

Women's behaviours towards cervical cancer screening in the COVID-19 pandemic: A moderated-mediation-model based on Information-Motivation-Behavioural Skills

Ayşe Taştekin Ouyaba¹ | Selma İnfal Kesim²

¹Afyonkarahisar Health Sciences University, Health Sciences Faculty, Afyonkarahisar, Turkey

²Selçuk University, Akşehir Kadir Yallagöz Health High School, Konya, Turkey

Correspondence

Ayşe Taştekin Ouyaba, Afyonkarahisar Health Sciences University, Health Sciences Faculty, Afyonkarahisar, Turkey.
Email: ayse.tastekin@hotmail.com

Abstract

Aims: (1) To establish a predictive model based on the Information-Motivation-Behavioural Skills model, which can analyse the factors affecting the behaviours of women towards cervical cancer screening in the COVID-19 pandemic, and (2) to test the mediating effects of behavioural skills in the model, and (3) to test the moderated mediation effect of age.

Design: A cross-sectional study was conducted among 354 women aged 30–65 between May and August 2021 in Turkey.

Methods: Data were collected by using an online survey. The direct and indirect effects were tested in the structural equation model and the moderated-mediation effect was tested in the PROCESS macro.

Results: Behavioural skills mediate the effect of motivation on cervical cancer screening behaviours. In addition, age has a moderated mediation effect on this mediation effect.

Conclusion: Our study revealed that as women's motivation for cervical cancer screening increased, their behavioural skills also increased. It can be stated that middle-aged and older women with higher behavioural skills are more likely to have screening during the pandemic and to comply with national recommendations.

Impact: This study is the first quantitative study to test the impact of the components of the Information-Motivation-Behavioural Skills model on cervical cancer screening during the COVID-19 pandemic. In addition, the results reveal the mediating effect of behavioural skills in the relationship between motivation and cervical cancer scanning behaviour and the moderated mediation effect of age. Our results can provide insight for nurses into how to triage women with delayed cervical cancer screening, how to build screening capacity, and how intervention strategies should be developed to improve compliance with cervical cancer screening and follow-up recommendations in women at risk during and after the pandemic.

KEYWORDS

cervical cancer, COVID-19, mediating variables, modelling, moderator variables, nurse, screening, women

1 | INTRODUCTION

Cervical cancer (CC) is a preventable and treatable women's health problem. CC is the 4th most common cancer type in women worldwide (WHO, 2021) and the ninth cancer type in Turkey (Republic of Turkey Ministry of Health, 2019). To reduce CC mortality and morbidity in Turkey, the HPV (Human Papillomavirus) DNA (Deoxyribonucleic Acid) test and conventional cytology have been implemented since 2014. Women aged 30–65 are screened free of charge every 5 years. In this context, the HPV positivity rate was reported as 4.29% among 3.8 million women screened between 2014 and 2018 in two “mega” HPV laboratories in Turkey (Gultekin et al., 2019).

As known, with the Coronavirus-19 (COVID-19) pandemic that has affected the world since the beginning of 2020, there has been a disruption in preventive services, including cancer screenings, due to the focus of health services on COVID-19 treatment, individuals' avoidance of hospitals for fear of contracting the virus, and the stay-at-home restrictions. Initial reports in the United States of America (USA) on CC screening during the pandemic show a decrease of 90% (DeGroff et al., 2021; Mast & Munoz del Rio, 2020) in the first half of 2020, and a decrease of around 25% in the second half of 2020 compared to the previous years (Miller et al., 2021). There is evidence that even after stay-at-home restrictions in the USA were lifted, screenings remained 35% below historical averages (Mast & Munoz del Rio, 2020). However, even a six-month screening interruption due to COVID-19 is predicted to lead to an increase in the risk of CC (Castanon et al., 2021) and the number of CC cases by 2027 (Burger et al., 2021). Disruptions in healthcare related to CC screening and management of abnormal results may lead to an increase in CC incidence. This is a major global women's health issue that could exacerbate existing health inequalities (Wentzensen et al., 2021).

1.1 | Background

Little is known about the impact of the pandemic on attitudes towards cancer screening. If the pandemic has led to a change in the public's attitudes towards screening, it may have a long-term negative impact on cancer outcomes. Although health visits were allowed during the lockdown periods, attitudes and priorities may have been influenced by local restrictions. In addition, the ‘stay at home’ message may have been interpreted as the necessity of delaying the screening (Wilson et al., 2021). Making health-seeking decisions is complex, hence the need for a complex perspective. Few studies have so far examined the theory-based behavioural frameworks for interventions to help improve adherence during the pandemic (Wells et al., 2021). To our knowledge, no studies have yet investigated the predictors, mediators, and moderators of women's behaviour towards CC screenings during the COVID-19 pandemic.

1.2 | Theoretical framework and research hypotheses

1.2.1 | The Information-Motivation-Behavioural Skills model and behavioural skills as a mediator

The conceptual framework of this study is based on the three components of the IMB model (Fisher & Fisher, 1992): information, motivation, and behavioural skills. The model argues that these three components are the main determinants of behaviour. Information is the individual knowledge necessary for behaviour. Motivation is the individual's attitudes related to the behaviour. Behavioural skills consist of both actual skills and perceptions of self-efficacy necessary to perform the behaviour. The model predicts that individuals will acquire positive behaviour such as participation in CC screening, smoking cessation, or condom use to the extent that they are well informed about the target behaviour, motivated to take action, and possess behavioural skills. If these three components are explained with an example, being informed and motivated about the use of condoms to protect a woman from sexually transmitted infections is not sufficient to protect her from sexually transmitted diseases. She should also have the technical skills on how to use a condom and the interviewing skills to persuade her partner to use it (Public Health Agency of Canada, 2008).

