Commentary

Sociodemographic Factors Influencing the Effectiveness of Public Health Education – A Comparison of Two Studies in Singapore

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Abstract

Introduction: We aimed to evaluate if sociodemographic factors influenced the effectiveness of public education programmes in Singapore. Materials and Methods: Data were extracted from 2 independent cross-sectional studies that assessed the effectiveness of diabetes and HIV/AIDS public health education programmes. The influence of sociodemographic factors including age, gender, ethnicity and years of education on diabetes and HIV/AIDS knowledge scores (surrogate marker for programme effectiveness) were assessed using separate univariable and multiple linear regression models for each outcome variable. Results: A total of 1321 subjects [46% male, mean (SD) age: 33.9 (13.44) years] participated in the diabetes study while 400 subjects [44% male, mean (SD) age: 33.9 (13.44) years] participated in the HIV/AIDS study. In univariable analyses, age, years of education and ethnicity influenced both diabetes and HIV/AIDS knowledge scores. However, in multiple linear regression analyses, only age and years of education influenced both diabetes and HIV/AIDS knowledge scores. Conclusion: We found that age and years of education influenced the effectiveness of public health education, suggesting that there is a need to tailor public health education programmes to meet the needs of younger subjects and those with fewer years of education. That knowledge scores were similar between male and female subjects was surprising but could potentially be explained by equal access to information, high availability of information technology and heightened awareness of HIV/AIDS in Singapore.

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Introduction

Public health education is a cornerstone in the primary prevention of chronic diseases. In the United States, for example, studies have shown that cardiovascular public health education contributed to increased hypertension detection and control as well as a decline in smoking, thus contributing significantly to the major reduction in heart disease and stroke mortality in the United States.[1,2] It is clear that the effectiveness of public health education depends largely on the extent to which it results in actual behavioural changes, such as participating in screening programmes, adopting an active lifestyle, adhering to medications, etc.

Behavioural changes may be explained at the individual level (e.g., health belief model, transtheoretical model, theory of reasoned action/planned behaviour, etc) or social levels (ecological approach).[1] At the individual level, sociodemographic characteristics may influence behavioural changes. For example, studies have shown that gender, family structure, ethnicity, knowledge, and attitudes are primary factors related to adolescents' health behaviours.[3] These factors were also found to be important in studies among adults.[4-6] Therefore, a thorough understanding of factors influencing the effectiveness of public health education efforts is important towards developing relevant health education programmes. With the knowledge, health educators could tailor and design programmes accordingly. However, to the best of our knowledge, there have been no similar studies in an Asian context. Hence, the purpose of this paper was to evaluate factors influencing the effectiveness of public education

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programmes in Singapore. We compared data from 2 studies to determine if the findings could be generalised across studies.

Materials and Methods

Data were extracted from 2 independent cross-sectional studies that assessed the effectiveness of existing public health education programmes in diabetes (Diabetes Knowledge Survey, DKS) and HIV/AIDS (HIV/AIDS Knowledge Survey, HKS). Details of the studies have been published elsewhere.[7,8] Briefly, the DKS was a cross-sectional study to evaluate the level of diabetes knowledge (as a surrogate outcome measure of the effectiveness of public health education) using a Diabetes Knowledge Test administered to members of the public who were the age of 16 years and above and spoke English, Chinese, Malay or Tamil.[8] The subjects were randomly selected by tossing a coin. The Diabetes Knowledge Test is a structured questionnaire (developed for the purpose of this study with Chinese, Malay and Tamil versions being translated from the source English version using standard forward-back translation procedure) comprising of 41 items, where subjects answered "True", "False", and "Don't know" to a series of statements regarding various aspects of diabetes, including general knowledge, risk factors, symptoms and complications, monitoring, treatment and management of diabetes. A point was awarded for each correct response and zero for wrong or unsure responses. The maximum total score was 41. The scores were re-scaled to a scale of 0 to 100. Data on age, gender, ethnicity and years of education (based on highest educational level attained) were also captured. Age was captured as a categorical variable but was recoded to pseudo-continuous variable using the midpoint of each category.

