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Cervical Cancer Screening's Predictors in European Countries: A Systematic Review

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Abstract

Objects: The study aim to explore the socio-demographics factors influencing women's decision of cervical screening uptake in European countries.

Methods: Systematic review was used with Health Belief Models analysis.

Results: The study identified 15 studies about cervical screening uptake's predictors. Perceived risks and barriers are predictors of screening practices, and heavily influenced by socio-demographic characteristics of women with organizational factors from public health systems.

Conclusion: Screening behaviors of women in European countries are influenced by various factors, and can be predicted by HBM. This review summarizes these driving factors to foster understanding of cervical cancer screening in population. To increase screening uptake, healthcare staffs should integrate these factors into cervical screening programs along with education and services improvement.

Introduction

Despite remarkable advances in treatments, cervical cancer has remained a great burden of health in European countries [1, 2]. As a sound prevention measure, cervical screening is highly recommended for women aged 25-65 [3].

Many factors such as socio-demographics [4, 5] can impact cervical screening's uptake. Many studies in USA showed that screening practices are impacted by socio-demographic factors [6]. To explore these factors roles in women's decision about cervical screening, this review aims to apply Health Belief Model (HBM) [7] - a recommended tool for prediction of screening uptake [8, 9] - to analyze cervical screening practices and its predictors in European countries.

Understanding how socio- demographics factors influencing attitudes and beliefs in cervical screening, health care providers and policy makers can develop better accessible screening programs.

Methods

Data Sources

A systematic review is conducted to assess cervical cancer screening's predictors in European countries. The study utilized electronic databases including PubMed, MEDLINE, health journals from 2000 to 2018 under terms: "cervical cancer screening", "European countries", "health belief model", "perceived risk", "predictors", "socio-demographics factors". A supplementary search in references of relevant articles provided additional input. The process was illustrated in Figure 1.

Study Selection

The study examined all qualitative and quantitative study designs including multiple research methodologies. The inclusion criteria included English language, European countries research of socio-demographic factors roles in cervical cancer screening practices; preferably HBM's application. The exclusion criteria were studies not involved cervical cancer screening and socio-demographic factors; not conducted in European countries; inaccessible data; not in English.

