Development of an explanatory model to explore cervical cancer screening behaviour among South Asian women: The influence of multilevel factors

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A B S T R A C T

Purpose: To develop an explanatory model, built on an ecological basis, and examine the relational effects of multilevel factors on screening behaviour among South Asian immigrant women.
Methods: This is a cross-sectional, exploratory correlational study using path analysis. 776 South Asian immigrant women were recruited from community in Hong Kong. A self-administered survey with eight sections covering socio-demographics, recommendations received from others, previous screening experience, knowledge of the disease and screening, attitudes and perceptions, level of acculturation, cultural barriers to screening and perception of cancer fatalism was used to collect data. Path analysis was done to test the hypothesised model.
Findings: The final model obtained an acceptable model fit with x^2/df = 2.52, RMSEA = 0.044, CFI = 0.95 and TLI = 0.93. A total of 15 factors, ranging from intra-personal to community level, were identified as being associated with South Asian immigrant women's cervical cancer screening behaviour. Three factors at the community level (language use, modesty and crisis orientation) had an inter-relationship with three intra-personal factors (perceived barriers to screening, cancer fatalism and perceived benefits of screening) and hence affected screening uptake.
Conclusions: South Asian women's cervical cancer screening behaviour is affected by multi-level factors. Efforts should be made to change the current health-promoting strategies and attract more involvement from appropriate stakeholders, incorporating cultural and socio-environmental components in future interventions.

1. Introduction

Cervical cancer is the fourth most common cancer among women worldwide. The age-standardised incidence and mortality rates were 13.1 and 6.9 per 100,000 population, respectively (International Agency for Research on Cancer, 2018a; 2018b). To prevent cervical cancer, Pap testing is the most effective available screening method (Center for Health Protection, 2018). The increased popularity of Pap tests in regions such as North America has led to a reduction in the age-standardised incidence rates (6.4 per 100,000) of cervical cancer (International Agency for Research on Cancer, 2018b, 2018c). However, this reduced rate does not apply to other regions, such as Asia. For example, the rates in India, Nepal and Pakistan are 14.7, 21.5 and 7.3 per 100,000, respectively (International Agency for Research on Cancer, 2018c).

The disparities are not only observed across countries, but also exist

within countries. An increased Pap test uptake rate among the general population does not apply to ethnic minorities (EM). In the United States, the uptake rate among Asian women (67.0%) is lower than that of the white population (73.9%) (Centers for Disease Contol and Prevention, 2017). In Britain, 88.2% of the majority group of women take Pap tests, but only 29%–56% of the EM population (Caribbean, African, South Asian) do so (Marlow et al., 2015).

A similar situation is to be found in parts of Asia, such as Hong Kong, where cervical cancer is common and the age-standardised incidence rate is 7.6 per 100,000(Hong Kong Cancer Registry, 2017). Health promotion of Pap testing has been carried out and recommendations made in Hong Kong (Department of Health, 2018a). These efforts have led to an uptake rate of 59% in the Hong Kong female population (Department of Health, 2018b). But the rate is low among South Asians (Indian, Pakistani and Nepalese), one of the major EM groups in Hong Kong, at only 36.8% (So et al., 2015).

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The ethnic disparities in screening uptake may be the result of various barriers that minorities encounter. A systematic review of the factors associated with cervical cancer screening behaviour among EM women shows that multilevel factors influence them: attitudes and perceptions, knowledge, cancer fatalism, recommendations from friends or doctors, religion, quality of the service, usual source of care, culture-related factors, language, acculturation and health insurance (Chan and So, 2017f). Apart from the direct influence of each factor on screening behaviour, the studies reveal that certain factors, such as knowledge, doctor's gender, acculturation, language use and cultural concerns, may have significant inter-relationships with individual beliefs to cause changes in screening behaviour (Chan and So, 2017f).

In the studies reviewed, the Health Belief Model (HBM), an individual-level model, was the most commonly used, although some studies used other models that included factors extending beyond the individual level, addressing environmental and social influences on behaviour, such as the ecological model. A person's behaviour is not only influenced by individual characteristics, but also by factors from multiple dimensions, such as culture-related issues, which are not explicitly illustrated in the HBM. A comprehensive view of how a person's screening behaviour cannot be provided if the model is unable to deal with factors other than those at the individual level.