The HKS was a cross-sectional study performed over 2 weeks to evaluate the level of HIV/AIDS knowledge (as a surrogate outcome measure of the effectiveness of public health education) using a HIV/AIDS Knowledge Test among students aged 13 to 19 years who spoke English, Chinese, Malay or Tamil.[7] The subjects were selected at random from various secondary schools, junior colleges, Institutes of Technical Education, the National University of Singapore, Nanyang Technological University, and other public areas. The HKS is a structured questionnaire (developed for the purpose of this study with Chinese, Malay and Tamil versions being translated from the source English version using standard forward-back translation procedure) comprising 31 items, where subjects answered "True", "False", and "Don't know" to a series of statements regarding General Knowledge of HIV/AIDS and AIDS Awareness Programmes evaluation. A point was awarded for each correct response and zero for wrong or unsure responses. The maximum total score was 31. The scores were re-scaled to a scale of 0 to 100. Data on age, gender, ethnicity and years of education (based on highest educational level attained) were also captured.

All results were expressed as mean (standard deviation) unless otherwise specified. The influence of socio-demographic factors including age, gender, ethnicity and years of education on DKS and HKS scores were assessed

Table 1. Description of Subject Characteristics

	Diabetes Knowledge Survey (n = 1321)		HIV/AIDS Knowledge Survey (n=400)	
	n (%)	% Mean Score (SD)	n (%)	% Mean Score (SD)
Gender				
Male	605 (45.8)	66.8 (19.91)	167 (43.9)	76.4 (16.81)
Female	716 (54.2)	65.3 (20.20)	213 (56.1)	78.6 (14.43)
Education				
None	43 (3.3)	67.1 (20.40) *	14 (3.5)	78.3 (16.13) *
Primary	111 (8.4)	66.8 (18.72)	237 (59.3)	72.0 (16.86)
Secondary	467 (35.5)	65.1 (20.05)	128 (32.0)	87.4 (7.56)
Tertiary and above	694 (52.8)	66.4 (19.68)	21 (5.2)	77.3 (10.58)
Ethnicity				
Chinese	1119 (85.0)	65.8 (19.99) *	364 (91.9)	78.1 (15.58) *
Malay	89 (6.8)	70.7 (19.77)	13 (3.3)	69.2 (15.67)
Indian	89 (6.8)	68.1 (18.55)	10 (2.5)	76.8 (16.78)
Other	20 (1.5)	60.6 (26.66)	9 (2.3)	69.5 (14.70)

SD: standard deviation

* Differences in knowledge scores among subgroups were statistically significant at $P < 0.05$, univariable linear regression.

Table 2. Univariable Analyses of Sociodemographic Factors on Diabetes (DKS) and HIV/AIDS (HKS) Knowledge Scores

	Regression coefficients			
	DKS	***P* value**	**HKS**	***P* value**
Age per year	0.085	0.038	3.1	<0.001
Female	1.6	0.157	2.1	0.52
Education per year	1.02	<0.001	3.9	<0.001
Ethnicity				
Chinese	0		0	
Malay	4.9	0.026	-8.9	0.045
Indian	2.4	0.27	-1.3	0.79
Other	-5.1	0.254	n.a.	

n.a.: not applicable

using separate univariable and multiple linear regression models for each outcome variable. Only those factors found to be statistically significant (P <0.05) were entered into the multiple linear regression models. All statistical tests were performed using STATA v8 software (College Station, TX: StataCorp LP).

Results

Subjects

A total of 1321 subjects [mean (SD) age: 33.9 (13.44) years] participated in the DKS while 400 subjects [mean (SD) age 15.9 (1.73) years] participated in the HKS. Details of subject characteristics are given in Table 1.

In univariable analyses of the DKS, age, years of education and ethnicity were significantly associated with diabetes knowledge (Table 2). In general, diabetes knowledge increases with age and years of education. Compared to Chinese, Malays and Indians had better diabetes knowledge. However, subjects of other ethnicities had poorer diabetes knowledge.

In univariable analyses of the HKS, age, years of education and ethnicity were significantly associated with HIV/AIDS knowledge (Table 2). In general, HIV/AIDS knowledge increases with age and years of education. Compared to Chinese, Malays and Indians had poorer HIV/AIDS knowledge.

In the DKS, multiple linear regression analysis (Table 3) was performed with age, years of education and ethnicity (factors with P <0.05 in univariable analyses). All 3 factors remained statistically significant in multiple linear regression analysis.

