ORIGINAL ARTICLE

Health education on HPV vaccination and cervical cancer prevention: A randomised controlled trial on knowledge, attitudes, beliefs, and behaviours

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Abstract

Objective: To evaluate the effect of a health education programme on changes in human papillomavirus knowledge, attitudes and intention to vaccinate among adolescent girls and their mothers.

Method: The randomised controlled trial was conducted at two adolescent outpatient clinics from January to June 2019 after approval from the Medical Specialist Education Board, Ankara, Turkiye, and comprised girls aged 9-18 years and their mothers. The two clinics were randomised using the lottery method into intervention group A and control group B. The subjects in group A received two health education sessions in addition to standard care: the first session in the first week, and the second session in the fifth week after the first. The follow-up period lasted 12 weeks. Those in group B received standard care. Data was collected using the Human Papillomavirus Knowledge Scale and the Health Belief Model Scale. Data was analysed using SPSS 23.

Results: Of the 216 subjects, 108(50%) each were in groups A and B; 54(50%) mothers and as many daughters. There were significant post-intervention differences between the groups ($p<0.05$). Among group A mothers, the intention to vaccinate their daughters was higher compared to those in group B ($p=0.001$).

Conclusion: Health education regarding human papillomavirus infection and cervical cancer prevention was found to be effective in increasing knowledge and promoting positive health beliefs, attitudes and behaviours.

RCT registration: The study was registered at ClinicalTrials.gov (Trial #: NCT04113902 Date of Approval: April 15, 2019). Link: https://www.clinicaltrials.gov/study/NCT04113902

Keywords: Adolescent health, Uterine cervical neoplasms, Health education, Papillomavirus vaccines.

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Introduction

Cervical cancer is a fatal, but preventable disease with high rates of prevention through human papillomavirus (HPV) vaccination.[1-3] Factors such as sexual intercourse at an early age in adolescence, lack of knowledge of HPV-related diseases, anti-vaccination stance, polygamy and inadequacy of screening programmes have contributed to the widespread global incidence of HPV infection.[4,5] Disseminating the HPV vaccine, providing sexual health education, raising awareness about risky sexual behaviours, and promoting healthy lifestyle behaviours are provided in the community by health professionals to ensure significant primary protection practices.[2,6] Screening programmes that include the Pap smear and HPV deoxyribonucleic acid (DNA) test fall within the scope of secondary protection from cervical cancer.[2,3,7]

Awareness, knowledge, health beliefs, attitudes and behaviours regarding the mode of transmission of HPV, possible outcomes of HPV infection, HPV vaccination, early diagnosis, and screening tests are not at the desired level, particularly in developing and underdeveloped countries.[8] Globally, the knowledge and awareness levels regarding HPV and cervical cancer prevention among adolescent girls and women are low to moderate.[1,2,5,8] The American Nursing Academy has reported that community-based studies are required to maximise vaccination rates in girls and women aged 9-26 years, which will help reduce morbidity and mortality in HPV-related cancer cases.[9] With the purpose of disseminating HPV vaccination, numerous countries have included this vaccine in their national schedules.[8,10] Countries that have integrated the HPV vaccine into their national immunisation programmes have observed a substantial reduction (50-100%) in the incidence of cervical lesions.[2,5,7,11] In a vaccination efficacy study, no HPV infections were detected among vaccinated individuals at the conclusion of a 12-year follow-up after the initial dose.[11] However, Turkiye has yet to include HPV vaccination in its national schedule.[12]

Studies on primary protection from HPV infection and cervical cancer have reported that health education is effective in increasing knowledge, raising awareness, and developing positive health beliefs and attitudes, but that it has a limited impact on vaccination rates and screening

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participation behaviours.[2,7,13] Observational studies have reported that improved knowledge regarding HPV and its vaccine is associated with a stronger intention to get vaccinated, ultimately resulting in higher vaccination uptake across various populations.[14-16] However, there is evidence suggesting that health education does not affect HPV vaccination rates.[17] Regarding secondary protection from cervical cancer, it has been reported that health education increases participation in cervical screening programmes by 25%.[18]

However, there is a need for methodologically sound intervention studies to investigate the impact of health education on primary and secondary protection from HPV and cervical cancer in adolescent girls and their mothers. There are limited studies focussing on the effect of health education on primary and secondary HPV protection among mothers and their adolescent daughters.[15,19,20]

The current study was planned to determine the effect of health education regarding protection from HPV infection and cervical cancer on knowledge, attitudes, beliefs and behaviours among mothers and their adolescent daughters.

Subjects and Methods

The single-blind randomised controlled trial (RCT) was reported in accordance with the Consolidated Standards of Reporting Trials (CONSORT, 2025) guidelines.[21] The study was conducted at two training and research hospitals affiliated with the University of Health Sciences, Turkiye, from January to June 2019 after approval from the Medical Specialist Education Board affiliated with the Provincial Directorate of Health, Ankara, Turkiye, and comprised girls aged 9-18 years and their mothers. The two clinics were randomised using the lottery method into intervention group A and control group B after the mothers provided prior written informed consent for themselves and their daughters. The sample was raised from among those who had received healthcare for any reason from the two hospitals that were located approximately 0.8 miles from each other within the same city to ensure that the population receiving health service from both centres had similar socioeconomic levels and cultural characteristics.

The daughters enrolled had no sexual experience, as confirmed by their verbal statements. In terms of overall sample, individuals with prior experience of HPV vaccination or education regarding HPV, those with hearing or speech disabilities, or mental health disorders, and those using antipsychotic medication were excluded.

The sample size was calculated using G*Power Ver. 3.1.9.2[22] with Type I error (α) 0.05, Type II error (β) 0.05, effect size 0.45 for the difference between the control and intervention groups,[23,24] power 90%, confidence interval (CI) 95% and level of significance 5%.

Each of the two participating health facilities was assigned a number, which was written on paper and placed in sealed opaque envelopes. A faculty member, independent of the research team, drew lots from the envelopes, randomly determining the intervention and control centres. The participants were blinded to group randomisation.

