Identifying Variables to Incorporate in an Extended TPB Model with Regards to HIV Testing in Kinshasa, DR Congo

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ABSTRACT
The present study intended to identify environmental and socio-demographic factors that are predictive of acceptance of HIV testing in order to extend the Theory of Planned Behaviour model (TPB), which will better explain the health-related behaviour under investigation. Data analysed using multiple regression were obtained by means of a cross-sectional face-to-face questionnaire administered by trained interviewers. The study proceeded to a mixed two-stage stratified random, cluster random and quota sampling to sample the population of under investigation. It is clear from the findings that only the levels of education and knowledge about the meaning of HIV/AIDS are eligible to be incorporated alongside the traditional TPB components in order to improve the model. Although both level of education and level of knowledge are statistically significant predictors of acceptance of HIV testing, the first variable made the strongest contribution.

Introduction

Consumer behaviour theories point out environmental and psychological factors as key elements that influence people's decision-making (Blythe, 2013, p. 4). However, the literature review of an extensive health-related behaviour change shows that practitioners mostly focus only on psychological factors to explain what predicts people's behaviour, leaving aside the influences that may include socio-demographic characteristics and other environmental factors. Therefore, researches to identify non-psychological variables that impact on people's decisions to adopt or reject specific health-related behaviour become pertinent.

In almost all studies devoted to HIV/AIDS, the spotlight is focused on condom use and abstinence, while faithfulness and HIV testing are also expected

behaviours to enhance in order to eradicate the spread of the epidemic (Corno & De Walque, 2007). Thus, the present study focuses on HIV testing.

Literature review

Among the most widely used, such as the Health Belief Model (HBM), the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) and the Trans-Theoretical Model (TTM), as theoretical approaches to study and predictors of health-related behaviour change, it seems that the TPB and TTM appear to be the most extensively employed (Taylor, Bury, Campling, Carter, Garfied, Newbould and Rennie, 2006, p. 9). In the meanwhile, only TRA and TPB offer theoretical frameworks that allow them to be applied in the analysis of virtually all significant health behaviours and, to a lesser extent, in predictive investigations and the design of health interventions (Turchik, 2010, pp. 14-17). However, health-related behaviours are predicted with greater effect through using the TPB model whose predictive power exceeds that of the TRA, though it is infrequently used to inform behaviour change interventions (Robinson, Masser, White, Hyde and Terry, 2008, pp. 2559-2561).

TPB, to some extent, has proved to be limited in predicting health-related behaviours, hence the existence of numerous attempts to extend the TPB model by including additional variables (Heirman & Walrave, 2012, p. 615). Thus, socio-demographic and environmental influences such as age, education, marital status, sex, socio-economic status, exposure to HIV/AIDS information, knowledge about the meaning of HIV/AIDS, knowledge about the modes of HIV transmission, knowledge about HIV prevention methods and ease of obtaining condoms have been investigated in order to determine which among them are eligible to integrate a model that predicts people's HIV-testing behaviour alongside the three TPB traditional components. Indeed, the TPB approach needs to take into account three components: attitude, subjective norms and perceived control (Taylor et al., 2006).

Although the added variables should satisfy a number of conditions for the sake of parsimony and theoretical coherence, only the evidence for predicting intention and/or behaviour independently of existing components is relevant when the aim is to improve the predictive power of the theory, rather than to specify additional components of intention (Sutton, 2004, p. 112).

DR Congo's heath system, especially HIV/AIDS response, has been badly affected by a violent war that collapsed public services and exacerbated poverty which hindered progress against the epidemic (Ayikwa, De Jager and Van Rensburg, 2013, p. 183). The majority of nearly 71 million Congolese have never been tested for HIV, and only a small fraction of people receive HIV/AIDS services and treatment (ProVIC, 2012). Kinshasa, like all other areas of the country, is not exempt from the current poor access to HIV testing for the population and refusal of testing where it is available. This emphasises once more the vicious circle of HIV/AIDS disease, because access to ARVs could only be implemented when a person tested positive for HIV (Bhattacharya, 2012). Thus, HIV testing should be elementary, whether for the general population or for pregnant women in a quest to reduce the spread of the epidemic. Therefore, social marketing interventions which influence people to take the HIV test are crucial.

