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Psychological factors and demands for breast and cervical cancer screening

Tao Jiang[a,1], Donghua Wei[b,1], Rui Sha[a], Junqing Zhang[c], Xiaopeng Zhang[c], Rui Feng[d], Xingrong Shen[a], Paul Kadetz[e], Debin Wang[a,*]

[a] Anhui Medical University, School of Health Service Management, Hefei, China
[b] Anhui Tumor Hospital, Department for Service Management, Hefei, China
[c] Hefei Center for Disease Control and Prevention, Hefei, China
[d] Anhui Medical University, University Library, Hefei, China
[e] Drew University, Department of Anthropology, Madison, USA

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ABSTRACT

Objective: The study aims to investigate relationships between demands for breast and cervical cancer screening (BCS/CCS) and related health beliefs.
Methods: The study used cluster-randomized sampling and collected data about demands for BCS/CCS and constructs of health beliefs model (HBM). It calculated indices of perceived risk and seriousness of the cancers and perceived effectiveness, benefits and difficulties of the screening; and performed descriptive and multivariate regression analysis of the demands and the HBM constructs.
Results: Less than 23.7% of respondents (N = 805) had ever undertaken BCS/CCS but 62.7% reported willingness to receive the service. Demands for BCS/CCS illustrated negative associations (Beta = −0.11 and −0.10) with age but positive (Beta = 0.15 and 0.11) links with education. The absolute values of standardized regression coefficients between the demand and the HBM constructs added up to 0.69 for BCS and 0.64 for CCS respectively, being 4–40 times that of age and education.
Conclusions: Models incorporating all HBM constructs have substantially greater power than commonly researched single factors in explaining BCS/CCS demands.
Practice implications: Comprehensive BCS/CCS promotion addressing all HBM constructs in a synergetic way may prove to be more effective.

1. Introduction

Breast and cervical cancer screening (BCS/CCS) has been introduced in many countries for decades [1,2]. However, their cost-effectiveness depends heavily on uptake of the service [3]. Inadequate use of the screening directly prevents the target women from benefiting; while overuse and disproportionate use leads to resource wastage and reduction in cost-efficiency [4]. BCS/CCS uptake varies greatly between nations even between population groups within a given nation. Reported uptake rate of ever getting BCS ranged from 3.2% to 52.8% in different states of the United States [5] and 76.2% for the Norwegian Breast Cancer Screening Program [6]; while uptake of CCS by different age groups, ragned broadly from 1.5% to 73.2% in the U.S. [7] and from 15.17% to 29.86% in the United Kingdom [8]. The literature also documented marked disparities in results between locale (rural versus urban areas), income (poor versus wealthy), and ethnicity [9,10]. Overall, most programs require repeated screening for the same individuals every few years, yet uptake of the second and third screenings reflect marked decreases. For example, the Norwegian Breast Cancer Screening Program approached 1,383,032 women, approximately 80% of whom participated in an initial screening, yet only 4.6% and 2.6% returned for the second and third screenings respectively [11].

Although researchers hold different perspectives on the optimal uptake rate of cancer screening (CS), there is a clear need for cost-effective measures in modulating the service utilization, correcting under-, over- and disproportionate use. Factors contributing to screening uptake are complex and not well-understood in the literature, but can be summarized into two broad categories: (1) demographics (e.g., age, gender, education, household income, occupation, and availability of screening) [12–14]; and (2) psychological determinants (e.g., perceptions about risks of cancer

* Corresponding author at: 81 Meishan Road, Hefei, Anhui, 230032, China.
E-mail address: dbwang@vip.sina.com (D. Wang).
[1] Tao Jiang and Donghua Wei are equal first authors.

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and perceived barriers to screening) [13,14]. While most studies reviewed have focused on associations between screening behaviors and socio-demographic and structural factors, there is a growing interest in exploring values and beliefs about sexual behavior, fatalism, and concepts about disease and health etc., and identifying the roles of such factors in women's decisions and behaviors regarding CS [13–15]. However, these values and beliefs increase or decrease the likelihood of CS use dynamically via direct and indirect pathways and thus pose a challenge for understanding and promoting the screening behaviors [15–18]. Psychological theories provide systematic views for tackling these challenges [14,17–19]. The current study analyzes psychological determinants of the demands for BCS/CCS among adult residents in Hefei, a representative city of the majority cities in China using the health belief model (HBM) as the guiding framework. Applied to the specific case of breast and cervical cancer screening, HBM holds that a person's use of the service is a function of the following beliefs: 1) perceived risks (PR) to cancer ("Am I at risk for cancer?"); 2) perceived severity (PS) of the condition ("How will cancer affect my life?"); 3) perceived effectiveness (PE) of CS ("Is cancer screening effective in detecting early stage cancers?"); 4) perceived benefits (PB) of CS ("If I participate in cancer screening, can I avoid the disease?"); 5) perceived difficulties (PD) to using CS ("I don't have time to seek cancer screening").