All participants in control group B received standard care, with the mothers receiving cervical cancer screening, and the daughters receiving primary protection against HPV infection. The national cervical cancer screening programme includes free HPV DNA testing and Pap smear testing for women aged >30 years. If the daughters or their mothers had any questions about HPV infection or vaccination, they were educated regarding primary protection methods of HPV by healthcare professionals. The control group received no additional intervention.

In the intervention group A, mothers and their daughters received health education on primary and secondary protection against HPV and cervical cancer. When preparing the contents of the health education programme, the primary learning objectives were identified based on a review of relevant literature. These objectives focussed on improving knowledge, attitudes, and preventive behaviours regarding cervical cancer and HPV vaccination among adolescent girls and their mothers.[18-20,23-29] Accordingly, health education topics were assigned to the mothers and their daughters. The topics included in the health education programme for mothers, titled "Things to Know About Cervical Cancer", were: Female reproductive organs; Information about cervical cancer; Symptoms of cervical cancer; Importance of early diagnosis and screening for cervical cancer; Factors causing cervical cancer; Definition, signs, and symptoms of HPV infection; Modes of transmission of HPV infection; Ways to protect against HPV infection, and importance and efficacy of HPV vaccine; HPV vaccination criteria. The topics included in the health education programme for the daughters, titled "HPV Infection and Vaccination", were: Female reproductive organs; Relationship between cervical cancer and HPV; Importance and efficacy of the HPV vaccine in protecting against HPV infection; HPV vaccination criteria; Points to consider when receiving the HPV vaccination.

The health education incorporated lectures, a question-and-answer format, brainstorming, summarisation, and feedback. The educational materials (slide presentations and booklets) were prepared following a literature

Section/topic	No	CONSORT 2025 checklist item description	Reported on page no.
Title and abstract			
Title and structured abstract	1a	Identification as a randomised trial	1-2
	1b	Structured summary of the trial design, methods, results, and conclusions	1-2
Open science			
Trial registration	2	Name of trial registry, identifying number (with URL) and date of registration	2
Protocol and statistical analysis plan	3	Where the trial protocol and statistical analysis plan can be accessed	2
Data sharing	4	Where and how the individual de-identified participant data (including data dictionary), statistical code and any other materials can be accessed	2
Funding and conflicts of interest	5a	Sources of funding and other support (eg, supply of drugs), and role of funders in the design, conduct, analysis and reporting of the trial	12
	5b	Financial and other conflicts of interest of the manuscript authors	12
Introduction			
Background and rationale	6	Scientific background and rationale	2-3
Objectives	7	Specific objectives related to benefits and harms	3
Methods			
Patient and public involvement	8	Details of patient or public involvement in the design, conduct and reporting of the trial	3-7
Trial design	9	Description of trial design including type of trial (eg, parallel group, crossover), allocation ratio, and framework (eg, superiority, equivalence, non-inferiority, exploratory)	3-7
Changes to trial protocol	10	Important changes to the trial after it commenced including any outcomes or analyses that were not prespecified, with reason	3-7
Trial setting	11	Settings (eg, community, hospital) and locations (eg, countries, sites) where the trial was conducted	3-7
Eligibility criteria	12a	Eligibility criteria for participants	4
	12b	If applicable, eligibility criteria for sites and for individuals delivering the interventions (eg, surgeons, physiotherapists)	4
Intervention and comparator	13	Intervention and comparator with sufficient details to allow replication. If relevant, where additional materials describing the intervention and comparator (eg, intervention manual) can be accessed	3-7
Outcomes	14	Prespecified primary and secondary outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome	4-5
Harms	15	How harms were defined and assessed (eg, systematically, non-systematically)	
Sample size	16a	How sample size was determined, including all assumptions supporting the sample size calculation	6
	16b	Explanation of any interim analyses and stopping guidelines	
Randomisation:			
Sequence generation	17a	Who generated the random allocation sequence and the method used	5
	17b	Type of randomisation and details of any restriction (eg, stratification, blocking and block size)	5
Allocation concealment mechanism	18	Mechanism used to implement the random allocation sequence (eg, central computer/telephone; sequentially numbered, opaque, sealed containers), describing any steps to conceal the sequence until interventions were assigned	4
Implementation	19	Whether the personnel who enrolled and those who assigned participants to the interventions had access to the random allocation sequence	4
Blinding	20a	Who was blinded after assignment to interventions (eg, participants, care providers, outcome assessors, data analysts)	4
	20b	If blinded, how blinding was achieved and description of the similarity of interventions	6-7
Statistical methods	21a	Statistical methods used to compare groups for primary and secondary outcomes, including harms	6-7
	21b	Definition of who is included in each analysis (eg, all randomised participants), and in which group	6-7
	21c	How missing data were handled in the analysis	-
	21d	Methods for any additional analyses (eg, subgroup and sensitivity analyses), distinguishing prespecified from post hoc	6-9
Results			
Participant flow, including flow diagram	22a	For each group, the numbers of participants who were randomly assigned, received intended intervention, and were analysed for the primary outcome	7-9
	22b	For each group, losses and exclusions after randomisation, together with reasons	
Recruitment	23a	Dates defining the periods of recruitment and follow-up for outcomes of benefits and harms	7-9
	23b	If relevant, why the trial ended or was stopped	7-9
Intervention and comparator delivery	24a	Intervention and comparator as they were actually administered (eg, where appropriate, who delivered the intervention/comparator, how participants adhered, whether they were delivered as intended (fidelity))	7-9
	24b	Concomitant care received during the trial for each group	7-9
Baseline data	25	A table showing baseline demographic and clinical characteristics for each group	7-9

Continued on next page .....

review.[18-20,23-29] Mothers and their daughters attended their education sessions separately. The educational content was designed in accordance with the learning characteristics of adults and adolescents. Each session was conducted in a quiet, well-lit, private room within the polyclinic and lasted 45 minutes (Figure 1). At the end of each education session, group A subjects received printed educational booklets summarising the health education. According to the literature, repeated education is recommended to enhance the retention of the training.[14,27] In this context, an appointment was scheduled with group A participants for a face-to-face interview in the fifth week, during which the health education was repeated in the same manner.