Objectives

The primary objective of the study is to identify the variables among the socio-demographic and environmental factors that explain significantly the acceptance of HIV testing in Kinshasa. More specifically, it looks at determining the positive relationship between socio-demographic and environmental variables (independent variables) investigated with regard to the acceptance of HIV testing (dependent variables), as well as weighting the contribution of significant independent variables in predicting the dependent variable.

Research Methodology

In the empirical part, the study made use of an exploratory research design that was quantitative in nature.

Participants and Sampling Procedures

The study focused on residents of Kinshasa who are established there for at least six months. Trained interviewers assisted in administering the questionnaires to people aged ≥18 years old selected randomly from different suburbs. It mixed a two-stage stratified random sampling method and quota sampling to sample the population under investigation. The first stage was stratified random sampling, which involved classification of the 24 Kinshasa's suburbs according to districts strata. The four districts of Kinshasa are as follows: Funa (7 suburbs), Lukunga (7 suburbs), Mont-Amba (5 suburbs) and Tshangu (5 suburbs). Then, the list of suburbs served as sampling frame. Suburbs were stratified according to their location in districts from which three suburbs were randomly selected. Bandalungwa, Barumbu, Gombe, Kasa-Vubu, Kimbanseke, Lemba, Limete, Matete, Masina, N'djili, Ngaliema, Ngiri-Ngiri and Selembao were the selected suburbs. The second stage was cluster random sampling, whereby streets of the house where to approach a participant were chosen at random from the list of all streets located within the limits of a suburb. Lastly, a quota of 30 respondents has been envisaged by suburb to constitute the sample.

Sample size

Findings that do not generalise to other samples are of little scientific value. Thus, the issue of generalisability that relates to the minimum number of participants needed is crucial for multiple regression. However, guidelines proposed by different authors concerning the number of participants do exist. Some authors suggest about 15 participants per predictor for a reliable equation, while others give a formula for calculating sample size (Protogerou & Turner-Cobb, 2011, p. 96). The present study considered Tabanick and Fidell's (2007, p. 123) method of defining sample size that suggests a minimum of fifty plus eight times the number of independent variables (n>50+8m; where m= number of exogenous variables). Hence, the study's 360 participants make its sample size adequate.

Data collection and Measures

Data were collected by means of a cross-sectional survey using anonymous and face-to-face questionnaires that borrowed an assistance-oriented approach to avoid any misunderstanding of the questions by respondents. The

questionnaires were based on surveys that were previously fielded and validated by Cha, Kim and Patrick (2008), as well as Cai, Ye, Shi, Xu, Shen, Ren and Huang (2013) in previous studies measuring similar variables investigated as this one. The participants were requested to answer a series of structured, closed-ended questions that measured their attitudes towards HIV-infected persons, ease of obtaining condoms, exposure to HIV/AIDS information and HIV/AIDS knowledge (three variables).

Acceptance of an HIV-testing Scale comprising four items was based on a five-point Likert scale (where 1 is "strongly agree" and 5 is "strongly disagree"). The assumption made was that high scores indicate favourable attitudes towards taking an HIV test.

The Ease of Obtaining Condoms Scale was measured through a modified questionnaire scale asking participants how easy it was for them to obtain condoms, regardless of age and gender in relation to nine listed channels offering condoms used by HIV/AIDS interventions. Response options range from "very difficult" (1) and "very easy" (5), and higher scores indicated the higher possibility of obtaining condoms.

Exposure to the HIV/AIDS Information Scale was assessed using a modified questionnaire scale asking how often participants were exposed to HIV/AIDS information, with regard to thirteen listed channels that are usually approached by HIV/AIDS programmes to inform on the epidemic. The instrument measures exposure to HIV/AIDS on a 5-point Likert scale, ranging from "Never" (1) to "Always" (5). Higher scores suggest higher exposure to HIV/AIDS information.

The HIV/AIDS Level of Knowledge Scale was measured through three modified instruments testing participants' level of knowledge on the meaning of HIV/AIDS, HIV modes of acquisition and prevention methods. HIV/AIDS-related knowledge about the meaning of the epidemic is assessed using twelve items, while HIV knowledge about modes of acquisition and prevention methods possess respectively fifteen and eight items, each with "yes", "no" or "don't know" responses. Responses that reflect correct answers were assigned a score of (1) while the others received a score of (0).