McLeroy et al. (1988) identified five levels of factors: intra-personal, interpersonal, organisational, community-based and policy-related, affecting health behaviour in an 'ecological model' (McLeroy et al., 1988). The ecological model provides more information on how various factors, extending beyond the individual level, affect a person's health behaviour. Such information informs the design of multi-level interventions and can aid the involvement of appropriate stakeholders in decision-making and resource allocation. In view of the superiority of this model over the individual-level type, the ecological model was used to guide this study.

In Hong Kong, EMs account for 8% of the total population (Census and Statistics Department, 2017) and Indian, Pakistani and Nepalese (called South Asians in this article) form one of the largest sections of EM group (Census and Statistics Department, 2017). A previous study found that South Asian women encountered different barriers to screening, including insufficient knowledge of cervical cancer and screening, inadequate language skills, poor access to services and individual health beliefs (So et al., 2017).

Currently, no model fully explains the cervical cancer screening behaviour of South Asian women. The development of a model, incorporating multilevel factors, could provide a comprehensive view of how these factors interact and influence women. Its findings would allow direct application of the model to practice by the healthcare professionals, especially the nurses who play an important role in patient care and education. Its findings could guide the subsequent development of multi-level interventions combining behavioural and social components intended to assist nurses and other healthcare professionals in delivering appropriate health education and promoting screening uptake of South Asian women. The findings would also inform the government and policy-makers about service delivery and the allocation of existing limited resources to this expanding population.

1.1. Study aims

The aims of the study are to develop an explanatory model, and examine the relational effects of multilevel factors on cervical cancer screening behaviour among South Asian women in Hong Kong.

1.2. The hypothesised model

The ecological model (McLeroy et al., 1988) was adopted as the conceptual model to guide this study. This model provides a framework for the understanding and involvement of stakeholders at different levels in influencing people's screening behaviour. The intra-personal

level describes an individual's characteristics and developmental history; the interpersonal describes the interaction with the primary group providing social support; the organisational concerns the characteristics and rules or regulations of organisations that exert influence on health behaviour; the community concerns a person's psychological sense of community, a functional unit meeting sustenance needs or as a mediating structure or the primary groups that a person belongs to and the influence of social networks or standards that exist in groups; and the policy-related level describing the existence of policies that support disease detection, prevention and management.

Based on the factors identified in a systematic review (Chan and So, 2017f) and the applicability of factors to the local South Asian population, the factors are classified into the five levels according to the definition of the ecological model and built the hypothesised model. The following factors were put into the hypothesised model: intra-personal (age, educational level, employment, income, marital status, history of childbirth(s), family history of cervical cancer, perceived susceptibility to and severity of the disease, perceived benefits of and barriers to screening, self-efficacy in screening, knowledge, cancer fatalism); interpersonal (recommendations from friends); organisational (usual source of care, recommendations from doctors of health organisations, religion, doctor's gender and language, regular primary care service providers, availability of clinics); community (culture-related factors: modesty, crisis orientation, use of traditional medicine, lack of family support; acculturation, language used, duration of residence) and policy (health insurance). The outcome of interest is the cervical cancer screening behaviour (Pap test uptake).

Also, based on relationships identified from the literature and existing theory/model, knowledge of the disease and screening, doctor's gender, acculturation, language use, duration of residence and a culture-related factor (modesty) (Chan and So, 2017f; Powe, 1995; Rosenstock, 1974, 1988) were hypothesised to have inter-relationships with intra-personal level factors and hence affect the cervical cancer screening behaviour (Fig. 1).

2. Methods

2.1. Study design

A cross-sectional, exploratory correlational study design with path analysis was employed to test the hypothesised path model (Fig. 1) and examine the relational effects of multi-level factors on screening behaviour among South Asian women in Hong Kong.

2.2. Study participants and setting

The study took place from April to November 2017 in Hong Kong. Participants were recruited via community centres and ethnic minority associations serving South Asians in Hong Kong. They were also approached in places where they gathered together, such as parks, health centres, workplaces, or churches, temples or mosques. To be eligible for the study, participants had to meet the following criteria: 1) South Asian women (Indian, Pakistani or Nepalese); 2) 21 or above; 3) no history of cervical cancer or of total hysterectomy; and 4) able to read and communicate in English, Urdu or Nepali. Those with any psychiatric illness such as anxiety disorder were excluded.