At the end of the 12-week period, all the participants in both groups completed an interviewer-administered questionnaire during face-to-face interviews. After the study concluded, willing participants in control group B received consultation, health education, and booklets similar to those provided to intervention group A.

Duration	Target	Application
0-5 min.	• Initiating and maintaining effective communication • Making an effective introduction to HPV and cervical cancer prevention	• Greeting the participants • Giving information about the content and duration of education, • Asking questions about knowledge, beliefs and behaviours regarding HPV and cervical cancer • The participant sharing their previous experiences
6-20 min.	• Filling the gap in knowledge about HPV and cervical cancer prevention • Developing a perception of the benefit of HPV vaccination • Eliminating the perception of barriers to HPV vaccination	• Sharing feelings and thoughts about a sample cervical cancer case • Explaining the definition of HPV and cervical cancer, the prevalence of HPV and cervical cancer, early warning signs of HPV and cervical cancer, factors that increase the risk of HPV contamination and cervical cancer, what should be done to minimize the risk of HPV contamination and cervical cancer. • Emphasizing the importance and benefits of early diagnosis and HPV vaccine • Discussing the barriers to HPV vaccination
21-35 min.	• Increasing knowledge, attitudes and beliefs about protection against HPV and cervical cancer and vaccination with HPV vaccine • To explain to people that vaccination with HPV vaccine is a sustainable preventive health service and to encourage them to get vaccinated.	• Introduction of HPV vaccination, • Giving information about the benefits of HPV vaccination, • Immunization (HPV vaccine) consultancy.
36-45 min	• Evaluating the participants' feedback	• Evaluating individual suggestions to eliminate participants' barriers, • Giving the training brochure and summarizing the training

Figure-1: Health education application programme.

Data was collected using the Health Belief Model Scale for HPV and Its Vaccination (HBMS-HPVV) and the HPV Knowledge Scale (HPV-KS).[23,29] The secondary outcome measures were behaviours for primary protection, such as HPV vaccination, and secondary protection, such as Pap smear/HPV DNA testing. All outcomes and related variables were measured at the baseline and post-intervention at the end of week 12. The questionnaires were based on the literature.[22-28] There were separate questionnaires for mothers and their daughters. The questionnaires consisted of sociodemographic questions, descriptive questions regarding cervical cancer and HPV vaccination, the HBMS-HPVV and the HPV-KS. [23,29]

The original 12-item HBMS-HPVV is a valid and reliable scale.[29] In a validity and reliability study, three items were added to the original scale, and one item was removed to better reflect Turkish culture.[23] The Turkish version of the scale consists of 14 items across four subscales: perceived benefits (three items), perceived susceptibility (two items), perceived severity (four items), and perceived barriers (five items). Each item was scored on a four-point Likert scale, ranging from 1 = not at all to 4=very much. The total score ranged 14-56, with higher scores indicating stronger health beliefs regarding HPV vaccination.[23,29,30]

The 20-item HPV-KS is a valid and reliable scale with a Cronbach's α value 0.88.[29] The Turkish adaptation contains 10 items and has Cronbach's α value 0.85.[22] Correct answers (true or false) for each item were scored 1, while incorrect answers and "I do not know" responses were scored 0. The total score ranged 0-10, with higher scores indicating greater HPV knowledge.[22,29]

Data was analysed using SPSS 23 and R statistics programme. Data normality was assessed using the Kolmogorov-Smirnov test, and kurtosis and skewness values were examined. Compliance with a normal distribution was evaluated using the ±3 test, based on skewness and kurtosis coefficients.[31] Chi-square and Fisher's exact tests were used for the analysis of categorical variables. To investigate differences between the groups, Independent samples t-test was used for normally distributed variables, while Mann-Whitney U test was applied for non-normally distributed variables. The robust test for two-way analysis of variance (ANOVA) was employed to compare scale scores that did not follow a normal distribution across group and time statistics. Categorical data was presented as frequencies and percentages, while and quantitative variables were presented as mean ± standard deviation and median with interquartile range (IQR). $P<0.05$ was taken as statistically significant.

Results

Of the 260 individuals assessed, 216(83%) were included (Figure 2); 108(50%) each in groups A and B that had 54(50%) mothers and as many daughters. There were no significant differences between the groups in terms of the sociodemographic variables of the mothers ($p>0.05$). However, there were significant differences between the daughters, with those in group B having higher age ($p=0.003$) and educational level ($p=0.048$) compared to those in group A (Table 1A). Baseline potential confounders showed no significant difference between the groups ($p>0.05$) (Table 1B).

When the differences between baseline and post-intervention scores were compared by group, the mothers' perceived severity ($p=0.044$), perceived benefits ($p<0.001$), perceived susceptibility ($p<0.001$) subscale scores, and HPV-KS total score ($p<0.001$) showed significant differences. Among the daughters, significant differences were noted for perceived severity ($p=0.01$), perceived benefits ($p=0.005$), perceived susceptibility ($p=0.001$) subscales scores, and the HPV-KS total score ($p<0.001$). Scores for the perceived barriers subscale of both the mothers and daughters showed no significant difference ($p>0.05$) (Table 2).