The socio-economic status of participants has been determined using the Universal Living Standard Measure (LSM) proposed by the South African Advertising Research Foundation (SAARF) which has been adapted to the DR Congo's context.

Data Analysis

Descriptive statistics were applied on socio-demographic and environmental variables investigated in the present study (acceptance of HIV-testing, ease of obtaining condoms, exposure to HIV/AIDS information and HIV/AIDS knowledge), using SPSS version 23.0 for Windows. Furthermore, the study performed a Standard Multiple Regression as to whether to accept or reject the two null hypotheses and to accept or reject their two related alternative hypotheses. These null and alternative hypotheses are:

- $H0_a$: All ten independent variables investigated do not explain acceptance of HIV testing;

- $H1_a$: All ten independent variables investigated explain acceptance of HIV testing;

- $H0_b$: All ten independent variables investigated do not have an equal positive relationship in predicting acceptance of HIV testing;

- $H1_b$: All ten independent variables investigated have an equal positive relationship in predicting acceptance of HIV-testing.

Ethics statement

Permission to carry out the project was granted ethical clearance by the Tshwane University of Technology based in South Africa as the researchers conducting the study belong to this institution. The study protocol was also approved by the ethic committee of the Protestant University in Congo given the fact that they are based in the country of the research ground. Furthermore all participants gave their consent in signing the designated form. Likewise, trained interviewers who administered the questionnaire consented to respect the confidential aspect of information collected from respondents. The completed questionnaires were placed and sealed in an envelope provided by interviewers.

Findings

Participants' demographic profile

The study's sample was made up of 55.3% of males and 44.7% of females. The majority of participants fell between the younger age group ≥18-24 years (59.2%), while the rest constituted the adult age group 25 years and above (40.8%). Most of the participants displayed a non-illiterate level of education (96.5%) and the other 3.1% did not go to school. Of the 347 literate participants, 68.6% attended university at undergraduate level, followed by the secondary school attendees (26.4%), the primary school attendees (1.7%) and the post-graduate attendees (0.3%).

The survey revealed that people in the majority are single (74.2%). Despite that fact, other marital groups are represented as well. The married group constituted 17.8% of the study sample, the living-together group 6.7% and the widowed/divorced group 5.7%. Given the economic situation in the country, people are mostly impoverished (47.5%). 13.9% of the study sample are likely to be classified as almost impoverished, 9.4% as medium, 18.6% as almost wealthy, and 10.6% as wealthy.

Descriptive statistics results

The descriptive statistics results demonstrate that participants are highly knowledgeable about the modes of HIV transmission, reasonably knowledgeable about the meaning of HIV/AIDS, while on the contrary they show a poor knowledge of methods for preventing getting infected by the virus. Descriptive findings show that people are poorly exposed to HIV/AIDS information, with only 28.3% of commonly-used channels providing people with necessary information, education and communication about the epidemic. Besides, results demonstrate that it is very easy for participants to obtain condoms, with a score of 85.3%.

Assessment of participants' acceptance of HIV testing revealed that they are more unlikely to take an HIV test with a score of 83.3%.

Reliability

The Cronbach Alpha technique has been applied to assess the reliability of the six measurement scales used for the purpose of the present study. Authors generally see a Cronbach Alpha value of at least 0.7 as an acceptable level of reliability, but in some cases 0.6 is also regarded as such (Pallant, 2010). The reliability statistics for this study are reflected in **Table 1**, which indicates that all the measurement sets are in fact reliable, as they all range from 0.72 to 0.85, exceeding the required minimum value, whether 0.7 or 0.6.

Table 1. Reliability statistics

Constructs	Cronbach's Alpha
Level of knowledge about the meaning of HIV/AIDS	0.723
Level of knowledge about the modes of HIV transmission	0.722
Level of knowledge about HIV-preventative methods	0.778
Exposure to HIV/AIDS information	0.718
Ease of obtaining condoms	0.777
Acceptance of HIV testing	0.849

Assessing the model and independents variables

Prior to assessing the model, a number of preliminary analyses which have not been reported were carried out to ensure that the underlying assumptions for performing the standard multiple regression analysis method were not violated. These analyses serve the study to verify that the data are normally distributed.