2.3. Procedures

Ethical approval was obtained from the ethics committee of the study institution. The principal investigator contacted stakeholders, people in charge of centres and leaders of ethnic minority associations, church/temple leaders and business managers to gain access to potential participants. The recruitment schedule was agreed and set up between stakeholders and data collectors. An information sheet was distributed and written informed consent obtained when participants
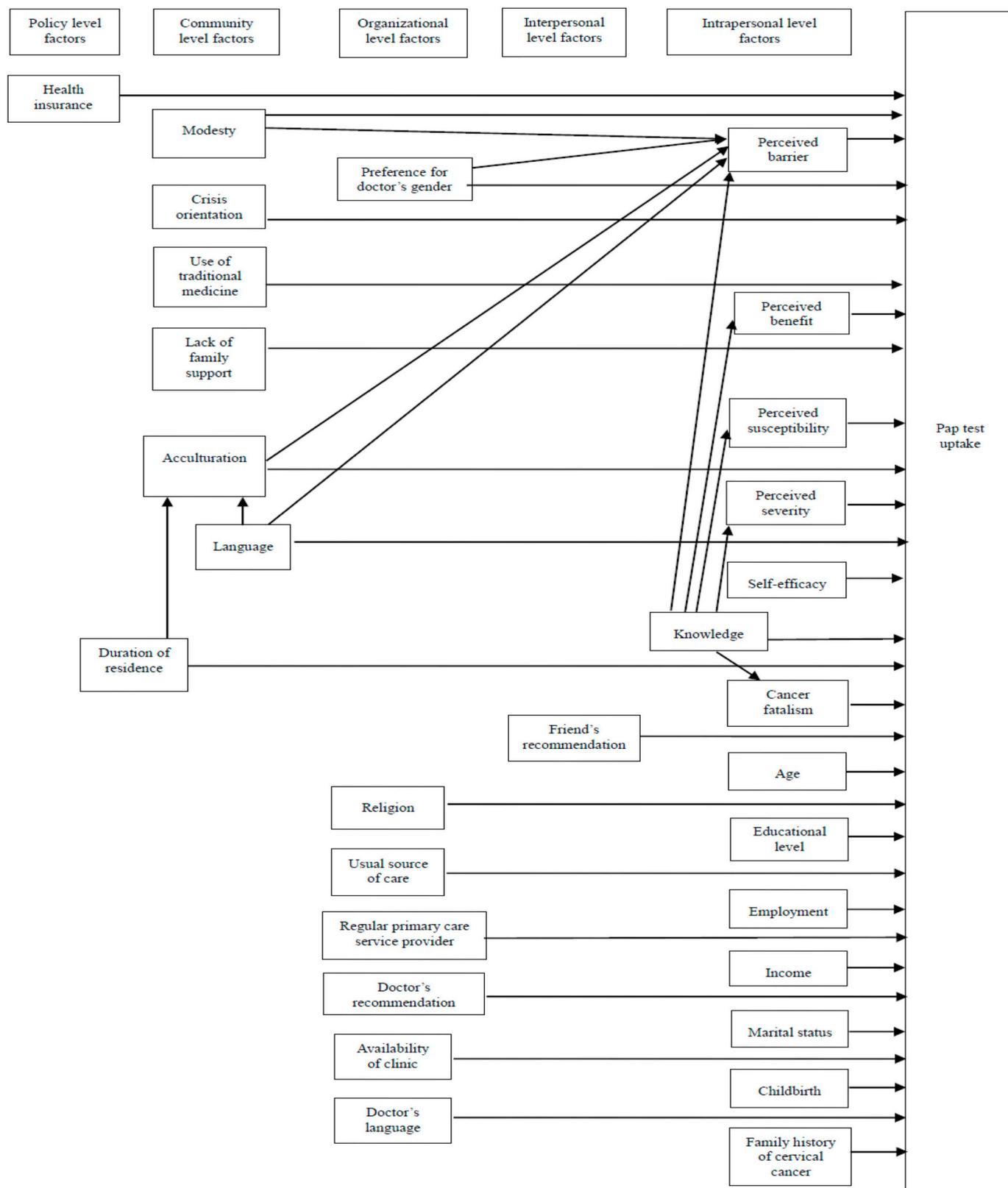
Fig. 1. Hypothesised path model to explore the cervical cancer screening behaviour of South Asian women.

agreed to join.

The data was collected in face-to-face interviews using a structured survey. The data collectors of the same ethnic origin as the target participants read the questions one by one and marked the responses from the participants. For those participants who did not know the anatomy of the cervix or details of Pap testing, picture cards of the cervix and a Pap test were used to aid communication. The survey involved sensitive issues such as cervical examination. Because of their cultural beliefs and embarrassment, these women were reluctant to discuss such topics in the presence of the opposite sex. Thus, they were

approached in the absence of a male. Whenever possible, private rooms were provided in community centres and ethnic minority associations and so they could complete the questionnaire in strict confidence. The survey took around 30 min to complete. An hour was reserved in each recruitment schedule and participants could take a rest whenever they needed during the interview.