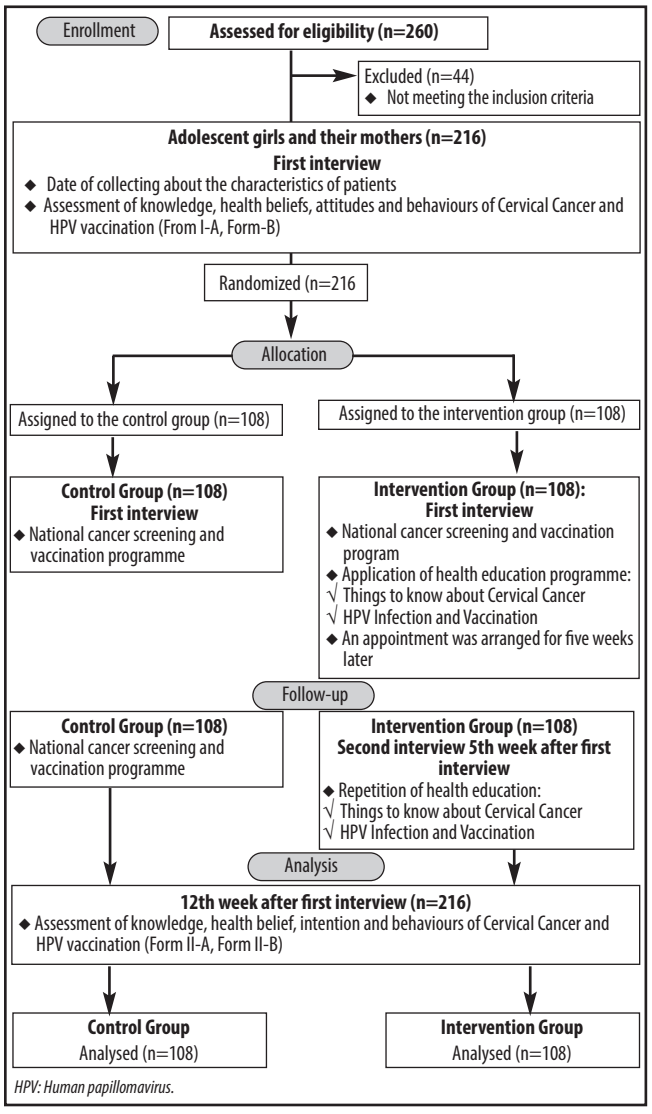

Figure-2: Consolidated Standards of Reporting Trials (CONSORT) flowchart.

Table-1A: Baseline characteristics in the two groups.

Variables	Intervention (n = 54) n (%)	Control (n = 54) n (%)	*t*-test	*p*-value
Mothers' educational level (years)				
≤8 years	36 (56.3)	28 (43.8)	2.455[a]	0.085
>8 years	18 (40.9)	26 (59.1)		
Fathers' educational level (years)				
≤8 years	19 (35.2)	23 (42.6	0.623[a]	0.430
>8 years	35 (64.8)	31 (57.4)		
Daughters' educational level (years)				
≤8 years	26 (61.9)	16 (38.1)	3.896[a]	0.048
>8 years	28 (42.4)	38 (57.6)		
Mothers' employment status				
Unemployed	46 (50.5)	45 (49.5)	0.070[a]	0.792
Employed	8 (47.1)	9 (52.9)		
Fathers' employment status				
Unemployed	5 (9.3)	8 (14.8)	0.787[a]	0.375
Employed	49 (90.7)	46 (85.2)		
Monthly income (TL)				
≥ 2.000	11 (36.7)	19 (63.3)	2.975[a]	0.085
< 2.000	42 (55.3)	34 (44.7)		
Number of children				
≤ 2	30 (48.4)	32 (51.6)	0.151[a]	0.697
> 2	24 (52.2)	22 (47.8)		

Variables	Mean±SD	Min.-Max.	Mean±SD	Min.-Max.	*t*-test	*p*-value
Mean age of Mothers'	40.59±6.28	29-55	42.00±4.71	32-54	1.318[b]	0.190
Mean age of Daughters'	14.28±2.66	9-18	15.74±2.38	9-18	3.012[b]	0.003

[a]: Pearson Chi-Square, [b]: Independent t test, SD: Standard deviation, Min: Minimum value, Max: Maximum value, TL: Turkish Lira.

The effect of the group factor on mothers' ($p<0.05$) and daughters' ($p<0.05$) baseline and post-intervention scores on the perceived severity subscales was significant. Evaluation of the time factor revealed that the baseline and post-intervention scores on the perceived severity subscales were significant for both mothers ($p<0.001$) and daughters ($p<0.001$). When group × time factor interactions were assessed, significant differences were observed between the groups in mothers' ($p<0.05$) and daughters' ($p<0.05$) perceived severity subscale baseline and post-intervention scores by group and time (Table 3).

The effect of the group factor on the baseline and post-intervention scores of the perceived barriers subscale for daughters ($p=0.004$) was significant, whereas the effect for mothers was not significant ($p>0.05$). Evaluation of the time

Table-1B: Baseline assessment of the two groups.

Variables		Intervention (n=108) n (%)	Control (n=108) n (%)	*t*-test	*p*-value
Have you ever been diagnosed with gynaecological diseases or experienced discomfort? †					
(Intervention n=54; Control n=54)					
Mothers	Yes	42 (77.8)	39 (72.2)	0.444[a]	0.505
	No	12 (22.2)	15 (27.8)		
Do you have knowledge about cervical cancer?					
Mothers	Yes	30 (55.6)	29 (53.7)	0.037[a]	0.847
	No	24 (44.4)	25 (46.3)		
Daughters	Yes	6 (11.1)	9 (16.7)	0.697[a]	0.404
	No	48 (88.9)	45 (83.3)		
Have you ever received education on cervical cancer from health personnel? †					
(Intervention n=54; Control n=54)					
Mothers	Yes	15 (27.8)	13 (24.1)	0. 193[a]	0.661
	No	39 (72.2)	41 (75.9)		
Do you know the symptoms of cervical cancer? †					
(Intervention n = 54; Control n = 54)					
Mothers	Yes	10 (18.5)	13 (24.1)	0. 497[a]	0.481
	No	44 (81.5)	41 (75.9)		
Have you ever had a Pap smear? †					
(Intervention n=54; Control n=54)					
Mothers	Yes	46 (85.2)	42 (77.8)	0. 982[a]	0.322
	No	8 (14.8)	12 (22.2)		
Is it possible to protect yourself from HPV?					
Mothers	Yes	43 (79.6)	42 (77.8)	0.055[a]	0.814
	No	11 (20.4)	12 (22.2)		
Daughters	Yes	44 (81.5)	41 (75.9)	0.497[a]	0.481
	No	10 (18.5)	13 (24.1)		
Have you ever heard of the HPV vaccine?					
Mothers	Yes	15 (27.8)	10 (18.5)	1.301[a]	0.254
	No	39 (72.2)	44 (81.5)		
Daughters	Yes	9 (16.7)	13 (24.1)	0.913[a]	0.339
	No	45 (83.3)	41 (75.9)		
Do you know who is given the HPV vaccine?					
Mothers	Yes	5 (9.3)	5 (9.3)	0.001[a]	1.000
	No	49 (90.7)	49 (90.7)		
Daughters	Yes	(0.0)	2 (3.7)	[c]	-
	No	54 (100)	52 (96.3)		