Pearson product moment correlation was applied to test the strength and direction of the relationships between the independent and the dependent variables. Results which emanated from correlation tests are displayed in **Table 2**. It shows that the acceptance of HIV testing is significantly correlated to ease of obtaining condoms, level of education and level of knowledge about the meaning of HIV/AIDS, at the $p<0.01$ level, while the significant level of relationship is set at $p<0.05$ for the exposure to HIV/AIDS information. The analysis of the direction of the observed significant correlations indicates a negative relationship between acceptance of HIV testing, ease of obtaining condoms, level of education and level of knowledge about the meaning of HIV/AIDS, while it is positive with exposure to HIV/AIDS information. **Table 2 also** reveals that the strength of the relationships between acceptance of HIV testing and all four independent variables is small. No practically significant

correlation is observed between acceptance of HIV-testing and the six remaining independent variables.

Table 2. Correlations between independent and dependent variables

	Acceptance of HIV testing		
	r	*p*	*Observation*
Age	0.037	0.241	No practically significant correlation
Sex	0.029	0.294	No practically significant correlation
Level of education	-0.161**	0.001	Practically significant negative correlation; small effect size
Marital status	0.056	0.145	No practically significant correlation
Socio-economic status	-0.014	0.394	No practically significant correlation
Level of knowledge about the meaning of HIV/AIDS	-0.119**	0.012	Practically significant negative correlation; small effect size
Level of knowledge about the modes of HIV transmission	-0.036	0.248	No practically significant correlation
Level of knowledge about HIV preventative methods	0.056	0.144	No practically significant correlation
Exposure to HIV/AIDS information	0.106*	0.022	Practically significant positive correlation; small effect size
Ease of obtaining condoms	-0.124**	0.009	Practically significant negative correlation; small effect size

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

After the correlation analysis, the study aimed to determine the amount of variance in acceptance of HIV testing that can be explained by the ten independent variables investigated. The results of the regression model displayed in **Table 3** demonstrate that only the levels of education and knowledge about the meaning of HIV/AIDS predict the dependent variable at $p<0.05$, implying that it is highly unlikely that the results are due to chance alone. All three exogenous variables explained approximately 6% ($R^2=0.057$) of the variance in acceptance of HIV testing. Although the regression model was

significant at $p<0.05$, it further appears that level of education made the strongest contribution in explaining acceptance of HIV-testing (β=0.134; p=0.018), followed by level of knowledge about the meaning of HIV/AIDS (β=0.110; p=0.014). **Table 3** shows that the levels of education and knowledge about the meaning of HIV/AIDS have a statistically-significant positive relationship with the acceptance of HIV-testing. The above-mentioned results suggest that one unit increase in level of education and level of knowledge about the meaning of HIV/AIDS will increase acceptance of HIV testing respectively by 13.4% and 11.0%.

Table 3. Regression model

	Endogenous variable: Attitudes towards HIV-infected persons		
Exogenous variables (Predictors)	**Beta**	**t**	**Sig.**
Level of education	0.134	2.379	0.014
Level of knowledge about the modes of HIV transmission	0.110	-2.026	0.018

F (10, 349)=2.112; Sig=0.023; R²=0.057; Adjusted R²=0.030

Implications

Following the findings of the study, it is observed from the regression model that only these two independent variables - level of education (β=0.134; t=2.379; p=0.014) and level of knowledge about the meaning of HIV/AIDS (β=0.110; t=-2.026; p=0.018) - were statistically significant in explaining acceptance of HIV testing. Consequently, it seems that in the context of influencing people to take an HIV test, only the level of education and level of knowledge about the meaning of HIV/AIDS can be viewed as predictors of acceptance of HIV testing in Kinshasa and they should form part of the core of HIV/AIDS social marketing intervention strategies. Although these two variables explained acceptance of HIV testing at 6%, they are necessary as their integration alongside traditional TPB tends to improve the model itself and better explains what can lead people to take the HIV test. It is important to bear in mind that extension of TPB does not mean replacement of its traditional components by others. Rather, it is about integrating additional components that have proved to be predictive of the specific health behaviour under investigation. In the context of the present study, it is suggested that the levels of education and knowledge about the meaning of HIV/AIDS should be incorporated together with attitudes, subjective norms and perceived control to explain in a powerful way people's acceptance of HIV testing.

Disclosure statement

The Authors reported that no competing financial interest.

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