2.4. Study measures

The Indian, Pakistani and Nepalese participants completed English, Urdu or Nepali versions of surveys, as appropriate. The English version was used for Indian participants since most Indians in Hong Kong are able to understand English (Census and Statistics Department, 2017). Before the survey administration, the English, Urdu and Nepali versions of surveys had undergone the semantic equivalence and content validity testing procedure by panel of experts who are originated from India, Pakistan and Nepalese. They evaluated the appropriateness and relevance of the surveys for use with Indian, Pakistani and Nepalese participants in Hong Kong. Besides, cognitive questioning and field testing of the surveys were done by fifteen Indian, Pakistani and Nepalese women. They helped to reveal the clarity, appropriateness and relevance of surveys, ease of answering and time needed to complete the surveys (Chan and So, 2017g). The survey content is detailed as follows.

2.4.1. Socio-demographic data, recommendation from others and previous screening experience

This section covered multi-level factors including age, marital status, educational level, employment status, household income, history of childbirth(s), duration of residence in Hong Kong, family history of cervical cancer, religion, usual source of care, having a regular primary care service provider, language use in daily life, health insurance, recommendations received from doctors of health organisations and friends, ever having had a Pap test, doctor's gender and spoken language and whether the clinics available were known to the subjects.

2.4.2. Knowledge of cervical cancer and its detection

Eleven statements covering the screening recommendation, signs and symptoms and risk factors of cervical cancer were used to assess knowledge (Ma et al., 2013). The answers were "Yes", "No" or "Don't know". Correct answers scored 1 and incorrect or "don't know" answers scored 0. The content validity indices of English, Urdu and Nepali versions were all 1.0 in this study and Cronbach's alphas ranging from 0.80 to 0.88 in this study sample.

2.4.3. Attitudes towards and perceptions of cervical cancer and screening

The Cervical Cancer Screening Belief Scale was used, with 27 items in five sub-scales dealing with perceived susceptibility to and severity of the disease, and perceived benefits of, barriers to and self-efficacy in screening (Ma et al., 2013). The items were scored on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher mean scores indicate higher perceived susceptibility to and severity of the disease, higher perceived benefits of and perceived self-efficacy in screening and higher perceived barriers to screening. The scale was validated in Vietnamese American women, with Cronbach's alphas ranging from 0.74 to 0.99. (Ma et al., 2013). The validated English, Urdu and Nepali versions used in this study sample showed fair to good internal consistency, while Cronbach's alphas for the sub-scales were 0.69–0.90, 0.65–0.88 and 0.60–0.88 respectively (Chan and So, 2017b, 2018).

2.4.4. Level of acculturation

The 12-item Short Acculturation Scale (Marin et al., 1987) was used, evaluating participants' language use at different periods of their lives, choice of media and ethnic/social relations. The items are scored on a five-point Likert scale from 1 (only Spanish) to 5 (only English). To

fit the language used by our subjects, the rating scale was modified to 1(only Hindi/Urdu/Nepali) to 5 (only English/Cantonese). The major languages used by Chinese in Hong Kong are Cantonese and English, and so the option 'Cantonese' is added (Census and Statistics Department, 2017). The mean score of the summed 12 items was calculated, with a score of 3 or more indicating a higher level of acculturation (Marin et al., 1987). The scale was validated in Hispanics, with a Cronbach's alpha of 0.92 (Marin et al., 1987). The validated English, Urdu and Nepali versions used in this study sample showed high internal consistency, while Cronbach's alphas for the overall scales were 0.95, 0.96 and 0.92 respectively (Chan and So, 2017e; Marin et al., 1987).

2.4.5. Cultural barriers to screening

The 16-item Cultural Barriers to Screening Inventory was used, with four sub-scales: modesty, crisis orientation, use of Eastern medicine and lack of family support (Nguyen-Truong et al., 2015; Tang et al., 2000). According to a previous study (So et al., 2012) exploring South Asian women's cancer screening behaviour, the themes identified were similar. Minor change was made with the wording altered to fit South Asians, such as 'use of Eastern medicine' to 'use of traditional medicine'. The items were scored on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher mean scores indicate higher levels of maintaining modesty, more prevention-oriented, more use of traditional medicine and more family support. The scale was validated with Chinese and Vietnamese Americans with Cronbach's alphas ranging from 0.54 to 0.91 (Nguyen-Truong et al., 2015; Tang et al., 2000). The validated English, Urdu and Nepali versions used in this study sample showed internal consistency comparable to that of previous studies, while Cronbach's alphas for the sub-scales were 0.63–0.82, 0.61–0.86, 0.54–0.81 respectively (Chan and So, 2017a, 2017c).