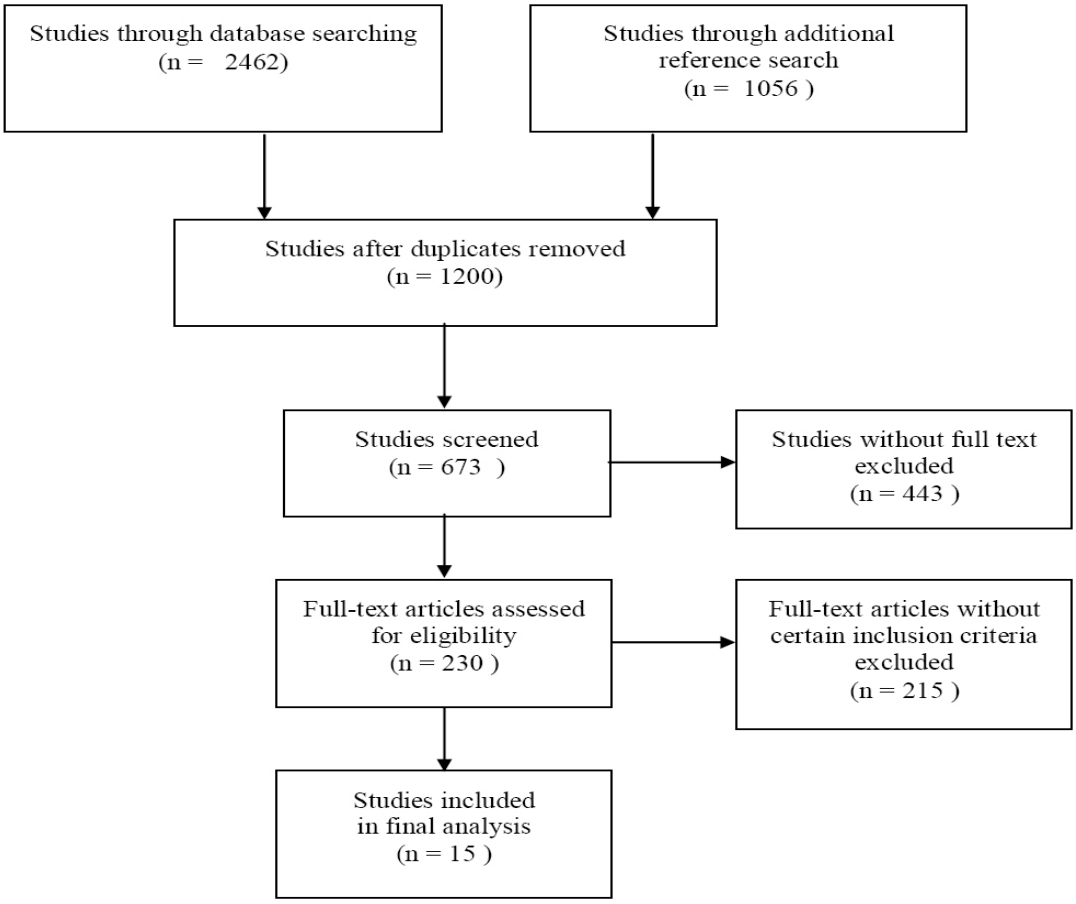

Figure1. S*tudies search process.*

RESULTS

Data Outcomes

The initial database search identified 2462 articles. After reviewed by inclusion criteria, 15 studies were identified. While sample size of these studies ranged from 46 to 1890, research population was determined by either randomization, convenience or purposive sampling. Subjects in these studies were women within 14-65 years old**.** Cross-sectional descriptive design was used most frequently, followed by 2 qualitative reviews [10, 11], 2 prospective studies [12, 13], 1 randomize control trial [14], 1 case-control study [15]. While most studies were involved socio-demographics factors, 1 study focused on smoking [16], 3 studies focused on minorities [17-19]. Applied methods were varied: interview, survey and focus groups. Language barriers were reported in 2 studies with minorities [18, 19]. 2 reviews featured HBM [15, 20], all studies covered perceived risk, barriers and attendance to screening.

Further details are illustrated in Table 1.

Table1. *Summarize of studies review*

Authors Years countries	Study design Population	Sample size	Outcomes measures	Results	Discussion
Sonja Eaker et. al. (2001) Sweden [15]	Case-control study Population-based Screened and non-screened women aged 25-60 years	944	HBM models Attitudes and beliefs' affect on women's participation in cervical screening	Attendance was positively associated with perceived severity (OR = 1.9) and satisfactory benefits (OR = 0.7), but negatively associated with barriers (time-consuming and economical - OR = 1.2 and OR = 1.7 respectively), anxiety [15] Nonattenders need their preferences to be met to change behaviors.	Differences between nonattenders and attenders are based on their attitude and beliefs. Main barriers are emotion, misunderstandings and lack of relevant information. The study had access to national database but low response rate in nonattenders responses.
Theresa M Mateau et. al. (2002) United Kingdom [16]	Cross-sectional descriptive study Women aged 20 - 64	722	Smokers' and non-smokers' perceptions of risks of cervical cancer and attitudes towards cervical screening.	Smokers perceived higher risk of cervical cancer but less positive attitude towards cervical screening than non-smokers. Intention to attend cervical screening in both groups were high. Attitudes towards cervical screening (OR = 1.9), perceived relative risk of developing cervical cancer (OR 1.5), educational level (OR = 3.8) and marital status (OR = 0.6) were predictive of attendance for screening. [16]	Having a positive attitude towards cervical screening and a higher perception of the relative chances of developing cervical cancer each predicted intention to attend for cervical screening. Smokers are unaware of their increased risk of cervical cancer and benefit of cervical cancer screening. Limitations are not directly assessed screening behaviors.
Rachel M Holloway et. al. (2003) United Kingdom [14]	Pragmatic, practice-based cluster randomized controlled trial. Women were recruited while attending for cervical screening	1890	Stated preferences for screening interval and actual screening behavior.	Interventional women was less likely to attend a shorter than recommended interval (OR = 0.51; $p < 0.0001$) and less likely to attend for screening sooner than their recommended recall. [14] Intervention have demonstrated better knowledge and perceived risk, screening practices and anxiety relief. The impact of perceived risk on actual screening behavior was equivocal. [14] Control groups overestimate of population risk of cervical cancer due to public health campaign, media scares and lack of knowledge. [14]	Perceived risk contributed greatly to determine screening intervals and practices. Individualized risk communication by primary care can affect women's stated preferences for tests and perceived risk. Different samples in control and intervention groups can affect the comparison although large sample size and longitudinal experimental study are strengths.