In particular, information and motivation directly affect behavioural skills and health behaviours (Fisher & Fisher, 1992). However, besides the direct effect, information and motivation are also expected to have an indirect effect on behaviour through behavioural skills. In other sayings, behavioural skills have a strong and consistent mediating effect on these relationships (Limbu et al., 2019).

Based on this conceptual framework, we hypothesize that the impact of information and motivation related to CC screening on CC screening behaviours will be mediated by behavioural skills (Figure 1).

1.2.2 | Age as a moderator

Modelling pre-pandemic and post-pandemic screening outcomes can support risk-based strategies for improving CC screening services. However, even in countries with strong databases, it can be difficult for screening services to identify and prioritize patients based on risk profiles. In this situation, the simplest way to present a risk-based recovery strategy may be to prioritize by age (Castanon et al., 2021).

Compared to the year 2019, in California, participation in HPV screenings decreased by 78% among women aged 21–29 and by 82% among women aged 30–65 in 2020 (Miller et al., 2021). During the pandemic in Slovenia, the greatest decrease in smear screening and the greatest increase in annual

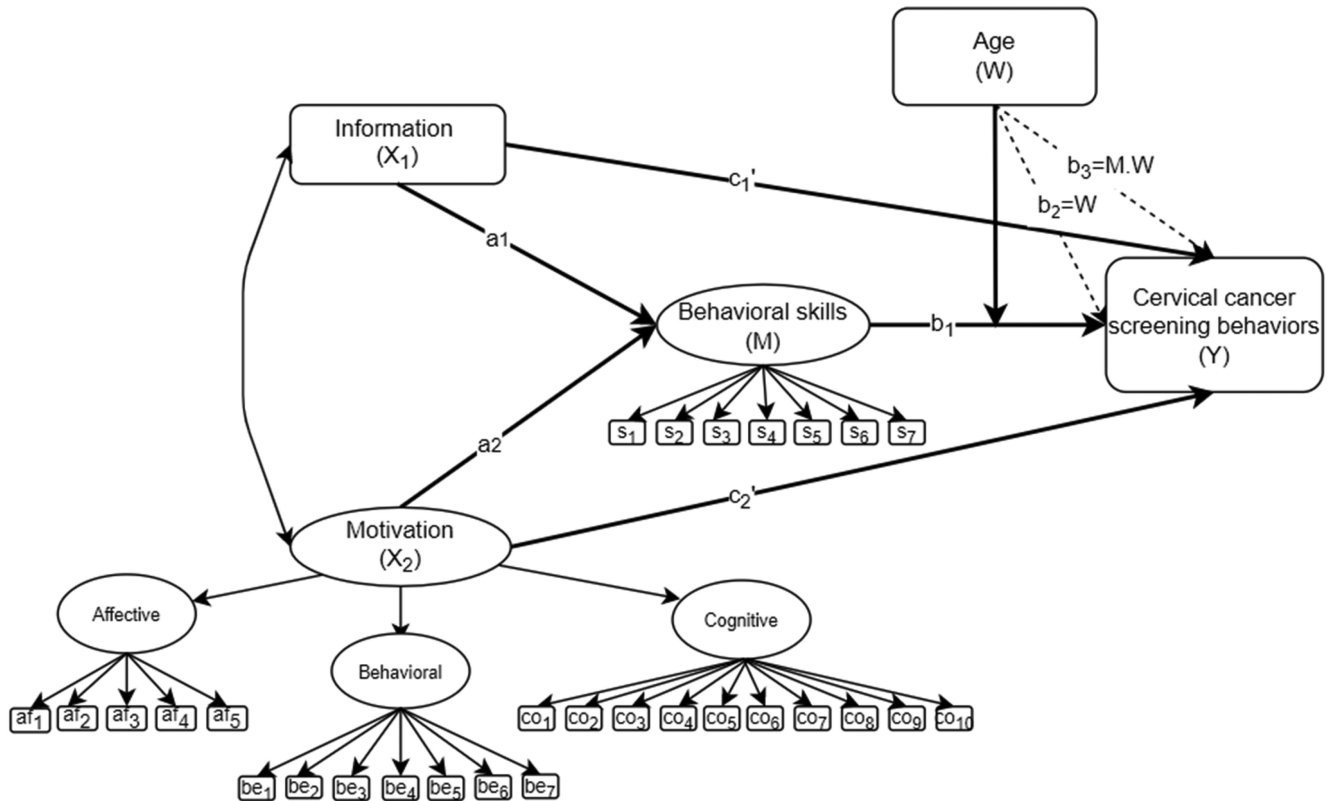


FIGURE 1 The hypothetical model

Path Hypothesis

$a_1 (X_1 \rightarrow M)$ H_1 Information affects behavioral skills.

$a_2 (X_2 \rightarrow M)$ H_2 Motivation affects behavioral skills.

$b (M \rightarrow Y)$ H_3 Behavioral skills affect cervical cancer screening behaviors (CCSB).

$c_1' (X_1 \rightarrow Y)$ H_4 Information affects CCSB.

$c_2' (X_2 \rightarrow Y)$ H_5 Motivation affects CCSB.

$a_1, b_1 (X_1 \rightarrow M \rightarrow Y)$ H_6 Behavioral skills mediate the effect of information on CCSB.

$a_2, b_1 (X_2 \rightarrow M \rightarrow Y)$ H_7 Behavioral skills mediate the effect of motivation on CCSB.