2.4.6. Cancer fatalism

The 15-item Powe Fatalism Inventory (Powe, 1995) was used, where cancer fatalism was conceptualised on four components: perceptions of fear, predetermination, pessimism and inevitability of death (Powe, 1995). Each item requires a "Yes" or "No" response, with "Yes" scoring 1 and "No" 0. Scores of 0–8 indicate a lower perception and those of 9–15 a higher perception of cancer fatalism. The scale was validated with African American with a Cronbach'a alpha of 0.87 (Powe, 1995). The validated English, Urdu and Nepali versions used in this study sample showed high internal consistency, with Cronbach's alphas for the sub-scales of 0.90, 0.87 and 0.89 respectively (Chan and So, 2017d; Powe, 1995).

2.5. Statistical analysis

The data for study variables was presented using appropriate descriptive statistics such as percentage, mean, standard deviation (SD), with IBM SPSS version 22.0. A hypothetical path model (Fig. 1) linking the factors to the likelihood of participants taking a cancer screening test are formulated as paths to guide the examination of the relationships among these variables. Path analysis was conducted to examine the hypothetical model and the parameters were estimated using mean and variance adjusted weighted least square method (WLSMV) implemented in Mplus Version 7.4 (Muthén and Muthén, 1998-2010). The initial model was refined by adding theoretically plausible paths while considering modification indices, and trimmed subsequently, by deleting insignificant paths, to obtain the final model.

The goodness-of-fit of the path models were assessed by the following indices: (1) the ratio of Satorra-Bentler scaled chi-square statistic to degree of freedom (x^2/df), (2) the root mean square error of approximation (RMSEA), (3) the comparative fit index (CFI) and (4) the Tucker-Lewis fit index (TLI). A x^2/df value < 3, RMSEA ≤ 0.08 and both CFI and TLI ≥ 0.90 indicate an acceptable fit to the data (Satorra and Bentler, 1994; Schermelleh-Engel, 2003). All statistical tests

Table 1
Socio-demographic characteristics of subjects (n = 776).

	Mean (SD)
Age (years)	37.8 (10.8)
Duration of residence (years)	14.4 (10.9)
	n(%)
Education level	
Primary school or below	187 (24.1%)
Secondary	254 (32.7%)
College	182 (23.5%)
University	153 (19.7%)
Employment status	
Unemployed (homemaker/student/retired)	528 (68.0%)
Employed	248 (32.0%)
Household income (HKD) (HKD 7.82~ = USD 1.00)	
$9999 or below	184 (23.7%)
$10,000 to $29,999	344 (44.3%)
$30,000 or above	76 (9.8%)
Don't know/decline to disclose	172 (22.2%)
Marital status	
Unmarried	142 (18.3%)
Married	634 (81.7%)
History of childbirth(s)	
No	166 (21.4%)
Yes	610 (78.6%)
Religion	
No	7 (0.9%)
Yes	769 (99.1%)
Family history of cervical cancer	
No/don't know	757 (97.6%)
Yes	19 (2.4%)
Friend's recommendation of Pap test	
No	557 (71.8%)
Yes	219 (28.2%)
Doctor's recommendation of Pap test	
No	592 (76.3%)
Yes	184 (23.7%)
Clinic for Pap testing known to subjects	
No	486 (62.6%)
Yes	290 (37.4%)
Having usual source of care when ill	
No	77 (9.9%)
Yes	699 (90.1%)
Having a regular primary care service provider	
No	494 (63.7%)
Yes	282 (36.3%)
Preference for doctor's gender	
No	219 (28.2%)
Yes	557 (71.8%)
Preference for doctor's language	
No	41 (5.3%)
Yes	735 (94.7%)
Language used in daily communication	
Mostly mother tongue	437 (56.3%)
Both mother tongue and English	339 (43.7%)
Health insurance	
No	651 (83.9%)
Yes	125 (16.1%)
Ever had a Pap test	
No	463 (59.7%)
Yes	313 (40.3%)

involved were two-sided, and a p-value of < 0.05 was considered statistically significant.