DP French et. al. (2004) United Kingdom [13]	Prospective questionnaire design Women with normal test results and women with inadequate test results	406	Perceived risk and perceived barriers among attenders and nonattenders of cervical screening	Woman with negative results have higher risk perception (P = 0.016), higher anxiety state (P = 0.025), higher concern (P<0.001). [13] Predictors of attendance of repeat test was anxiety (P = 0.001) (13) Perceived risks are predictive with higher state anxiety (P = 0.042), lower satisfaction with given information (P<0.001), high concern. [13]	Attendance was not associated with any demographic variables but was predicted by state anxiety, expectation and satisfaction with given information. Satisfaction with information was best predictor of anxiety and concern about the tests. The study's limitation is generalizability due to sample and observational design (not infer the causal associations).
Jane C. Walsh (2006) Ireland [12]	Prospective quantitative design Irish woman aged 25-60	1114	Impact of knowledge, perceived risk. past experience and perceived barriers on attendance for a routine cervical screening	Poor levels of knowledge about cervical cancer and screening. Unpleasant past experience of smear test were associated with nonattenders (P<0.001) [12] Screening attenders' behavior predictors included increased perception of risk (P < 0.05), level of understanding about cervical screening (P = 0.001), and perceived barriers (time consuming (P < 0.01); distressful (P < .01) and fear-provoking (P < 0.05). [12] Male smear taker, commitments and unsuitable appointment times also barriers. [12] Married/retired women are more likely to attend screening -> more social support and more time.	Barriers play a crucial role on attendance rates. Highlighting benefits of cervical screening, provision of more flexible services to accommodate more women, media campaigns on acknowledging discomfort of the test can enhance attendance rates.
Margot Tacken et. al. (2006) Netherlands [21]	Cross-sectional descriptive research design Dutch women (30-60 years old)	1392	Impact of women's characteristics (demographics, risk behavior, and beliefs) and services characteristics on cervical cancer screening.	Beliefs about cervical screening and attendance especially personal moral obligation and normative beliefs of others are good predictors of uptake. (p<0.05) Organizational factors such as invitation and reminders in general practice also contributed. [9] Screening attendance of women with one sexual partner lifelong is significantly greater than that of women with none or more than one partner lifelong. [9]	Woman's belief is better predictor of uptake of cervical screening than organizational aspects. A balance relationship influences on the screening attendance. Demographics do not play significant roles. Poor perceived risk and lack of information are reasons of non attenders

Laura AV Marlow et. al. (2009) United Kingdom [22]	Cross-sectional quantitative design (interview) British women age 16-75 years	965	Perceived risk of cervical cancer and cervical screening practices	HPV information did not have an effect on perceived risk of cervical cancer (p=.396), but have increased perceived risk (p<.001) in the youngest age group and decreased in the oldest age group. [22] Perceived risk have positive correlation with attendance in cervical screening in high-risk age groups (p=0.022) Barriers: long-term relationship (older women), fear (younger women) [22]	Health information has more effect on perceived risk of younger women than older women. Perceived risks are main driver in cervical screening behaviors for younger women.
Kati Kuitto et. al. (2010) Germany [23]	Cross-sectional descriptive research design German women aged 14–65 years	760	Determinant of attendant to cervical cancer preventive measures	Regular screening attendance was best predicted by attitude; also by socio-structural characteristic and subjective risk. Screening attendance was significantly higher among respondents of higher socioeconomic status and higher educational attainment. Lack of willingness to invest in a healthy lifestyle was predictive of irregular screening attendance. Knowledge of cervical cancer/prevention was not predictive of screening practices. [23] Attendance at screening was associated with positive connotation of cancer prevention and expectations (role models, confidence gains, fear and high risk perception. (OR 1.77) [23]	Cervical cancer screening behaviors are positive related to perceived benefit of regular screening. Low respondent rate for younger age groups (14-26 years old) Low level of knowledge about cervical cancer and its risk factors
J Waller et. al. (2011) United Kingdom [11]	Qualitative review (focus group, interview) UK screening professionals, nonattenders (25-65 years old)	58	Barriers to attendance at cervical screening.	Barriers (by health professionals): poorly informed of services, mobility, poor service provision, time pressure, low perceived risk and poor attitude, psychological barriers and paternalistic attitudes. [11] Barriers (by women themselves): disinclined abstainers (sexually inactive, potential harm), inclined abstainers (service provision issue, negative emotion, time demand, low-risk perceptions) [11] Older women tend to make an active decision not to take part and younger women intended to be screened but did not attend.	Services provision and health education play crucial role in cervical cancer screening practices. Time demand and perceived risks are main drivers of nonattendance in cervical screening. Age differences are barriers to screening.