$a_2 (b_1 + b_2, b_3) (X_2 \rightarrow M.W \rightarrow Y)$ H_8 Age moderates the mediating effect of behavioral skills on the relationship between motivation and CCSB.

CIN2+ (cervical intraepithelial neoplasia grade 2 or worse) cases were reported in women aged 30–39 (Ivanuš et al., 2021). Given these changes, it is necessary to consider the age differences while determining the initiatives that could increase participation in CC screening during and after the pandemic. In this context, in addition to the conceptual framework of the IMB model described above, we hypothesize that age will regulate the mediating effect of behavioural skills on CC screening behaviours. In this way, we try to predict the best model that can explain participation in CC screening by examining women's participation in CC screening before and during the pandemic using cross-sectional and longitudinal methods (2016 and before, 2017–2019, and 2020–2021).

The hypothetical model we created based on these assumptions and the research hypotheses are given in Figure 1. In the figure, each one-way bold arrow represents the research hypothesis.

2 | THE STUDY

2.1 | Aims

This study aims (1) to establish a predictive model based on the Information-Motivation-Behavioural Skills (IMB) model (Figure 1), which can analyse the factors affecting the behaviours of women towards CC screening during the COVID-19 Pandemic, and (2) to test the mediating effects of behavioural skills in the model, and (3) to test the moderated mediation effect of age.

2.2 | Design

A cross-sectional study using Structural Equation Modelling (SEM) and PROCESS macro was conducted.

2.3 | Sample/participants

It is recommended that the sample size for SEM should be at least 150 (Gürbüz, 2019). Hayes et al. (2017) reported that using the PROCESS and SEM programs in a large sample (for example, 180) did not change the results. For these reasons, 390 online surveys filled out between May and August 2021 were considered for evaluation in our study.

The study included literate and married women in the 30–65 age group (appropriate age range for pap smear test), with internet access. The data on 11 women under the age of 30 were excluded from the study as they did not meet the inclusion criteria. In addition, some measures were taken to increase data reliability. Only one response attempt was allowed from each IP number to avoid filling out the same questionnaire several times. The limit to only one reply was activated. Data with a response time of fewer than 5 minutes were not considered reliable. For these reasons, 25 questionnaires were excluded from the study. As a result, the study was completed with the data obtained from 354 questionnaires.

2.4 | Data collection

The data were collected with an online survey prepared in Google form. The participants were invited to fill out the survey by sending the link via some online platforms (e.g., Instagram, Facebook, and WhatsApp). The first part of the survey explained the aim of the study and asked the participants to give their consent for participation in the study. Those who gave consent in this part were allowed access to the survey. It took about 10–15 minutes to fill out the survey.

The survey includes 32 questions to reveal the sociodemographic characteristics of the participants and their characteristics related to CC screening. The survey also included the following IMB components:

2.4.1 | Information

The participants have been posed the question “Have you information about CC before?” The answer “no” was scored as 1, and the answer “yes” was scored as 2.

2.4.2 | Motivation (attitudes and social support)

The motivation for CC screening was evaluated with the Attitudes towards Prevention of Cervical Cancer Scale (APCCS) (Dadak & Taştekin Ouyaba, 2021). The scale measures women's attitudes towards prevention from CC and consists of a total of 22 items under three factors: affective, behavioural, and cognitive. These factors include statements about knowledge of CC risk factors, signs, and symptoms (e.g. *Polygamy increases the risk of cervical cancer*); behavioural disposition towards CC early detection and prevention practices (e.g. *I have a regular Pap smear test*); positive, negative, or

neutral feelings about these practices (e.g. *I'm afraid of cervical cancer*); and social support (e.g. *If I had cervical cancer, I would tell my spouse first*). The items were scored on a five-point Likert scale from “I totally agree= 5” to “I totally disagree= 1”. Higher scores reflect a more positive attitude.

2.4.3 | Behavioural skills (self-efficacy)

The behavioural skills of the participants regarding CC screening were evaluated with the Self-Efficacy Scale (SES) (Beser et al., 2012). The seven items (e.g. *Even though the screening center is far away, would you join the screening?*) on the scale are scored between “definitely no = -3” and “definitely yes= +3”. A high score indicates a high self-efficacy perception.

2.4.4 | Behaviour (CC screening behaviour)

In this study, the main outcome is to analyse how, when, and in which situation CC screening behaviours are affected by the COVID-19 pandemic process. Therefore, the participants were asked when they last had a CC screening. The answer “I have never had a CC screening” was scored as 1, the answer “I had a screening a long time ago (2016 and earlier)” was scored as 2, the answer “I had a screening in the three years before the COVID-19 Pandemic (2017–2019)” was scored as 3, and the answer “I had a screening during the COVID-19 Pandemic (2020–2021)” was scored as 4.

2.5 | Ethical considerations

Ethical approval was obtained from the Selcuk University Faculty of Medicine Local Ethics Committee (dated 05.05.2021, numbered 2021/233).

2.6 | Data analysis

The normality of the distribution of the data was evaluated with the skewness and kurtosis coefficients. The multicollinearity between the measured variables was examined with Pearson correlation coefficients and variance increase factor (VIF). Descriptive statistics were used to analyse demographic characteristics and the variables. The validity of the scales was tested with the Confirmatory Factor Analysis (CFA), and the reliability was assessed with Cronbach's alpha coefficients. First, the measurement model was tested in SEM, and then the structural model was examined. Maximum likelihood estimation was used to test the hypothetical model. The ratio of chi-square statistics to degrees of freedom (χ^2/df), Goodness of Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Türker-Lewis Index (TLI), and Comparative

Fit Index (CFI) were used to evaluate model fit. GFI and AGFI values of 0.80 and above (Meydan & Şeşen, 2015); TLI and CFI values of 0.90 and above; RMSEA and SRMR values of 0.08 and below; and χ^2/df values of 3 and below (Gürbüz, 2019) were accepted as an indicator of fit.

