Segmenting women eligible for cervical cancer screening using demographic, behavioural and attitudinal characteristics

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ABSTRACT

The best ways to communicate effectively to under-screened women about cervical cancer screening are unknown. Segmentation techniques create homogeneous segments of women in the population that are different from one another, and help to determine on whom communication efforts should be focused and how messaging should be tailored. We used segmentation techniques to better understand the demographics, attitudes and behaviours of women eligible for cervical screening. We developed a brief online questionnaire that consisted of demographic characteristics, attitudes toward health, and cervical screening behaviour. Simple descriptive statistics were used to describe the study population and principal components analysis was used to define the segments. The study sample consisted of 615 women living in Ontario, 508 from the general population and 107 from South Asia; 63.1% reported regular screening. We defined four segments that represented the sample: i) Proactive, ii) Family First, iii) Social and Stylish, and iv) Faith-Driven. South Asians were represented in all segments. Women who were in the Family First and Faith-Driven segments were least likely to have regular Pap tests and were least likely to know about human papilloma virus (HPV)'s role in cervical cancer. The Internet was very popular among women in all segments as a source of health information, particularly among Faith-Driven women. Only 69.2% of Family First women listed their family physician as a source of health information vs. 91.1% of Proactive women. Future research should focus on how to most effectively reach women who meet the Family First and Faith-Driven profiles, and through which communication media.

1. Introduction

Cervical cancer is highly preventable. Screening for cervical cancer regularly using the Pap test can significantly reduce both incidence and mortality among eligible women, and for the most part has been quite successful in Canada (Canadian Cancer Statistics, 2015; Canadian Cancer Statistics 2016, 2016). In the Canadian province of Ontario, which is the country's largest by population size, the most recent guidelines recommend that women be screened at least once every 3 years starting at 21 years of age if sexually active and discontinuing at age 70 years (Cervical Cancer Screening, 2016). However, despite these

clear screening guidelines and a universal health care system, the proportion of women who are up-to-date on screening has remained lower than desired over the past two decades in Ontario, holding steady at 60–65% since 2002, well below the provincial screening target of 85% (Screening, 2016). Data from Cancer Care Ontario (CCO), the provincial cancer agency, show that there are currently over 1 million women in Ontario who are overdue for cervical cancer screening that is, they have not had a Pap test in the past three years. This is despite good primary care coverage in the province with 94% of Ontario residents having a primary care provider (Health Quality Ontario, 2015).

Under-screening in Ontario and in Canada has long been known to

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be associated with specific demographic variables such as age, income, education, immigrant/refugee status, time in Canada, and language ability (Tilbrook et al., 2010; Lofters et al., 2010a; Lofters et al., 2007; Lofters et al., 2011; Lofters et al., 2014a; Lofters et al., 2014b; Amankwah et al., 2009; Lofters et al., 2010b). Ontario women born in South Asian countries (the primary source region for immigrants to Ontario with 17.8% of immigrants according to the 2016 Census) have been found to be particularly at risk for being under-screened (Lofters et al., 2010a; Lofters et al., 2014a; Visible Minority Population, by Province and Territory (2006 Census), 2014; Lofters et al., 2017; Gupta et al., 2002). For example, in a study of cervical cancer screening among immigrants by region of origin, the main author found rates were lowest among women from South Asian countries (adjusted rate ratio 0.81, 95% CI [0.80–0.82] among women aged 18–49 years when compared to long-term residents, adjusted rate ratio 0.67 [0.65–0.69] among women aged 50–66 years) (Lofters et al., 2010a).

However, despite this knowledge and despite identifying a particular high-risk demographic group, there remains a lack of clear guidance as to how to improve screening rates. Barriers to cervical cancer screening in Canada are also well-known, including: a lack of awareness or knowledge about screening, including the preventive value of screening; misconceptions about the causes of cervical cancer (Amankwah et al., 2009; Black et al., 2011; Fitch et al., 1998; Oelke and Vollman, 2007; Racey and Gesink, 2016; Redwood-Campbell et al., 2011; Van Til et al., 2003); the perception that seeking health care when asymptomatic is unnecessary (Oelke and Vollman, 2007; Van Til et al., 2003; Donnelly, 2006); fear of diagnosis as a result of screening (Black et al., 2011; Racey and Gesink, 2016; Van Til et al., 2003); embarrassment and physical discomfort (Black et al., 2011; Fitch et al., 1998; Racey and Gesink, 2016; Redwood-Campbell et al., 2011; Van Til et al., 2003; Donnelly, 2008; Chang et al., 2013), competing priorities (e.g. work and family commitments) (Amankwah et al., 2009; Black et al., 2011; Fitch et al., 1998; Oelke and Vollman, 2007; Racey and Gesink, 2016), and cultural barriers including taboos regarding sexual behaviours (Oelke and Vollman, 2007; Redwood-Campbell et al., 2011; Donnelly, 2006; Chang et al., 2013; Bottorff et al., 2001). Many of these barriers (e.g. lack of awareness or knowledge about screening, misconceptions, perceptions of healthcare, fear) could likely be addressed with effective communication, but the best ways to communicate about screening to eligible under-screened women are not yet known. As a first step toward developing more effective communication strategies, we undertook a segmentation analysis.