Alice Kivistik et. al. (2011) Estonia [18]	Cross-sectional population based survey design Women aged 30 to 55	1054	Awareness of cervical cancer risk factors, reasons why women do not want to participate in cervical screening program.	Perceived barriers are a recent visit to a gynecologist (42.3%), fear-provoking (14.3%), long appointment queues (12.9%) and unsuitable reception hours (11.8%), language differences in minority groups. Fear was higher among women aged 30 and 35 than 50 and 55 (RR 1.46) and women with one or no children (RR 1.56). [18] Awareness of cervical cancer risk factors is poor and not depend on socio-demographic factors. Awareness is lower in minorities groups.	Lack of information sharing about cervical cancer risk factors and screening. Individualized and delicate information sharing can encourage women to uptake the screening. Minorities, older women or women with small or no children are at higher risk. Low response rates, potential biased due to the interest of cervical cancer.
Christine Ekechi et. al. (2014) United Kingdom [17]	Cross-sectional study using questionnaire Black women aged 18 - 78	937	Socio-demographic and ethnicity-related predictors of cervical cancer knowledge, cervical screening attendance and barriers in black women	Perceived barriers of poor attendance for screening are procrastination (28%), fear of the procedure (18%) and low risk perception (18%). Most nonattenders are young ($p<0.05$), single ($p<0.05$), and higher education level ($p<0.005$). [17] Ethnicity, birthplace and religiosity are listed as barriers for screening attendance. Young age ($p<0.005$), single, African ($p<0.05$), migrated ($P<0.005$), religious services attendance ($P<0.05$) were associated with poor screening practices. [17]	Ethnicity, migration and religiosity play a role in predicting cervical screening attendance among Black women. Those who attend religious service on a frequent basis were more likely to delay cervical screening. The study took a novel approaches to recruit and target a specific ethnic group resulting in larger sample size. Although lower response rate, limited diversity in socio-cultural factors in recruitment and language barriers can be limitation.
Gokce B. Acar et. al. (2015) Turkey [20]	Cross-sectional descriptive research design Women 15 -49 years old	267	HBM models Socio-demographic and cultural features, socioeconomic conditions, health perspectives, the knowledge about cervical cancer and Pap smear test	Lack of any health complaints (28.3%) and not having adequate information about the test (21.0%) were barriers for not undergoing a Pap smear test. Education level, employment status and pregnancy status have positive correlation with screening behaviors and knowledge of cervical cancer ($p < 0.05$). [20]	Awareness, susceptibility and motivation perception towards screening was low. Socio-demographic properties of women are influential on their Pap smear test taking attitude. Informed women are more willing to take the test.