Developed in the 1950s, the HBM has been widely used as a systematic method to explain and predict health behaviors [17–21]. However, empirical evidence about using HBM constructs in exploring BCS/CCS remains scant and the few published studies uncovered interesting findings. Some of the HBM constructs (e.g., PB and PD of the screening) identifiied strong links with BCS/CCS; while others (e.g., PR and PS of the cancers), demostrated relatively weak or no relations. Furthermore, these associations between screening behaviors and patient perception varied substantially across different ethnic groups [18–20]. China is a nation with unique and strong traditional values and concepts about cancer and related health services. How HBM constructs affect BCS/CCS in China merits particular attention. More importantly, the nation has a population of over 1.3 billion with an estimated annual incidence and mortality of 187,213 and 47,984 respectively due to breast cancer and 61,691 and 29,526 due to cervical cancer in 2012 [22]. With funding by the central government, China has been piloting free BCS/CCS since 1986 [23]. Since 2012, the nation has sped up expansion of these screening programs. However, uptake of the screening remains very low [24,25]. These all point to a clear need for better understanding of the underlying causes and inform future efforts for promoting CS in China. The current study aims to investigate relationships between demands for BCS/CCS and related HBM constructs.

2. Methods and statistics

2.1. Study design and content

The study adopted a cross-sectional design and a cluster-randomized sampling in which 960 female residents were selected from 8 communities in Hefei, China. The sampling and recruitment proceeded in the following steps: a) random selection of 1 community from each of the 8 districts in Hefei; b) random selection of 1 index household from each of the community selected; c) randomly selection of one eligible member as the respondent from the household selected; d) door-by-door recruitment of one respondent from each of the households being closest to the index household until a preset number (120 eligible residents per community) had reached. Criteria for inclusion were women who: a) had registered residence in Hefei and were actually living in the sampled community when this survey was conducted; b) aged 40–70 years (the prevalence rate of breast and cervical cancer starts to grow rapidly from around 40 years old and the proportion of woman being able to give reliable response to the survey begin to decrease from around 70 years old); and c) were willing to participate and able to answer the questions.

Variables measured in this survey comprised three categories: a) social demographics (e.g., age, education, income, type of health insurance coverage); b) demand for BCS and CCS; and c) HBM constructs. Here, the HBM constructs included perceived risks of getting cancer (PR, 14 interview items), perceived seriousness of cancer (PS, 12 items), perceived effectiveness of BCS/CCS (PE, 4 items), perceived benefits from CS (PB, 9 items) and perceived difficulties to taking CS (PD, 9 items). These items were partly drown from previous studies [17–21] and partly designed by the study team under the guidance of HBM. Both the for BCS and CCS consisted of 6 items soliciting information about times of past BCS/CCS and preferred frequency of and willingness to participate in and pay for future screening (see Table 2, Supplemental content, which illustrates the survey questionnaire). The questionnaire had been piloted before commence of the study and the standardized Cronbach's Alpha values of PR, PS, PE, PB, PD and DS ranged from 0.79 to 0.94.

2.2. Value assignment

The study employed 2 kinds of indices: a) demand index for BCS (DI-BCS) and demand index for CCS (DI-CCS); and b) five HBM construct indices, i.e., perceived risks index (PRI), perceived seriousness index (PSI), perceived effectiveness index (PEI), perceived benefits index (PBI) and perceived difficulties index (PDI). Calculation of each of these construct indices adopted both non-weighted and weighted sums. Non-weighted sums are calculated according to $NS = (\Sigma_i^n = 1x_i)$; while weighted sums, $WS = (\Sigma_i^n = 1w_i x_i)/n$. Here x_i = the i^{th} item of questions designed to measure the construct under concern; n = the total number of items included in the construct; w_i = the weight of the i^{th} item generated from a linear regression model using DI-BCS or DI-CCS as the dependent variable and x_i as the independent variables. Similarly, DI-BCS or DI-CCS $\Sigma_j^6 = 1 w_j x_j$. Here, w_j = the average relative weight of the j^{th} item given by a panel of eight informants (including 4 attendees to breast and cervical cancer screening service and 2 physicians and 2 researchers on the service).

2.3. Data collection and analysis

Field data collection took place during early June to late July 2015. A structured interview was administered at the informants' households. The data collected from the field were double-entered using Epidata 3.1 (Odense, Denmark) and analyzed via SPSS 10.01 (International business machine corporation, U.S.). The initial analysis centered on descriptive summaries intended to examine the patterns of distributions of the variables and check for normality of the continuous variables, e.g., DSI, PSI. The next step estimated, using two-sided tests of the null hypothesis, the power of differences between different sub-groups in terms of specific items and compiled indices with p-value <0.05 being considered statistically significant. The last step performed multivariate regression modeling to determine independent influencing factors of demand for CS.

2.4. Ethical approval

The study protocol had been reviewed and approved by the Biomedical Ethics Committee of Anhui Medical University. Participation in and withdrawal from the study were voluntary

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