Segmentation analysis is a powerful analytical tool commonly used in commercial marketing research that incorporates demographic, attitudinal, and behavioural traits to cluster a heterogeneous population into smaller homogenous "segments" of people that are sufficiently distinct from one another on key characteristics. Segmentation provides more information than demographics alone. It helps to more accurately determine on whom communication efforts should be best focused and to inform how messaging and communication strategies should be tailored (Gray, 2016; Boslaugh et al., 2005; Maibach et al., 1996). In this study, we used segmentation to better understand the demographics, attitudes and behaviours of women eligible for cervical cancer screening, including women from South Asian countries, and to inform future work that will produce more effective tailored outreach and communication strategies. Specifically, we used an online questionnaire and principal components analysis to create a segmentation of women eligible for cervical cancer screening in the Greater Toronto Area (GTA), over-sampling women of South Asian birth, incorporating demographic variables, attitudinal variables, and self-reported screening behaviours.

2. Methods

2.1. Study setting

The GTA is Canada's most populous and diverse metropolitan area. With a population of nearly 6 million people according to the 2016 Canadian Census, it contains 44% of Ontario's population and 16.8% of Canada's population. Almost half (46%) of residents of the GTA are foreign-born.

2.2. Questionnaire development and administration

We developed a brief 10-minute questionnaire that consisted of closed-ended multiple choice questions on demographic characteristics, attitudes toward health and healthcare, and cervical cancer screening behaviour (Appendix 1). The survey questions were developed by the study team. Study participants were recruited via a third party organization, Canadian Viewpoint. This research fielding company provides survey data collection using pre-existing panels (groups of people who have expressed interest in being potential participants for various studies) and based on requested inclusion criteria as described below. The questionnaire was administered online in July 2017 to a pre-existing panel of GTA residents who had previously provided their email addresses to the third party organization and provided consent to participate in research studies. This panel was previously created through telephone and online recruitment.

2.3. Inclusion criteria

We aimed to recruit approximately 600 women in total to participate in our survey: 100 who self-identified as being of South Asian birth and 500 from all other ethnicities. To participate in the online survey, participants had to be women aged 21–69 years of age (in line with provincial guidelines), had to live in the GTA, and had to be able to read English. These inclusion criteria were previously self-reported by participants. The third party organization holds data on panel members including age, gender, language, and ethnicity. Respondents are asked to update their profile information every three months. This profile information was used to send targeted invitations to potential participants. Canadian Viewpoint uses technology that verifies IP and computer information to ensure there is no duplication of respondents. All participants were compensated for their time (five Canadian dollars for South Asian women, two Canadian dollars for all others).

2.4. Statistical analysis

Simple descriptive statistics were used to describe the study population (absolute numbers and percentages) and all statistical tests of significance were performed at the 5% level of significance, two-sided. Principal components analysis was used to create the segments. Principal components analysis reduces an array of variables that correlate with one another into components or factors, and produces estimates of the correlations between each of the variables and the estimated components/factors (Groth et al., 2013). The stronger the correlation of the variable to that factor, the higher the factor loading of a variable is within a particular factor. In this study, our variables were statements on the survey for which respondents were asked to report their level of agreement (Table 2, Appendix 1). For each respondent, the analysis computed a factor loading score that corresponded to the number of factors chosen i.e. if there were four factors or segments, then each respondent had four factor loading scores. We allowed for a possible three to six segment solutions in our analysis. We ultimately selected four group segments because our analyses yielded a high percentage (85.5%) correct classification when running against the independent variables noted in Table 2. In other words, these four segments seemed to make the most sense to understand the data. We