[a]: Pearson chi-square test, [b]: Fisher's exact test, [c]: Not analysed, †Only mothers' answers, HPV: Human papillomavirus.

factor revealed that the baseline and post-intervention scores on the perceived barriers subscale for daughters (p<0.05) were significant, while those for mothers (p>0.05) were not. When group × time factor interactions were evaluated, significant differences were found for the daughters' (p<0.05) baseline and post-intervention scores on the perceived barriers by group and time (Table 3).

The effect of the group factor on mothers' (p=0.02) and daughters' (p<0.001) perceived benefits baseline and post-intervention scores was significant. The evaluation of the time factor revealed that the baseline and post-intervention scores of the perceived benefits subscale were significant for mothers (p<0.001), but not for daughters (p>0.05). When group × time factor interactions were evaluated, significant differences were found between the groups in mothers' (p<0.001) and daughters' (p<0.001) perceived benefits baseline and post-intervention scores by group and time (Table 3).

The effect of the group factor on the baseline and post-intervention scores of the perceived susceptibility subscale for mothers (p<0.05) was significant, whereas no such effect was observed for daughters (p>0.05). The evaluation of the time factor revealed that the baseline and post-intervention scores of the perceived susceptibility for both mothers (p=0.004) and daughters (p=0.001) were significant. When group × time factor interactions were assessed, significant differences were found between the groups in both mothers' (p<0.05) and daughters' (p<0.001) perceived susceptibility baseline and post-intervention scores by group and time (Table 3).

The effect of the group factor on the HPV-KS baseline and post-intervention scores for mothers (p<0.001) was significant, while no such effect was observed for daughters' scores (p>0.05). The evaluation of the time factor revealed that the HPV-KS baseline and post-intervention scores of mothers (p<0.001) and daughters (p<0.001) were significant. When group × time interactions were evaluated, significant differences were found between the groups in both mothers' (p<0.001) and daughters' (p<0.001) HPV-KS baseline and post-intervention scores by group and time. When the main difference was found between the baseline and post-intervention scores of the mothers in group A, the HPV-KS score increased by 2.5 points to 7 points. The HPV-KS baseline and post-intervention scores of the mothers in group B were similar (Table 3). When the main difference was found between the baseline and post-intervention of the daughters in group A, the HPV-KS score increased by 1 point to 5 points. There was a difference between the baseline and post-intervention scores of the daughters in group B, and the HPV-KS score increased by 2 to 3 points (Table 3).

A significant difference was found in knowledge regarding the ideal frequency of Pap smear testing between mothers in both the groups (p=0.004). There was no significant difference between the groups in terms of having had a Pap smear within the preceding three months (p>0.05). Regarding willingness to have their daughters vaccinated against HPV, group A exhibited higher rates than group B (p<0.05). Among the mothers, the intention to vaccinate their daughters was significantly higher in group A compared to group B (p=0.001). The rate of attempting to obtain the HPV vaccine in the preceding three months was

higher in group A compared to group B (p<0.05). In group A, mothers reported various efforts to access the HPV vaccine (Table 4).

Significant differences were observed between the groups regarding mothers' reasons for not having their daughters vaccinated (p<0.05) (Table 4). At the end of the study, only

Table-2: Intergroup comparison of HBMS-HPVV and HPV-KS total scores at baseline and after the -intervention.

Participants	Variables	Intervention (n =54)		Control (n=54)		*t*-test	*p*-value	Effect Size Cohen (d)
		Mean±SD	Median (Min.-Max.)	Mean±SD	Median (Min.-Max.)			
Mothers	Perceived Severity	-2.24±2.91	-2.5 (-8-4)	-1.02± 2.9	0 (-7-7)	1134[a]	0.044	0.420
	Perceived Barriers	-0.5±3.5	-0.5 (-8-10)	-1.04±3.79	-1 (-8-10)	0.765[b]	0.446	0.148
	Perceived Benefits	-2.59±2.93	-3 (-9-5)	-0.83±1.84	-1 (-5-3)	3.736[b]	<0.001	0.719
	Perceived Susceptibility	-1.63±1.89	-2 (-5-3)	-0.09±1.69	0 (-4-3)	804[a]	<0.001	0.859
	HPV-KS Total	-3.67±2.56	-4 (-8-4)	-0.65±1.78	0 (-4-3)	490[a]	<0.001	1.370
Daughters	Perceived Severity	-3.26±3.85	-3 (-12-5)	-1.19±3.54	-1 (-8-10)	1040[a]	0.010	0.560
	Perceived Barriers	-0.54±4.08	-1 (-11-9)	-1.8±3.51	-1 (-9-11)	1.719[b]	0.089	0.331
	Perceived Benefits	-2.06±2.82	-3 (-9-5)	-0.74±1.95	-1 (-5-3)	1007.5[a]	0.005	0.544
	Perceived Susceptibility	-1.52±2.15	-2 (-5-4)	-0.17±1.96	0 (-5-4)	903.5[a]	0.001	0.656
	HPV-KS Total	-3.57±2.5	-3.5 (-8-2)	-1.22±2.54	-1 (-7-4)	742[a]	<0.001	0.933

HBMS-HPSS: Health Belief Model Scale for human papillomavirus and its Vaccination, HPV-KS: Human papillomavirus Knowledge Scale, [a]: Mann Whitney U test, [b]: Independent samples t test, SD: Standard deviation, Min: Minimum value, Max: Maximum value.