3. Results

3.1. Recruitment and response

A total of 909 eligible Indian, Pakistani and Nepalese women were approached during the data collection period. 776 women including 257 Indians, 269 Pakistanis and 250 Nepalese consented and completed the surveys. The response rate was 85.4%.

Table 2
Selected study variables: Attitudes and perceptions, cultural barriers to screening, acculturation and knowledge of subjects (n = 776).

	Mean (SD)
Cervical Cancer Screening Belief Scale	
Perceived susceptibility to the disease (Score range: 1–5)	2.47 (0.87)
Perceived severity of the disease (Score range: 1–5)	3.09 (0.88)
Perceived benefits of screening (Score range: 1–5)	3.80 (0.82)
Perceived barriers to screening (Score range: 1–5)	2.74 (0.64)
Perceived self-efficacy in screening (Score range: 1–5)	3.56 (0.94)
Cultural Barriers to Screening Inventory	
Modesty (Score range: 1–5)	3.08 (0.72)
Use of traditional medicine (Score range: 1–5)	2.96 (0.92)
Crisis orientation (Score range: 1–5)	3.87 (0.74)
Lack of family support (Score range: 1–5)	2.93 (0.80)
Acculturation (Score range: 1–5)	2.09 (1.01)
Cancer fatalism (Score range: 0–15)	5.74 (4.43)
Knowledge of the disease and screening (Score range: 0–11)	6.25 (3.09)

3.2. Participants characteristics

The mean age of subjects was 37.79. Nearly 70% were unemployed. 68% had a monthly household income of HKD 29,999 (USD 3822) or below, and most were married. About 44% would use both English and the mother tongue during their daily communication. Among all the participants, around 40% had ever screened. The socio-demographic characteristics and selected study variables are summarised in Tables 1 and 2.

3.3. Path model results

The final model obtained an acceptable model fit with x^2/df = 2.52, RMSEA = 0.044, CFI = 0.95 and TLI = 0.93. In the final model, a total of 15 factors remained and showed direct or indirect influence on South Asian women's screening behaviour (Fig. 2).

At the intra-personal level, knowledge was positively associated with women's perceived benefits of screening (β = 0.18, p < 0.001) (β: regression coefficient). Hence, those women who perceived higher benefits of Pap testing (β = 0.10, p < 0.01) were positively associated with its uptake. Perception of cancer fatalism had a positive relationship with perceived barriers to screening (β = 0.18, p < 0.001). Those women who perceived higher barriers to screening showed a negative relationship with Pap test uptake (β = −0.15, p < 0.001).

At the interpersonal and organisational levels, Pap test uptake was directly associated with receiving Pap test recommendations from a friend (β = 0.18, p < 0.001) or a doctor (β = 0.20, p < 0.001), clinics available for a Pap test being known to the subjects (β = 0.32, p < 0.001), and having a regular primary care service provider (β = 0.12, p < 0.01). In addition, a negative association was identified between clinics being known to subjects and their perceived barriers to screening (β = −0.21, p < 0.001) and so to Pap test uptake.