The direct and mediating (indirect) effects between the variables were tested in the IBM SPSS AMOS 22 program, and the moderator effect was tested in the SPSS PROCESS macro v4 program with Model 14. To examine the significance of the mediation effect, a 95% deviation-corrected confidence interval (CI) was established from 5000 bootstrap samples. If the CI does not contain zero in the regulatory impact analysis, the effects have been considered to be significant. The level of statistical significance was set at $p < .05$.

2.7 | Validity and reliability/rigour

In CFA, it is tried to understand whether the measurement moulds whose factorial structure is known before are verified by the data and whether the assumed relations in the theoretical universe exist in the data set obtained because of empirical observation. Validated measurement tools must be used to test the hypothetical model. Therefore, items with a factor load of <0.50 in the CFA were removed (Gürbüz, 2019).

The Cronbach's Alpha reliability coefficient of the APCCS was 0.87 (Dadak & Taştekin Ouyaba, 2021). In our study, as a result of the CFA, six items with factor loadings below 0.50 were removed from the scale, and Cronbach's alpha for the remaining 16 items was found to be 0.88.

The Cronbach's Alpha of the SES is 0.85 (Beser et al., 2012). In our study, the factor loadings of all the items in the scale were found to be over 0.50 with the CFA, and Cronbach's alpha of the scale was found to be 0.91.

3 | RESULTS/FINDINGS

3.1 | Characteristics of the participants

The mean age of the women in the study was 42.0 ± 8.3 , and the mean age at marriage was 22.0 ± 4.2 . About one-third of women (31%) were university graduates. Women have an average of 2.0 ± 2.2 (0–15) children, 60.2% were unemployed, 57.9% have an average income, and 75.1% live in the city center. About half (47%) of women hesitated to go to health centers for fear of contracting COVID-19, 58.5% have never had a pap smear test before, and only 5.1% have had a screening during the pandemic (Table 1).

3.2 | Preliminary analyses

The descriptive statistics for the variables in the hypothetical model are presented in Table S1, and the correlation matrix between the

TABLE 1 Descriptive characteristics of women

	N (%) / mean \pm SD
Age	42.9 \pm 8.3
Education level	
Primary	125 (35.3)
Secondary	119 (33.6)
High	110 (31.1)
Husband's education level	
Primary	66 (18.6)
Secondary	159 (44.9)
High	129 (36.4)
Age at marriage	22.4 \pm 4.2
Working status	
Not working	213 (60.2)
Working	141 (39.8)
Husband's working status	
Not working	19 (5.4)
Working	335 (94.6)
Income status	
Bad	11 (3.1)
Middle	205 (57.9)
Good	138 (39)
Number of living children	2.8 \pm 2.2
First birth age	22.3 \pm 7.5
Cervical cancer (CC) information ^a	150 (42.4)
Getting the HPV vaccine ^a	29 (8.2)
Number of CC screening	0.8 \pm 1.2
Time to join the last CC screening	
I have never participated	205 (57.9)
Longer ago (2016 and earlier)	59 (16.7)
In the 3 years before the pandemic (2019–2017)	72 (20.3)
During the pandemic (2020–2021)	18 (5.1)
The situation in which COVID-19 prevents access to health care ^a	166 (46.9)
Total	354 (100.0)

^aOnly yes answers were given.

variables is presented in Table S2. The correlation coefficients of the variables with significant correlations range between $-.34$ and $.91$.

3.3 | Testing the hypothetical model

To test the model, first, the CFA was used to confirm whether the measurement model was validated by the data. After removing six items with factor loadings below 0.50 (af_3 , be_{1-5}), it was observed that the goodness of fit values of the measurement model was acceptable ($\chi^2/SD = 2.541$, GFI = 0.86, AGFI = 0.83, TLI = 0.90,

CFI = 0.91, RMSEA = 0.066, SRMR = 0.0645). Thus, the measured variables and the latent variables were adequately defined for the hypothetical model (Gürbüz, 2019; Meydan & Şeşen, 2015).

Secondly, the standardized regression coefficients of the hypothetical model were examined in SEM with standard errors and statistical significance (Figure 2). Pathway a_1 was removed from the model because the path between information and behavioural skills was not significant ($p = .718$, H_1 rejected). After repeating the analysis, pathway c_2 was removed from the model because the path between motivation and CC screening behaviours was not significant ($p = .068$, H_5 rejected). After repeating the analysis, the remaining paths were significant ($p < .05$), and the model fit goodness values ($\chi^2/SD = 2.535$, GFI = 0.86, TLI = 0.90, CFI = .91, RMSEA = 0.066, SRMR = 0.0655) were at an acceptable level (Gürbüz, 2019; Meydan & Şeşen, 2015).

3.4 | The direct and mediating effects

In the hypothetical model, the direct and mediating effects of the variables were evaluated with standardized regression coefficients and statistical significance (Table 2; Figure 2). Four of the seven recommended paths in the hypothetical model were statistically significant ($p < .05$; H_{2-4} , H_7 accepted). Motivation positively affects behavioural skills (H_2 ; $\beta = .53$, $p < .001$, 95%CI [0.42, 0.63]) and explains 28% of behavioural skills variability. Behavioural skills affect CC screening behaviours positively (H_3 ; $\beta = .22$, $p < .01$, 95%CI [0.12, 0.33]) and information affects CC screening behaviours negatively

(H_4 ; $\beta = -.35$, $p < .001$, 95%CI [-0.44, -0.27]). The two together account for 19% of CC screening behaviour variability. Behavioural skills mediate the effect of motivation on CC screening behaviours (H_7 ; $\beta = .12$, $p < .01$, 95%CI [0.06, 0.18]). In addition, a negative correlation was identified between information and motivation ($r = -.23$, $p < .001$).