Table-3: Multiple comparisons of HBM-HPVV and HPV-KS total score by group and time.

Participants	Variables		Intervention (n = 54) Median (Min.-Max.)	Control (n = 54) Median (Min.-Max.)	Total Median (Min.-Max.)	Factor	F	*p*-value
Mothers	Perceived Severity	Pre-test	12 (7 - 16) A	12 (5 - 16) A	12 (5 - 16)	Group	4.08	0.043
		Post-test	15.5 (10 - 16) B	13.5 (5 - 16) A	14 (5 - 16)	Time	25.52	<0.001
		Total	14 (7 - 16)	13 (5 - 16)	13 (5 - 16)	Group*Time	4.08	0.043
	Perceived Barriers	Pre-test	11 (7 - 18)	11 (6 - 17)	11 (6 - 18)	Group	2.13	0.144
		Post-test	11 (7 - 20)	12.5 (6 - 18)	12 (6 - 20)	Time	2.13	0.144
		Total	11 (7 - 20)	12 (6 - 18)	11 (6 - 20)	Group*Time	2.87	0.090
	Perceived Benefits	Pre-test	7 (3 - 12) A	7 (3 - 11) A	7 (3 - 12)	Group	9.22	0.002
		Post-test	10.5 (5 - 12) B	8 (3 - 12) A	9 (3 - 12)	Time	29.86	<0.001
		Total	9 (3 - 12)	8 (3 - 12)	8 (3 - 12)	Group*Time	14.5	<0.001
	Perceived Susceptibility	Pre-test	5 (2 - 8) A	5 (2 - 8) A	5 (2 - 8)	Group	8.17	0.004
		Post-test	7 (4 - 8) B	5 (2 - 8) A	6 (2 - 8)	Time	8.17	0.004
		Total	6 (2 - 8)	5 (2 - 8)	6 (2 - 8)	Group*Time	9.48	0.002
	HPV-KS Total	Pre-test	2.5 (0 - 7) A	3 (0 - 7) B	3 (0 - 7)	Group	23.7	<0.001
		Post-test	7 (2 - 9) C	4 (0 - 7) B	5 (0 - 9)	Time	114.7	<0.001
		Total	4 (0 - 9)	3.5 (0 - 7)	4 (0 - 9)	Group*Time	71.3	<0.001
Daughters	Perceived Severity	Pre-test	10 (4 - 15) A	10 (6 - 16) A	10 (4 - 16)	Group	9.19	0.002
		Post-test	14 (6 - 16) B	11 (4 - 16) A	12.5 (4 - 16)	Time	25.52	<0.001
		Total	12 (4 - 16)	11 (4 - 16)	11 (4 - 16)	Group*Time	9.19	0.002
	Perceived Barriers	Pre-test	11 (7 - 20) A	9 (5 - 20) B	10 (5 - 20)	Group	8.17	0.004
		Post-test	11 (7 - 18) A	11 (5 - 18) A	11 (5 - 18)	Time	8.17	0.004
		Total	11 (7 - 20)	10 (5 - 20)	11 (5 - 20)	Group*Time	9.48	0.002
	Perceived Benefits	Pre-test	8 (3 - 11) A	7 (3 - 9) A	7 (3 - 11)	Group	23.89	<0.001
		Post-test	9 (6 - 12) B	7 (4 - 12) A	9 (4 - 12)	Time	2.65	0.103
		Total	9 (3 - 12)	7 (3 - 12)	8 (3 - 12)	Group*Time	22.96	<0.001
	Perceived Susceptibility	Pre-test	4 (2 - 8) A	5 (2 - 8) A	4 (2 - 8)	Group	0	1.000
		Post-test	6 (4 - 8) B	5 (2 - 8) A	5 (2 - 8)	Time	15.2	0.001
		Total	5 (2 - 8)	5 (2 - 8)	5 (2 - 8)	Group*Time	18.6	<0.001
	HPV-KS Total	Pre-test	1 (0 - 5) A	2 (0 - 6) A	2 (0 - 6)	Group	2.65	0.103
		Post-test	5 (0 - 8) B	3 (0 - 7) C	4 (0 - 8)	Time	66.35	<0.001
		Total	3 (0 - 8)	2 (0 - 7)	2.5 (0 - 8)	Group*Time	71.66	<0.001

HBMS-HPSS: Health Belief Model Scale for human papillomavirus and its Vaccination, HPV-KS: Human papillomavirus Knowledge Scale, A-B-C: No difference is present between the interactions with the same letter; F: Two-way robust variance analysis test statistics.

Table-4: Distribution of participants according to knowledge, intentions and behaviours regarding cervical cancer and HPV after the intervention.

