	
Caucasian	161 (66)	110 (63)	51 (74)	Information
Oriental	60 (25)	46 (26)	14 (20)	not collected
Indo-Canadian	7 (3)	7 (4)	0 (0)	by SFU
Other	11 (5)	7 (4)	4 (6)	
Unspecified	5 (2)	5 (3)	0 (0)	
Faculty	n=244	n=175	n=69	
Applied Science	40 (16)	29 (17)	11 (16)	17%
Arts	99 (41)	70 (40)	29 (42)	43%
Business	30 (12)	27 (15)	3 (4)	16%
Education	24 (10)	15 (9)	9 (13)	9%
Science	42 (17)	28 (16)	14 (20)	14%
Other	2 (1)	1 (1)	1 (1)	Not applicable
Unspecified	7 (3)	5 (3)	2 (3)	Not applicable

TABLE II

Whether Students Differed by Immunization Status

Variable	Overall Mean (SD)	Immunized Mean (SD)	Not Immunized Mean (SD)	t-test	p-value
Susceptibility	3.71 (0.70)	3.60 (0.69)	4.00 (0.68)	4.04	0.000*
Severity	2.25 (0.63)	2.19 (0.61)	2.40 (0.67)	2.35	0.020*
Benefits	2.02 (0.73)	1.96 (0.66)	2.16 (0.87)	1.89	0.060
Barriers	3.98 (0.48)	4.04 (0.46)	3.83 (0.50)	-3.11	0.002*
Cues to Action	3.06 (0.78)	2.87 (0.66)	3.54 (0.86)	6.57	0.000*
Motivation	2.22 (0.58)	2.26 (0.59)	2.12 (0.54)	-1.64	0.100
Confidence	1.71 (0.67)	1.69 (0.69)	1.74 (0.63)	0.55	0.580
Knowledge	2.50 (0.65)	2.46 (0.66)	2.62 (0.62)	1.79	0.070
Prior Contact	3.00 (1.46)	3.05 (1.44)	2.90 (1.52)	-0.71	0.480
Threat	2.91 (1.32)	2.72 (1.28)	3.38 (1.32)	3.57	0.000*
Age	26.70 (8.72)	25.81 (9.28)	30.10 (10.7)	3.10	0.002*

* p=0.00

TABLE III

Logistic Regression of Variables on Student Immunization Status

Variables in the Equation

Variable	B	S.E.	Wald	df	Sig	R	Exp (B)
Susceptibility	-0.62	0.28	4.92	1	0.03	-0.10	0.54
Barriers	0.98	0.37	6.86	1	0.01	0.13	2.66
Cues to Action	-1.12	0.25	20.49	1	0.00	-0.26	0.33
Health Motivation	0.51	0.30	2.98	1	0.08	0.06	1.67
Constant	1.88	1.89	0.98	1	0.32		

Variables Not in the Equation

Variable	Score	df	Sig	R
Severity	0.33	1	0.57	0
Benefits	0.06	1	0.81	0
Confidence	0.25	1	0.62	0
Knowledge	0.60	1	0.44	0
Prior Contact	0.98	1	0.32	0
Threat	1.45	1	0.23	0
Age	0.48	1	0.49	0

the vaccine are more serious than the disease," and "It would be better to get immunity naturally by getting the disease." Concerns that related to immunization clinic environment included the need for shorter lines, for more privacy while being immunized and for "friendlier and more informative clinic staff."

DISCUSSION

Students were more likely to be immunized if they believed they were highly susceptible to contracting measles; that there were few barriers to being immunized; that certain cues to action influenced whether they were immunized; and that their good health was very important. Although immunized students perceived greater susceptibility than those not immunized, the majority of students perceived low measles susceptibility. Non-immunized students perceived more barriers to getting vaccinated. Immunized students perceived more cues to action. In the midst of the SFU measles outbreak and the widely broadcast information about the risks of measles disease, approximately 10% of the non-immunized students indicated a need for even more information. This finding may reflect a characteristic of a university student population that is accustomed to obtaining and synthesizing information in a very comprehensive manner. At least half of each group indicated a high level of motivation to maintain good health. Only a slightly greater percentage of the non-immunized than immunized students had high motivation. This may have been related to the 17 non-immunized students having been immunized the previous year. These 17 students were already fully immunized, and were correct in their understanding of no need for further measles immunization. This knowledge would have been obtained during the process of informed consent. It was not possible to extract this subset of 17 fully immunized students from the non-immunized group, as the questionnaires were not coded. This poses a limitation to the study as the students' perceptions of personal susceptibility, disease severity, benefits, and threat may have been influenced by the fact that they were already protected against measles.

The response rate of 33.5% resulted in a lower than desired sample size based on

power analysis, but represents a usual response rate for mailed questionnaires without personal contact.[18] A selection bias could have been introduced if students who did not complete a questionnaire were different from those who did and if the differences were related to the decision to be immunized. As the mailed questionnaires were not coded prior to mailing, it was not possible to examine the demographics of the students who did not return a completed questionnaire. Less bias is likely, however, because the sample demographics were representative of the student population. Due to the smaller sample size, the power dropped by approximately 30%. This limits the generalizability of the study findings.

As the data were collected retrospectively, history and maturation effects may have influenced the internal validity of the study. The retrospective method of data collection also presented a limitation to the study findings in that attitudes and beliefs about measles disease may have differed before, during, and after the measles outbreak.

The design of the Immunization Health Belief Model Scale also presented a limitation to the study findings. According to Kerlinger, the variables comprising data collection instruments should be measured by at least three items to provide proper resolution of dimensionality of the measured variables.[21] Three variables of the Immunization Health Belief Model Scale were not measured in accordance with that criterion: knowledge of measles, prior contact with measles, and perceived threat.

CONCLUSIONS

This study provides needed information about the determinants of university student immunization decision-making and demonstrates the utility of the Immunization Health Belief Model in providing a framework to understand these determinants.

Education of health care providers about ways to influence the immunization decision-making process can have a major impact on maintaining and increasing vaccine coverage levels. Given concerns that a growing number of people are opposed to immunization, the application of this information to immunization program planning is imperative to the continued success of immunization programs. It behooves health professionals to use new knowledge to improve immunization coverage and thereby provide greater protection against vaccine-preventable diseases.

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RÉSUMÉ

Objectif : Comparer les données d'étudiants vaccinés et non vaccinés durant l'éclosion de rougeole à la Simon Fraser University (Colombie-Britannique) en 1997.

Méthode : Étude descriptive comparative prenant pour cadre théorique le modèle de croyance à la santé. Un questionnaire à remplir soi-même a été posté à un échantillon aléatoire stratifié de 400 étudiants vaccinés et de 400 étudiants non vaccinés de la SFU.

Résultats : La prédisposition subjective, la gravité, les obstacles, les facteurs poussant à l'action, la menace et l'âge de l'étudiant(e) présentaient des liens significatifs avec le fait d'être vacciné. Par analyse de régression logistique, nous avons obtenu un taux de prédictions exactes de 84,7 % dans l'ensemble, en incluant l'action de quatre variables : la prédisposition, les obstacles, les facteurs poussant à l'action et la motivation liée à la santé. L'analyse du contenu des descriptions des étudiants non vaccinés sur ce qu'il aurait fallu pour les convaincre de se faire vacciner confirme l'influence de ces quatre variables.

Discussion : L'échelle fondée sur le modèle de croyance à la santé est un outil précieux pour établir avec précision les attitudes et les convictions liées à la décision de se faire vacciner ou non. Les interventions axées sur les convictions ancrées pourraient accroître les niveaux de couverture vaccinale et améliorer la prévention des maladies.