3.5 | The moderated-mediation-model

The slope analysis results given in Figure 3a show the moderating effect of age. At lower ages, the relationship between behavioural skills and CC screening behaviours is not significant ($b = 0.003$, 95%CI [-0.010, 0.017]). At middle ages ($b = 0.012$, 95%CI [0.002, 0.022]) and older ($b = 0.021$, 95% CI [0.010, 0.033]), the relationship between behavioural skills and CC screening behaviours is significant.

Figure 3b shows a graphical representation of the situational mediating effect. The slope of the indirect effect line in the graph indicates that the moderate mediating effect of age on the indirect effect of motivation on CC scanning behaviours is through behavioural skills. In addition, the moderated mediation index value of age is significant (H_8 ; $b = 0.001$, 95%CI [0.000, 0.001]).

4 | DISCUSSION

The COVID-19 pandemic has posed significant challenges in maintaining cancer screenings and has led to a dramatic decline in CC

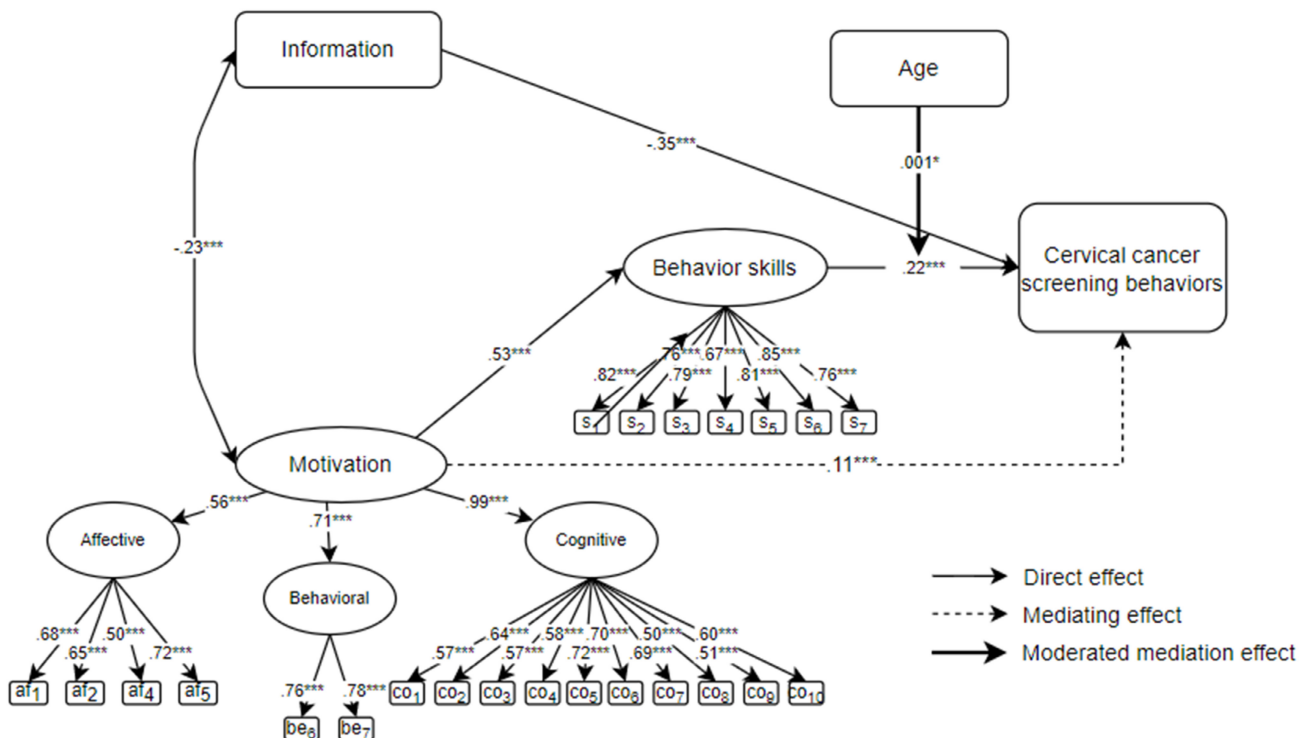


FIGURE 2 The final model

TABLE 2 Results for testing hypotheses (n = 354)

Hypotheses	Paths	b	β	SE	t	CR	BOOT 95% CL	R ²	F
Direct effects									
H ₂	Motivation → behavioural skills	1.395	.53***	0.205	—	6.817	—	.28	—
H ₃	Behavioural skills → CC screening behaviour	0.134	.22***	0.030	—	4.446	—	.19	—
H ₄	Information → CC screening behaviour	-0.691	-.35***	0.093	—	-7.419	—	—	—
Mediating (indirect) effect									
H ₇	Motivation → behavioural skills → CC Screening behaviour	0.186	.12***	—	—	—	LB (for β) .098 (.064) UB (for β) .313 (.183)	—	—
Moderated mediation effect									
H ₈	Constant	0.713	—	0.318	2.24*	—	LLCI 0.087 ULCI 1.340	.10	9.85***
	Motivation → CC screening behaviour	0.016	—	0.005	-3.28**	—	0.006	0.026	—
	Behavioural skills → CC screening behaviour	0.012	—	0.005	2.52*	—	0.002	0.022	—
	Age → CC screening behaviour	0.000	—	0.006	0.02	—	-0.011	0.012	—
	Behavioural skills X Age → CC screening behaviour	0.001	—	0.000	2.14*	—	0.000	0.002	—
Indirect effect									
	Lower ages (-SD)	0.003	—	—	—	—	-0.010	0.017	—
	Middle ages (Mean)	0.012	—	—	—	—	0.002	0.022	—
	Higher ages (+SD)	0.021	—	—	—	—	0.010	0.033	—
	Moderated mediation index	0.001	—	—	—	—	0.000	0.001	—