At the community level, three factors were revealed to have interrelationships with intra-personal level factors. Women who could use both English and their mother tongue for daily communication (β = −0.12, p < 0.001) were associated with lower perceived barriers to screening. However, those women who emphasised maintaining modesty (β = 0.42, p < 0.001) showed higher levels of perceived barriers to screening. Crisis orientation and language use were both associated with perception of cancer fatalism. Women who used English and the mother tongue for communication (β = −0.30, p < 0.001) and those who were more prevention-oriented (β = −0.15, p < 0.001) had lower levels of perceived cancer fatalism. Crisis orientation was also associated with perceived benefits of screening. That is, women who were more prevention-oriented (β = 0.44, p < 0.001) perceived more benefits of screening and hence had a higher test uptake.
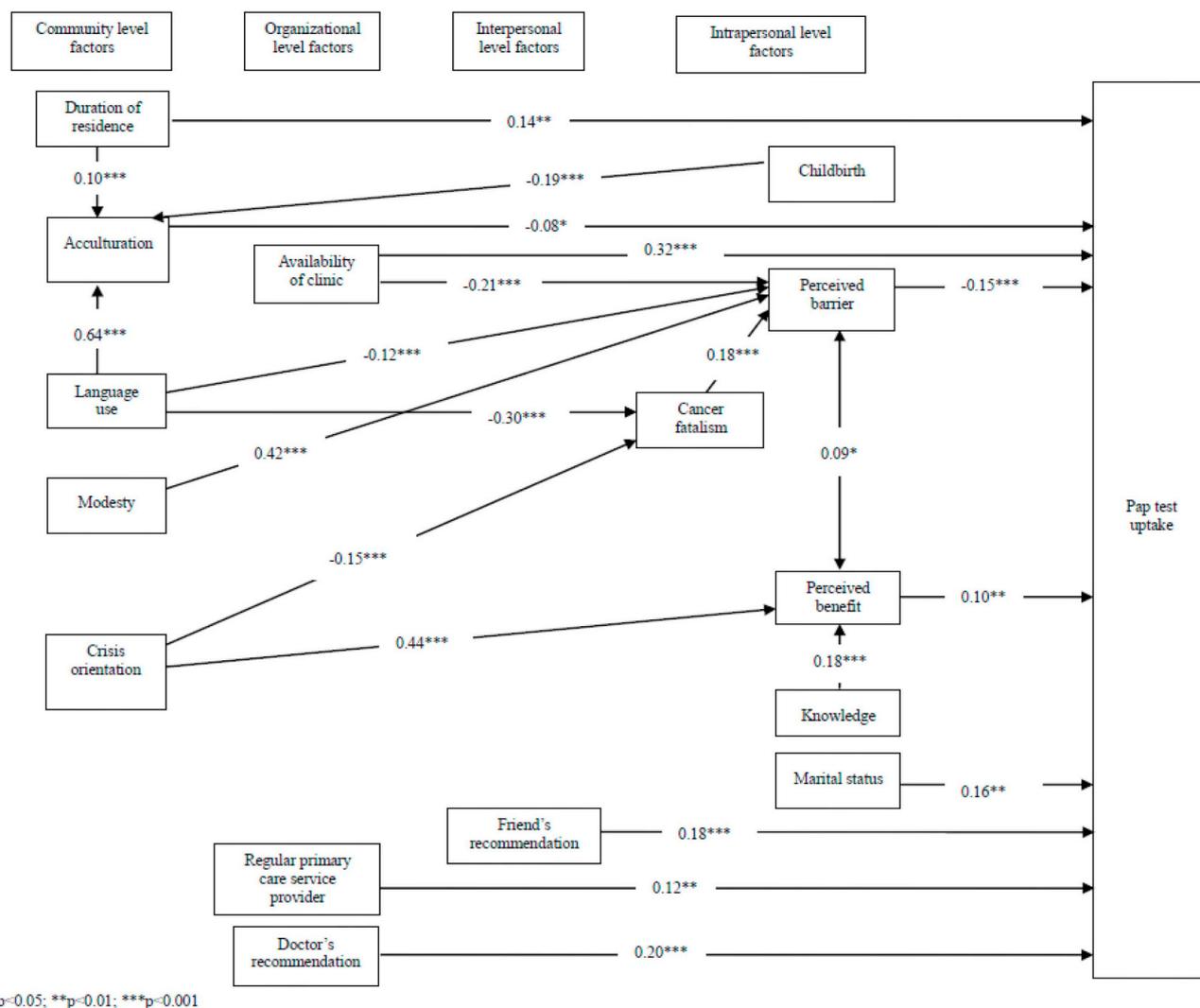
Fig. 2. Final path model explaining the cervical cancer screening behaviour of South Asian women.

4. Discussion

To the best of our knowledge, this is the first study to develop an explanatory model to explore the cervical cancer screening behaviour of South Asian women. The findings indicate that 15 factors ranging from intrapersonal, interpersonal, organisational and community levels affect the women's screening behaviour. Language use, modesty and crisis orientation at the community level and clinics known to be available for a Pap test at the organisational level had an inter-relationship with cancer fatalism, perceived barriers to and benefits of screening at the intra-personal level, to cause a change in the final screening behaviour.

This study reveals a positive direct and indirect association with clinics being available for Pap test uptake at the organisational level. Clinics or health centres that are readily available and known in the living districts of South Asian women would enhance their screening uptake. The women would not need to take long hours of transport to attend the screening, which would fit their family duty schedules (Department of Health, 2017; The Family Planning Association of Hong Kong, 2018). For those who do not know where to obtain a test or the clinics available for the test, this factor serves as their barrier to screening. To improve, extending assistance, which includes providing the name and address of the clinics offering the Pap test, could be a way to resolving the barrier. Public transport information that enhances their accessibility may likewise minimise the barriers to obtaining a Pap test.