Fatima Azerkan et. al. (2015) Sweden [19]	Focus group discussions Danish and Norwegian immigrant women (27-66 years old)	800	Perception of cervical cancer screening and driven factors of nonattenders for cervical cancer screening	Barriers: competing needs, organizational and structural factors, immigration-related perceptions, past experiences, psychological and individual factors, childbearing-related factors, social support, social network, risk perception. [19]	Immigration factors may influence cervical cancer screening behavior, including self perception and experiences; along with other social and individual factors. Many immigrants are unaware of being non-attendance.
Mihaela Grigore et. al. (2017) Romania [24]	Cross-sectional study Women from rural and urban areas	454	Perception and awareness of pap smear tests	Good awareness of pap smears, lack of knowledge and acceptance of screening showed in lower socio-economic status and rural women. [24] Perceived barriers: financial difficulties, embarrassment, fear, lack of counselling, low-risk perceived, lack of knowledge, fatalistic attitude, low susceptibility perceived. [24]	Socio-demographic characteristics of individuals have significant effects on knowledge and benefit of Pap smear and acceptance. The study have large sample from different socioeconomic statuses.
Hersha Patel et. al. (2018) United Kingdom [10]	Qualitative review (interview) 25-65-year-old UK women	46	Awareness and attitudes towards HPV screening	Knowledge: Lack of information about cervical cancer screening program content and follow-up assessment necessary. Attitude: not motivated to participate after HPV information provided Perceived risks: not motivated to have follow-up test after negative results, negative emotion after positive results. [10] Perceived barriers to participation: long-term relationship sabotage; social judgement of high-risk lifestyles compared with nonattenders. [10]	Educational methodology might not be deliverable to women for motivation and information about cervical screening. Lack of risk and health communication between nurses/doctors and patients. Perceived risk and participation affected by cultural, religious and lifestyle background. Lack of/negative partner support may worsen adverse psychological effects experienced. Small sample size and lack of cultural and religious factors assessment are limitations.

Awareness and Knowledge

Overall women's awareness of cervical screening services were high (75%-95%) [5, 18, 20, 24]. Studies found significant association between awareness and socio-economical factors and minorities status indicating socioeconomic disparities of healthcare accessibility [18, 24]. Two studies in UK stated that women were only aware of the test after receiving positive results [10].

On the other hand, lack of knowledge about cervical screening and cervical cancer risk were notable in many studies (48%-70%) [12, 17, 18, 20, 24]. Better knowledge were observed in screening attenders [12], dominant ethnic groups [17, 18], child-bearing [18], higher education, older age [17, 20, 22]. Knowing someone with cervical cancer [20, 24] and visiting healthcare [24] were also predictors for knowledge. While some studies observed significant relationship between marriage status, income and knowledge [20, 24], the opposite was true to Kivistik [18] and Ekechi [17]. Two studies did not observe knowledge as a predictors of screening attendance [12, 23].

Perceived Susceptibility

Susceptibility as women's perception of the likelihood of experiencing cervical cancer was relatively low [20]. Lack of knowledge of cervical cancer and its risk factors [20, 24], having no symptoms [20, 24], low-risk perception [15, 17, 24], monogamous lifestyle, belief in partner's sexual health, religious belief [10] or not sexually active [11], young age [11, 19] were common low susceptibility beliefs observed. While no different of perceived risk was shown between smokers and nonsmokers [16], younger and older [11]; sexually active and inactive women [10] and women had experienced positive smear test versus negative [13, 20] had different view of their vulnerability of cervical cancer. Such disparities between age and lifestyle showed the socio-cultural influences on women's misconceptions of cervical cancer, resulting in low screening attendant rates. Presentation of HPV information are suggested to improve perceived risk in younger women [14, 22].

On the other hand, women with chronic diseases [20] and who regular attended screening services [12, 22] perceived themselves as higher susceptibility. Greater perceived risk of developing cervical cancer was predictor of attention/attendance to screening services [12-16, 22]

Perceived Severity

As women with higher education, higher income, chronic diseases [20], sexually active [10], regular attend cervical cancer [12] perceived higher severity of cervical cancer, non attenders tended to see cervical cancer as less severe compared to other cancer and not worth treated [15].

One study suggested that women were likely to perceive cervical cancer much more common and severed than reality because of media coverage [11]; while another stated women's risk perception seemed to be connected to the health problems of people in their social circles [19]. Perceived risk of developing cervical cancer was also higher in women with uninformative results [13]. Overall, perceived severities are influenced by socio-economic factors and lifestyle. Higher perceived severity was a moderate predictor of screening practices [10, 12].