Abbreviations: b, unstandardized regression weights; BOOT, bootstrap; CC, cervical cancer; CL, confidence intervals; CR, critical ratio; LB, lower bounds; LL, low limit; R², squared multiple correlations; SB, screening behaviours; SD, standard deviation; SE, standard error; UB, upper bounds; UL, upper limit; β , standardized regression weights.

*p < .05; **p < .01; ***p < .001.

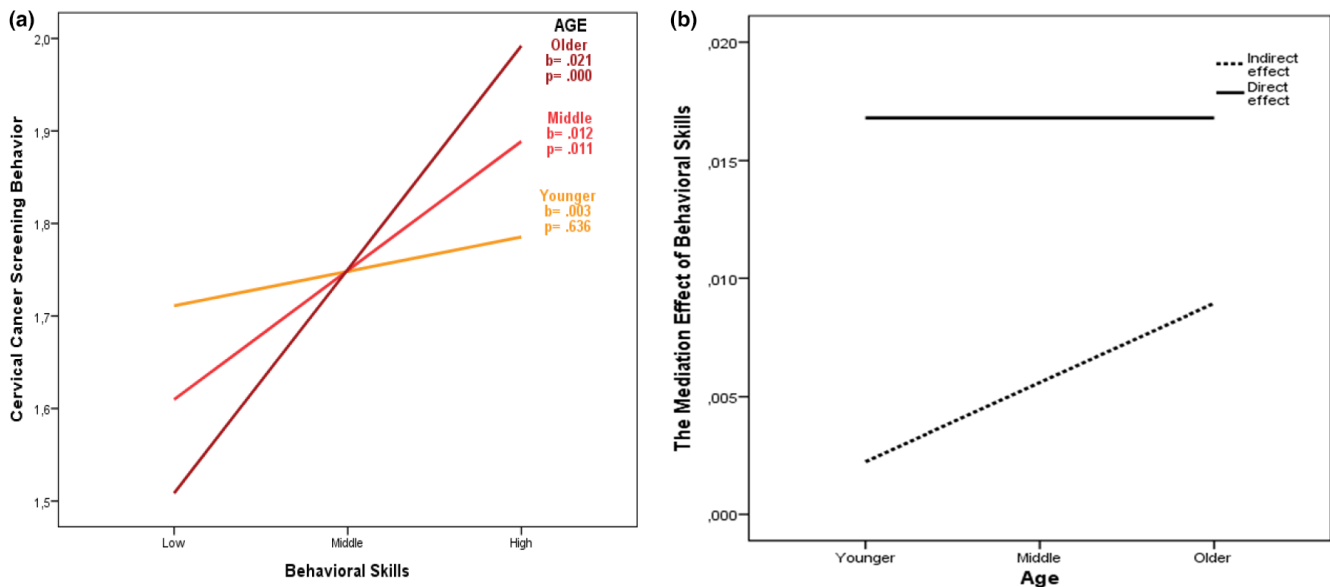


FIGURE 3 (a) the moderation effect; (b) the moderated mediation effect

screening (DeGroff et al., 2021). Although it is known that preventive services have decreased during the pandemic, the reasons for women's reluctance to have routine medical care have not been defined (Miller et al., 2021). Our study is the first quantitative study to test the impact of the components of the IMB model on having CC screening during the COVID-19 pandemic. In addition, our study reveals the mediating effect of behavioural skills on having CC screening and the moderated mediation effect of age in Turkish women.

According to the IMB model, high information and motivation correlate with health behaviours (Fisher & Fisher, 1992). In our study, it was revealed that women who stated that they did not receive CC information before and those with high motivation scores were more likely to have CC screening during the COVID-19 pandemic. Wells et al. (2021) pointed out that women are overwhelmed with too much information in this process and emphasized the importance of accurate information. The authors also stated that knowledge alone is not sufficient for behavioural change and motivation is necessary. These findings not only show that knowledge is not sufficient for the development of CC screening behaviours but also show that nurses working in primary care should be more proactive in increasing the motivation of the relevant population after the COVID-19 pandemic (Jazieh & Kozlakidis, 2020). Indeed, it has been determined in Slovenia that women who were encouraged and motivated to participate in CC screenings through communication channels had better participation in CC screening (Ivanuš et al., 2021).

According to Maslow's hierarchy of needs, having unmet basic needs results in anxiety, tension, and an impulse to relieve them (Bozyigit, 2021). Only when this tension is relieved can a woman focus on higher-order needs, such as following CC screening recommendations. For this at-risk population, it may be important to address each IMB component to identify strengths and facilitators while overcoming barriers (Wells et al., 2021). Our study reported that approximately one out of every two women (46.9%) did not go to health centers due

to the fear of contracting COVID-19, and one out of every 20 women (5.1%) had CC screening. In addition, in our study, it was found that as motivation increases in women, behavioural skills also increase, and similar to the IMB model (Fisher & Fisher, 1992), behavioural skills mediate the relationship between motivation and behaviour. A study conducted in the UK found that 15% of women chose not to have the screening due to COVID-19 (Wilson et al., 2021). Another study conducted in the UK reported that women were afraid to go to the hospital due to concerns about contracting or transmitting COVID-19 or they suspended their health concerns in order not to put further burden on health services (Quinn-Scoggins et al., 2021). Women delay participation in CC scans for reasons such as lack of information, lack of symptoms, or neglect (Kilic et al., 2019).