Variables		Intervention (n =108) n (%)	Control (n = 108) n (%)	*t*-test	*p*-value
Do you know how often the Pap smear should be performed? *					
Mothers	Yes	49 (90.7)	37 (68.5)	8.220a	0.004
	No	5 (9.3)	17 (31.5)		
Have you had a Pap smear in the last three months? *					
Mothers	Yes	23 (42.6)	19 (35.2)	0.623 a	0.430
	No	31 (57.4)	35 (64.8)		
Are you willing to have your daughter (for mothers)/yourself (for daughters) vaccinated with HPV?					
Mothers	Yes	35 (64.8)	19 (35.2)	9.615 b	0.008
	No	4 (7.4)	9 (16.7)		
	Uncertain	15 (27.8)	26 (48.1)		
Daughters	Yes	27 (50.0)	21 (38.9)	6.350 b	0.042
	No	3 (5.6)	12 (22.2)		
	Uncertain	24 (44.4)	21 (38.9)		
Do you have any intention to have your daughter (for mothers)/yourself (for daughters) vaccinated with HPV?					
Mothers	Yes	23 (42.6)	5 (9.3)	15.621 a	0.001
	No	31 (57.4)	49 (90.7)		
Daughters	Yes	45 (83.3)	49 (90.7)	1.313 a	0.252
	No	9 (16.7)	5 (9.3)		
Have you made any attempt to obtain the HPV vaccine in the last three months?					
Mothers	Yes	40 (74.1)	9 (16.7)	35.900 a	0.001
	No	14 (25.9)	45 (83.3)		
Daughters	Yes	32 (59.3)	2 (3.7)	38.633b	0.001
	No	22 (40.7)	52 (96.3)		
What efforts have you made? *					
Mothers' Answers: Yes	Tried to determine the price	21 (38.9)	3 (5.3)	17.357b	0.001
	Reading on the internet	20 (37.0)	5 (9.3)	11.711b	0.001
	Asked a nurse how to get the vaccine	16 (29.6)	2 (3.7)	13.067b	0.001
	Asked a pharmacist how to get vaccine	16 (29.6)	3 (5.3)	10.794 b	0.002
	Asked a doctor how to get vaccines	10 (18.5)	-	11.020 b	0.001
Why has your daughter not undergone HPV vaccination in the last three months? *					
Mothers' Answers: Yes	The vaccine is unaffordable	36 (66.6)	3 (5.6)	43.706b	0.001
	The vaccine is not covered by insurance	39 (72.2)	4 (7.4)	47.335b	0.001
	The vaccine is not mandatory	10 (18.5)	1 (1.7)	8.199 b	0.008
	Adverse effects	5 (9.3)	11 (20.4)	2.641 b	0.174
	Lack of knowledge	4 (7.4)	48 (88.9)	71.802b	0.001

HPV: Human papillomavirus, a: Pearson's chi-square test, b: Fisher's exact test, *Only mothers' answers.

1(1.85%) mother in the group A reported having administered the first dose of the HPV vaccine to her daughter.

Discussion

Today, the scope of protection against HPV and HPV-related cancers includes enhancing knowledge and raising awareness through health education, encouraging participation in screening programmes, and promoting the widespread adoption of HPV vaccination.[2,15,16] The current study found that health education had a positive impact on knowledge, attitudes, beliefs, and behaviours related to HPV infection and vaccination in both daughters and their mothers. Among the daughters, the higher age and educational levels in the control group at baseline were considered advantageous for being in the control group. Knowledge, attitudes, beliefs and behaviours regarding HPV and related matters tend to improve with age and educational level.[1,2] The lower mean age and educational level in the intervention group at the start of the study served as an indicator of the reliability of the findings obtained post-intervention. Similarly, the lack of difference between the groups at baseline concerning potential confounders further supported the reliability of the results (Table 1).[2,15]

Health education programmes are strongly recommended for adolescents and their parents, as they have a positive impact on awareness, knowledge, attitudes and health beliefs, ultimately preventing future HPV-related cancers.[15,24] Studies indicate that health education improves health beliefs and increases HPV

knowledge.[19,20,32,33] Similar to the current study, Calo et al. assessed the effectiveness of a weekly training programme conducted in two sessions, followed by a four-week follow-up.[19] Their results revealed significant differences in HPV-related knowledge, attitudes and beliefs between the experimental and control groups.[19] In a study conducted in Sweden with 751 students, it was reported that after face-to-face education provided by a school health nurse, post-test assessments conducted three months later indicated that students in the experimental group had significantly better knowledge, awareness and beliefs regarding HPV prevention and the HPV vaccine compared to those in the control group.[20] Likewise, Wang et al. compared pre-test scores with three months post-intervention scores[33] and showed that the mean scores for knowledge, perceived susceptibility, subjective norms, and self-efficacy were significantly higher in the intervention group compared to the control group. However, no significant difference in perceived barriers scores was reported between the two groups at the end of the follow-up.[33]

In contrast, some studies have reported that health education may lead to confusion regarding the side effects of the HPV vaccine.[34] Although health education did not affect participants' perceived barriers, it had a moderate to strong impact on mothers' and daughters' perceptions of severity, benefits, susceptibility, and HPV knowledge in the current study. The data, obtained from robust analyses evaluating group, time and group×time interactions, supported the finding that health education influenced mothers' and daughters' perceptions of severity, benefits, susceptibility and HPV knowledge. In Turkiye, there is no national HPV vaccination programme funded by the government. In addition, HPV vaccine is too expensive in the country, and millions of adolescents cannot access this protection easily. As a result, health education may not have had an impact on participants' perceptions of barriers.

At the end of the current study, the intervention group demonstrated more positive intentions and behaviours regarding Pap smear knowledge and HPV vaccination compared to the control group ($p<0.05$). It has been reported that health education on HPV and Pap smears for the protection against cervical cancer has a significantly positive impact on knowledge, awareness, beliefs and attitudes, as well as vaccination intention and rates.[1,2,7,15,16,24,35] While there are studies arguing that health education has a limited impact on vaccination rates,[2,8,13] others report that it positively influences aspects such as intention, attitudes and beliefs, but does not affect vaccination rates.[17] In the current study, it was determined that health education positively influenced knowledge, attitudes, beliefs, intention and health behaviours ($p<0.05$), but did not have the desired effect on the rate of HPV vaccination. The most frequently reported barrier was the unaffordability of the vaccine. Similarly, factors such as incorrect and inadequate knowledge about HPV vaccination, fear of side effects, and unaffordability are among the most frequently reported barriers against HPV vaccination.[2,26,36] Certain differences in the current results compared to previous studies may stem from variations in vaccination programmes across countries, differences in the interventions conducted, the characteristics of the populations involved, and varying follow-up periods.[2,13]

The current study has several limitations as only adolescent daughters and their mothers were included, while adolescent boys and fathers were excluded. Furthermore, the follow-up period lasted only three months. Although the research centres were affiliated with the same university and located close to each other, the randomisation of centres using the lottery method was a limitation as it was not performed at the individual participant level to minimise contamination bias arising from potential interactions among participants within the same centre. While this approach helped reduce information exchange between the groups, it also introduced limitations related to the randomisation process that may have affected the balance between the groups. Although the similarity of the centres strengthened the internal validity of the study by reducing the risk of selection bias, it may have limited the generalisability of the findings to populations with differing socioeconomic and cultural characteristics. Prospective studies that provide health education to adolescent girls and their mothers across different countries would facilitate cultural comparisons.