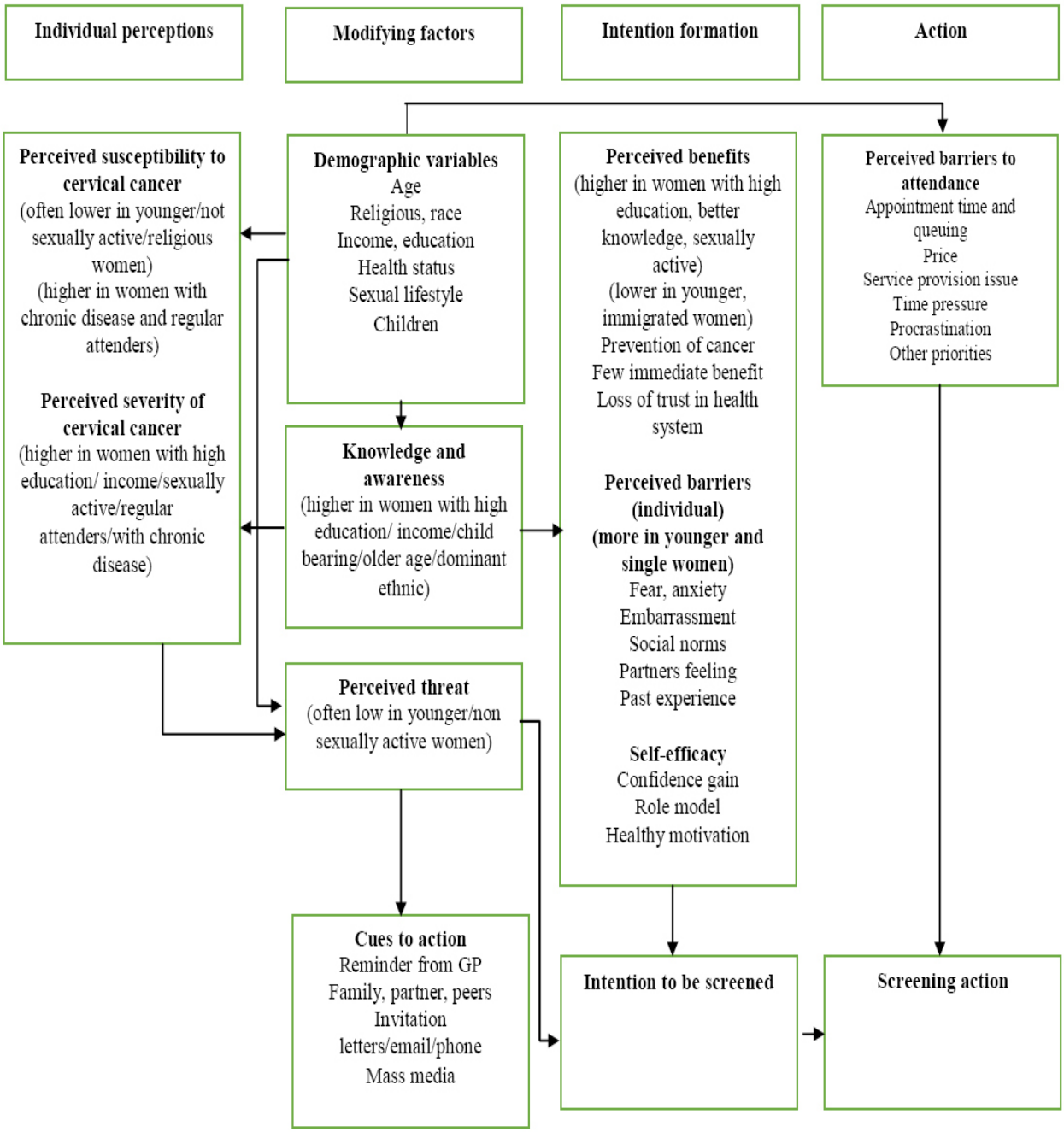

Figure2. *Predictor of cervical screening practices using HBM.*

Perceived Benefit

Women's belief in cervical screening's benefit score was recorded high in Turkey's study [20]. Perceived benefit was higher in high educated, employed women with better knowledge and practices of screening [20]. Kuitto also stated that as women perceived cervical screening as a sound cancer prevention and positive health promotion, such benefits can improve screening practices [23]. Additionally, studies in United Kingdom showed women acknowledged primary HPV screening as beneficial to their reproductive health and cancer prevention,

especially in sexually active groups, then consequently attend screening more often [10, 11, 16]. In contrary, perceived benefits were not acknowledged as a predictor for screening behaviors [15, 20].