Determining the target age range is an important risk-based strategy to optimize cervical screening. At the same time, this strategy is cost-effective, ensures efficient use of resources, and has a positive impact on women's quality of life (Castanon et al., 2021). A modelling study of COVID-19-related delays in Australia found that the most common ages at which CC was diagnosed would be between the ages of 30 and 49 (Cancer Council, 2020). Our study revealed that the mediating effect of behavioural skills was significant if the female age was medium or high. Our results suggest that as age increases, the rate of screening and compliance with national recommendations may be higher. These results show an increased risk of CC in younger women.

4.1 | Strengths and limitations

This study includes some limitations. First, the data are cross-sectional and specific to Turkish women and thus, the findings should be interpreted cautiously. Second, the findings are based on self-report questionnaires, not clinically justified. For this reason,

they may include participant response bias. Third, validated measurement tools were used in testing the hypothetical model, though some items with low factor loadings in the CFA had to be deleted. Therefore, the original APCCS scale was not used.

Despite these limitations, our study is the first to investigate predictor, mediator, and moderator variables of CC screening behaviours based on the IMB model during the pandemic. In our study, the participation of women in CC screening before and during the pandemic was examined and we tried to estimate the best model that could explain participation in CC screening. In addition, our study confirms that prioritizing CC screening by age is the simplest way to offer a risk-based recovery strategy. Our findings can provide insight for nurses into how to triage women with delayed CC screening, how to build screening capacity, and how intervention strategies should be developed to improve compliance with CC screening and follow-up recommendations in women at risk during and after the pandemic.

5 | CONCLUSION

Our study revealed that as the participants' motivation for CC screening increased, their behavioural skills also increased. It can be stated that women with higher behavioural skills are more likely to have screening during the pandemic and to comply with national recommendations. The mediating effect of behavioural skills becomes significant as women's age increases. It can also be said that middle-aged and older women are more in line with national recommendations for participation in CC screening. Unfortunately, this also suggests that the risk of CC may increase in younger women in the coming years.

Our findings indicate that it would not be sufficient to focus only on obstacles, needs, or strengths to increase participation in CC screening during the COVID-19 pandemic and it also is necessary to take into account factors such as mediators or moderators. In addition, our findings may help advance and expand IMB interventions to encourage women at risk to have CC screening and to improve compliance with national screening guidelines.

CONFLICT OF INTEREST

No conflict of interest.

PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/jan.15447>.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Ayşe Taştekin Ouyaba  <https://orcid.org/0000-0002-5907-1140>
 Selma İnfal Kesim  <https://orcid.org/0000-0003-4696-6401>

REFERENCES

- Beser, A., Bahar, Z., Aydođdu, N., Ersin, F., & Kissal, A. (2012). Validity and reliability study for the self-efficacy scale. *HealthMED*, 6(1), 195–200.
- Bozyiđit, S. (2021). Evaluation of Maslow's hierarchy of needs theory within the context of COVID-19 pandemic. In M. Gülmez (Ed.), *Understanding the consumer behaviour during COVID-19 pandemic* (pp. 51–68). Akademisyen Bookstore.
- Burger, E., Jansen, E., Killen, J., Kok, I. M., Smith, M., Sy, S., Dunnewind, N., Campos, N., Haas, J., Kobrin, S., Kamineneni, A., Canfell, K., & Kim, J. (2021). Impact of COVID-19-related care disruptions on cervical cancer screening in the United States. *Journal of Medical Screening*, 28(2), 213–216. <https://doi.org/10.1177/09691413211001097>
- Cancer Council. (2020). *Modelled analysis of hypothetical impacts of COVID-19 related disruptions to the National Cervical Screening Program*. <https://www.health.gov.au/resources/publications/modelled-analysis-of-hypothetical-impacts-of-covid-19-related-disruptions-to-the-national-cervical-screening-program>
- Castanon, A., Rebolj, M., Pesola, F., & Sasieni, P. (2021). Recovery strategies following COVID-19 disruption to cervical cancer screening and their impact on excess diagnoses. *British Journal of Cancer*, 124(8), 1361–1365. <https://doi.org/10.1038/s41416-021-01275-3>
- Dadak, A., & Taştekin Ouyaba, A. (2021). Developing the attitude scale for protection from cervical cancer. *Journal of Nursing Measurement*, 29(2), 302–316. <https://doi.org/10.1891/JNM-D-19-00081>
- DeGroff, A., Miller, J., Sharma, K., Sun, J., Helsel, W., Kammerer, W., Rockwell, T., Sheu, A., Melillo, S., Uhd, J., Kenney, K., Wong, F., Saraiya, M., & Richardson, L. C. (2021). COVID-19 impact on screening test volume through the National Breast and cervical cancer early detection program, January–June 2020, in the United States. *Preventive Medicine*, 151, 106559. <https://doi.org/10.1016/j.ypmed.2021.106559>
- Fisher, J. D., & Fisher, W. A. (1992). Changing AIDS-risk behavior. *Psychological Bulletin*, 111, 455–474. <https://doi.org/10.1037/0033-2909.111.3.455>
- Gultekin, M., Karaca, M. Z., Kucukyildiz, I., Dundar, S., Keskinilic, B., & Turkyilmaz, M. (2019). Mega Hpv laboratories for cervical cancer control: Challenges and recommendations from a case study of Turkey. *Papillomavirus Research*, 7, 118–122. <https://doi.org/10.1016/j.pvr.2019.03.002>
- Gürbüz, S. (2019). *Structural equation modeling with AMOS*. Seçkin Publishing.
- Hayes, A., Montoya, A., & Rockwood, N. (2017). The analysis of mechanisms and their contingencies: PROCESS versus structural equation modeling. *Australasian Marketing Journal*, 25(1), 76–81. <https://doi.org/10.1016/j.ausmj.2017.02.001>
- Ivanuš, U., Jerman, T., Oblak, U. G., Meglič, L., Florjančič, M., Fležar, M. S., Sršen, T. P., Smrkolj, Š., Pakiž, M., Žakelj, M. P., Prevodnik, V. K., Pogačnik, A., Josipović, I., Mate, T., & Gobec, M. (2021). The impact of the COVID-19 pandemic on organised cervical cancer screening: The first results of the Slovenian cervical screening programme and registry. *The Lancet Regional Health - Europe*, 5. <https://doi.org/10.1016/j.lanepe.2021.100101>
- Jazieh, A. R., & Kozlakidis, Z. (2020). Healthcare transformation in the post-coronavirus pandemic era. *Frontiers in Medicine*, 7. <https://doi.org/10.3389/fmed.2020.00429>
- Kilic, A., Tastan, S., Guvenc, G., & Akyuz, A. (2019). Breast and cervical cancer screening for women with physical disabilities: A qualitative study of experiences and barriers. *Journal of Advanced Nursing*, 75(9), 1976–1986. <https://doi.org/10.1111/JAN.14048>
- Limbu, Y. B., McKinley, C., Gautam, R. K., Ahirwar, A. K., Dubey Harisingh Gour Vishwavidyalaya, P., & Jayachandran, C. (2019). Nutritional knowledge, attitude, and use of food labels among Indian adults with multiple chronic conditions a moderated mediation model.