In the HKS, multiple linear regression (Table 3) was performed with age, years of education and ethnicity (factors with P <0.05 in univariable analyses). Age and years of education remained statistically significant.

Discussion

In this study, we used data from 2 independent studies (whose aims were to evaluate the effectiveness of public diabetes and HIV/AIDS health education, respectively) and assessed if sociodemographic factors influenced the effectiveness of each programme. We found that in univariable analyses, age, years of education and ethnicity influenced both diabetes and HIV/AIDS knowledge scores (a surrogate outcome measure of programme effectiveness). However, in multiple linear regression analyses, only age and years of education influenced both diabetes and HIV/AIDS knowledge scores.

Interestingly, both diabetes and HIV/AIDS knowledge were found to increase with age and years of education, thus suggesting that modification of existing public health education programmes may be required to improve the knowledge of younger subjects and those with fewer years of education. That younger subjects had poorer disease knowledge was surprising and required further investigations. This observation could suggest that younger subjects were less interested in health issues. At the same time, it was also interesting to note that compared to

Table 3. Multiple Linear Regression of Sociodemographic Factors on Diabetes (DKS) and HIV/AIDS (HKS) Knowledge Scores

	Regression coefficients (95% confidence interval)			
	DKS	***P* value**	**HKS**	***P* value**
Age per year	0.25 (0.16, 0.35)	<0.001	2.2 (0.87, 3.23)	<0.001
Education per year	1.7 (1.27, 2.21)	<0.001	1.8 (0.33, 3.44)	0.030
Ethnicity				
Chinese	0		0	
Malay	6.3 (1.99, 10.54)	0.004	-5.2 (-11.86, 6.62)	0.22
Indian	2.5 (-1.79, 6.75)	0.254	-2.8 (-19.3, 0.17)	0.55
Other	-7.1 (-15.82, 1.56)	0.108	na	

na: not applicable

Chinese, Malays and Indians had better diabetes knowledge but similar HIV/AIDS knowledge after adjusting for age and years of education. This suggests that different ethnic groups may have different educational needs. Incidentally, the prevalence of diabetes was highest among Indians (15.8%), followed by Malays (11.3%) and Chinese (8.0%)[9] while the prevalence of HIV/AIDS was highest among Chinese (83.7%), followed by Malays (8.5%) and Indians (4.6%).[10] This could partially explain the difference in knowledge among ethnic groups but confirmation is needed.

Several earlier published studies identified gender as a predictor of HIV/AIDS knowledge.[11-13] However, in our study, HIV/AIDS knowledge was not significantly different between male and female students. This appears counter-intuitive and suggests the need for further studies to confirm the findings. Nevertheless, the results are potentially encouraging in suggesting that male and female students in Singapore have equal access to information. Furthermore, most of the published studies were performed a decade before our current study. As there was an explosion in information technology over the recent decades as well as heightened awareness about the danger of HIV/AIDS, the knowledge gap between male and female students may have narrowed over the years.

That similar findings were made for 2 studies concerning different health topics (diabetes vs. HIV/AIDS), conducted in different settings (street versus school) and different populations (general population aged 16 years and above versus students aged 13 to 19 years) added robustness to this study. However, this study is not without its limitations. First, we acknowledge that disease knowledge is likely to represent only one of several possible measures of programme effectiveness (e.g., participation rate in health screening, disease prevalence, mortality). However, as information on other measures of programme effectiveness is not readily available, using knowledge as a surrogate marker represents a pragmatic compromise. In view of that, our findings need to be confirmed in the context of other measures of effectiveness when these become available. Second, the failure to observe statistically significant differences in scores may be due to the small sample size of some subgroups, e.g. ethnic minorities in the HKS study. Third, further studies are required as to whether our findings can be generalised to other Asian population. Nevertheless, our findings are useful in forming the design of future similar studies.

In conclusion, in evaluating the influence of socio-demographic factors on the effectiveness of public health education, we found that age and years of education influenced the effectiveness of public health education. Hence, there is a need to tailor public health education programmes to meet the needs of younger subjects and those with fewer years of education.

Public health educators should bear in mind the influence of age, education and ethnicity on the effectiveness of public health education and review the suitability of their programmes and materials for the various demographic strata of their target population. Programmes and materials may need to be tailored for specific subgroups so as to achieve the desired level of knowledge.

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