Some factors at the community level do not have a direct influence on screening uptake. Instead, they show their influence at the intra-personal level factors and, hence, the Pap test uptake. The language used by South Asian women has a close relationship with their perceived barriers to screening and cancer fatalism at the intra-personal level. This finding is consistent with study identifying language as one of the major barriers, and the language used by EM was significantly associated with cancer fatalism levels (Vrinten et al., 2016). In Hong Kong, Cantonese and English are the major languages used (Census and Statistics Department, 2017). Most health-promoting materials are written in Chinese and English and providers of screening services speak in Cantonese or English. South Asians may have difficulty in expressing their needs while using the services and find it hard to understand the health information shown in the materials if they cannot use the majority language. Without understandable information, their misconceptions about cervical cancer cannot be clarified and may persist.

To improve the situation, written translation and onsite interpretation services could help (Center for Harmony and Enhancement of Ethnic Minority Residents, 2018; Department of Health, 2018a; HKSKH Lady Maclehose Centre, 2017). However, these services are not all known to South Asian women. Also, most of the interpreters may not be specially trained to deal with medical-related terminology, and some medical terms, such as "cervical cancer", are not present in the South

Asian mother tongue. This situation may lead to misinterpretation. For better utilisation and delivery of interpretation services, more effort should be put into service promotion and more resources should be allocated to improve medical interpreters' and translators' training. Tertiary institutions are recommended to provide such training in medical terminology to make for more accurate information. If onsite interpretation is not readily available, trained ambassadors or cultural liaison staff (those who have stayed for a long time in Hong Kong and are familiar with both cultures), or younger family members (such as daughters) who can speak both Hindi/Urdu/Nepali and English/Cantonese may help in interpretation.

A culture-related factor, modesty, shows an association with perceived barriers to screening. Maintaining modesty is a prominent value in South Asian culture and women are taught not to expose their private parts to people other than their husbands (Bedi and Devins, 2016; Crawford et al., 2015; Marlow et al., 2015). They feel uncomfortable and embarrassed discussing cervical health with their healthcare providers (Bedi and Devins, 2016; Anderson de Cuevas et al., 2018; Marlow et al., 2015). They transform this kind of cultural barrier into their own barrier, which appear at the intra-personal level. To alleviate this problem, a procedure performed by a female healthcare provider can help to reduce embarrassment (Rosenstock, 1974; So, 2017). Information about the availability of female healthcare providers could be provided during appointment scheduling.

Another culture-related factor, crisis orientation, shows a direct association with the perceived benefits of screening at the intra-personal level. South Asians often seek advice when signs and symptoms occur. Attending screening without health problem is considered a waste of time. Fulfilling their duty of taking care of the children and family is a top priority and their own health a low one (Anderson de Cuevas et al., 2018). In future, community-based educational interventions could be conducted in South Asian communities and schools through lecture presentation and educational video with contents addressing the benefits of Pap tests in detecting problems and maintaining health. These would aim to change a woman's mindset about keeping herself in good health and thus fulfil a real familial duty.

4.1. Limitations

There are some limitations to be acknowledged. The quantitative nature of the study is useful in providing a broad understanding of the phenomenon of interest, but may be inadequate for a deeper understanding. Some multi-level factors, such as a friend's recommendation, are dichotomous variables. The impact of friends on screening behaviour could be enhanced through a qualitative enquiry. Another limitation is the inadequate exploration of some factors, such as health policy, where changes, such as sponsorship of Pap testing for low-income families, may influence screening uptake. Further exploration of the relationship of such factors with screening behaviour in any future study is clearly warranted.

5. Implications

The multi-level path model provides information in directing interventions at an appropriate level. Nurses can provide information about the availability of female healthcare providers to overcome women's barrier and to enhance appointment scheduling. Provision of navigation assistance including clinics' addresses and transportation means are useful to enhance service access (Chan and So, 2015; So et al., 2019). Nurses can also provide knowledge on the benefits of Pap test and about the preventive nature of cervical cancer to help to clarify South Asian women's misconception and overcome their barriers, and so, enhance screening uptake.

6. Conclusions

South Asian women's cervical cancer screening behaviour is affected by multi-level factors. This study supports the view that there exist inter-relationships between factors across levels, especially cultural influence at the community level, affecting women's perceptions at the intra-personal level. Efforts should be made to change current health-promoting strategies in future interventions, and introduce more involvement of appropriate stakeholders, incorporating cultural and socio-environmental components.

Conflicts of interest

No conflict of interest has been declared by the authors.

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