However, as cervical screening demonstrated fewer immediate benefits [11], perceived benefits in younger women were low [20]. Lower perceived of benefits were also consistent in 2 studies in Sweden [15, 19], as both found nonattenders' negative feeling towards quality and accuracy of the screening as well as healthcare system. It is possible that perceived benefits of cervical cancer are influenced by women's attitude towards health system.

Perceived Barriers

Perceived barriers in cervical screening included: fear of procedure [12, 13, 15, 18, 20, 24], low risk perception [19, 20, 24], time [11, 15, 24] and financial pressure [15, 24], embarrassment [11, 24], services provision issues [11-13, 18], social norms from religious, relationship and sexual implication [10, 11], negative partners support [10, 19], other commitments [11, 12, 20], negative past experience [11, 15], stress [12]. More barriers were recorded in younger and single women [17]. Higher barriers perception was associated with lower cancer screening practices [12, 15].

While Swedish immigrants' barriers also included competing needs, organizational and structural factors and mentality differences, which related to immigration status [19], other studies on minorities groups did not detect these differences [17, 18].

According to one study, while higher educated, employed women with better knowledge and screening practices perceived less barriers, women who had family gynecological cancer history tended to feel more barriers towards cervical screening [20]. The result was not consistent with one study in UK showing higher educated employed women were more likely to provide barriers of nonattendance [17].

Cues to Action

Children, partners and health care providers are source of social support for women to attend screening [15]. If family and friends are supportive force [11, 12, 19, 23], health care providers [11, 19, 21] were perceived as opposing source that discourage women to seek cervical screening. Mass media also plays important role in this stage [11, 24]. Immigration groups reported to experience less cue to actions [19].

Self-Efficacy

Willingness to engage in health promotion behaviors [23], self-confidence gains [10, 23] and normative belief [21] are strongly associated with higher attendance of cervical screening.

Discussion

This review provided an insight look into cervical screening's practices and its predictors among European women. Perceived susceptibility, severity and barriers are most predictive of screening practices; as well as women's awareness and knowledge of cervical cancer, its risk factors and prevention measures. This outcome is consistent with previous findings [25, 26]. The influence of demographic factors such as ages, religious and ethnicity were presented most in knowledge and awareness of women, perceived susceptibility, benefits and barriers. Socio-economics' impacts were varied among awareness, knowledge and perceived severity, barriers. Considerations into these factors are crucial in implementation and improvement of current cervical screening in European countries.

Regarding perceived barriers, benefits, and cue to actions; organizational and structural factors play a big part in determinant of women's screening practices. As healthcare providers and healthcare quality were associated with screening attendance, public health should consider relevant strategies to enhance service provision such as individualized invitation letters [10, 11, 18], GP recommendations [11, 13, 18, 24] and desexualized screening [10].

Along with social norms and lack of partner's support, lack of knowledge and awareness of cervical screening effects heavily on women's perceived perceptions. An outreach intervention, especially for younger women [10] is needed to improve public understanding of cervical cancer.

The review encountered some limitations. Most studies are cross-sectional studies with quantitative measures so the causal impact on screening behaviors is not fully exposed. Many studies was carried out in United Kingdom hence the lack of diversity for other countries. Applied HBM also met some challenges and limitation to interpret the results due to inconsistency in usage of the model, inclusion of different components across studies. Moreover, small sample size and low response rate were commonly reported, emphasized on potential bias. From the review, current available approaches were insufficient to explain the perception and behavior of cervical cancer, research with alternative designs and more diverse contexts are needed [26].

Conclusion

Screening behaviors of women in European countries are influenced by various factors, and can be predicted by HBM. This review summarizes these driving factors to foster understanding of cervical cancer screening in population. To increase screening uptake, healthcare staffs should integrate these factors into cervical screening programs along with education and services improvement.

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