- British Food Journal*, 121(7), 1480–1494. <https://doi.org/10.1108/BFJ-09-2018-0568>
- Mast, C., & Munoz del Rio, A. (2020). *Delayed cancer screenings—A second look*. EHRN. <https://ehrn.org/articles/delayed-cancer-screenings-a-second-look/>
- Meydan, C. H., & Şeşen, H. (2015). *Structural equation modeling AMOS applications* (2nd ed.). Detay Publishing.
- Miller, M. J., Xu, L., Qin, J., Hahn, E. E., Ngo-Metzger, Q., Mittman, B., Tewari, D., Hodeib, M., Wride, P., Saraiya, M., & Chao, C. R. (2021). Impact of COVID-19 on cervical cancer screening rates among women aged 21–65 years in a large integrated health care system—Southern California, January 1–September 30, 2019, and January 1–September 30, 2020. *Morbidity and Mortality Weekly Report*, 70(4), 109–113. <https://doi.org/10.15585/mmwr.mm7004a1>
- Public Health Agency of Canada. (2008). *Canadian guidelines for sexual health education*. <http://sieccan.org/pdf/guidelines-eng.pdf>
- Quinn-Scoggins, H., Cannings-John, R., Moriarty, Y., Whitelock, V., Whitaker, K. L., Grozeva, D., Hughes, J., Townson, J., Osborne, K., Goddard, M., McCutchan, G., Waller, J., Robling, M., Hepburn, J., Moore, G., Gjini, A., & Brain, K. (2021). The impact of COVID-19 on cancer symptom experience and help-seeking behaviour in the United Kingdom: A cross-sectional population survey. *SSRN Electronic Journal* <https://doi.org/10.2139/SSRN.3793564>
- Republic of Turkey Ministry of Health. (2019). *Cervical cancer*. Republic of Turkey Ministry of Health. https://hsgm.saglik.gov.tr/tr/?option=com_content&view=article&id=362&catid=648
- Wells, A., Allen-Brown, V., Alam, N., Skulski, C., Jackson, A. L., & Herzog, T. J. (2021). The importance of information, motivation, and behavioral skills (IMB): Healthcare provider perspectives on improving adherence to cervical cancer screening among at-risk women. *Public Health in Practice*, 2, 100079. <https://doi.org/10.1016/J.PUHIP.2021.100079>
- Wentzensen, N., Clarke, M., & Perkins, R. (2021). Impact of COVID-19 on cervical cancer screening: Challenges and opportunities to improving resilience and reduce disparities. *Preventive Medicine*, 151, 1–8. <https://doi.org/10.1016/J.YPMED.2021.106596>
- WHO. (2021). *Cervical cancer elimination initiative*. WHO. <https://www.who.int/initiatives/cervical-cancer-elimination-initiative>
- Wilson, R., Quinn-Scoggins, H., Moriarty, Y., Hughes, J., Goddard, M., Cannings-John, R., Whitelock, V., Whitaker, K. L., Grozeva, D., Townson, J., Osborne, K., Smits, S., Robling, M., Hepburn, J., Moore, G., Gjini, A., Brain, K., & Waller, J. (2021). Intentions to participate in cervical and colorectal cancer screening during the COVID-19 pandemic: A mixed-methods study. *Preventive Medicine*, 153, 1–11. <https://doi.org/10.1101/2021.07.20.21260558>

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Additional supporting information can be found online in the Supporting Information section at the end of this article.

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