Conclusion

Health education on protection from HPV and cervical cancer had a positive impact on awareness, knowledge, attitudes, beliefs and behaviours among adolescent daughters and their mothers. However, it did not lead to increased vaccination rates due to the unaffordability of the vaccine. Planned education interventions could positively influence community awareness, knowledge, attitudes and beliefs, contributing to higher HPV vaccination rates.

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References

1. Ampofo AG, Boyes AW, Khumalo PG, Mackenzie L. Improving knowledge, attitudes, and uptake of cervical cancer prevention among female students: A systematic review and meta-analysis of school-based health education. Gynecol Oncol. 2022;164:675-90. doi:10.1016/j.ygyno.2021.12.021
2. Flood T, McLaughlin M, Hughes CM, Wilson IM. Applying the COM-B behaviour model to understand factors which impact school immunisation nurses' attitudes towards designing and delivering a HPV educational intervention in post-primary schools for 15–17-year-old students in Northern Ireland, UK. Vaccine. 2023;41:5630-39. doi:10.1016/j.vaccine.2023.07.066
3. Khan M, Zafar A, Muneer R, Siddiqui AA. Awareness regarding pap smear among female university students of Karachi: A cross-sectional survey. Cureus. 2018;10:e2784. doi:10.7759/cureus.2784
4. Bencherit D, Kidar R, Otmani S, Sallam M, Samara K, Barqawi HJ, et al. Knowledge and awareness of Algerian students about cervical cancer, HPV and HPV vaccines: A cross-sectional study. Vaccines (Basel). 2022;10:1420-33. doi:10.3390/vaccines10091420
5. Ota Y, Nomura K, Fujita N, Suzuki T, Kamatsuka M, Sakata N, et al. Influence of LINE-assisted provision of information about human papillomavirus and cervical cancer prevention on HPV vaccine intention: A randomised controlled trial. Vaccines (Basel). 2022;10:2005-31. doi:10.3390/vaccines10122005
6. Sherman SM, Nailer E. Attitudes towards and knowledge about human papillomavirus (HPV) and the HPV vaccination in parents of teenage boys in the UK. PLoS One. 2018;13:e0195801. doi:10.1371/journal.pone.0195801
7. Bruel S, Rakotomampionona Z, Gignon M, Agrinier N, Ndiaye NC, Lasset C, et al. The intentions of French health university students to recommend and to receive the HPV vaccine are mainly influenced by vaccine knowledge, confidence in vaccines and personal HPV vaccination. Vaccine. 2024;42:1934-40. doi:10.1016/j.vaccine.2024.02.033
8. Song D, Liu P, Wu D, Zhao F, Wang Y, Zhang Y. Knowledge and attitudes towards human papillomavirus vaccination (HPV) among healthcare providers involved in the governmental free HPV vaccination programme in Shenzhen, Southern China. Vaccines (Basel). 2023;11:997-1010. doi:10.3390/vaccines11050997
9. Wiley DJ, Mastro KA. An effective human papillomavirus vaccination policy will reduce infection and malignancy-related morbidity and mortality. Nurs Outlook. 2018;66:319-24. doi:10.1016/j.outlook.2018.03.005
10. Jeannot E, Viviano M, de Pree C, Amadane M, Kabengele E, Vassilakos P. Prevalence of vaccine type infections in vaccinated and non-vaccinated young women: HPV-IMPACT, a self-sampling study. Int J Environ Res Public Health. 2018;15:1447. doi:10.3390/ijerph15071447
11. Kjaer SK, Nygård M, Dillner J, Marshall JB, Radley D, Li M, et al. A 12-year follow-up on the long-term effectiveness of the quadrivalent human papilloma virus vaccine in 4 Nordic countries. Clin Infect Dis. 2018;66:339-45. doi:10.1093/cid/cix797
12. Republic of Turkey Ministry of Health. Get Healthy. 2024. [Online] [Cited 2024 May 1]. Available from: URL:https://www.saglik.gov.tr/TR,21088/sagliga-asilanin.html
13. Barnard M, Cole AC, Ward L, Gravlee E, Cole ML, Compretta C. Interventions to increase uptake of the human papillomavirus vaccine in unvaccinated college students: A systematic literature review. Prev Med Rep. 2019;14:100884. doi:10.1016/j.pmedr.2019.100884
14. Chu H, Ko LK, Ibrahim A, Mohamed FB, Lin J, Shankar M, et al. The impact of an educational forum intervention on East African mothers' HPV vaccine-related knowledge, attitudes, and intentions to vaccinate their adolescent children. Vaccine. 2021;39:3767-76. doi:10.1016/j.vaccine.2021.05.029
15. Özdemir S, Akkaya R, Karaşahin KE. Analysis of community-based researches related to knowledge, awareness, attitude and behaviours towards HPV and HPV vaccine published in Turkey: A systematic review. J Turk Ger Gynecol Assoc. 2020;21:111-23. doi:10.4274/jtgga.galenos.2019.2019.0071
16. Thompson B, Barrington WE, Briant KJ, Kupay E, Carosso E, Gonzalez NE, et al. Educating Latinas about cervical cancer and HPV: a pilot randomized study. Cancer Causes Control. 2019;30:375-84. doi:10.1007/s10552-019-01150-w
17. Koc Z, Kurtoglu Ozdes E, Topatan S, Çinarli T, Şener A, Danaci E, et al. The impact of education about cervical cancer and human papillomavirus on women's healthy lifestyle behaviours and beliefs: Using the PRECEDE educational model. Cancer Nurs. 2019;42:106-18. doi:10.1097/NCC.0000000000000570
18. Dion H, Choi H, Huang M, Sathyan L, Herfel E, Makhulo B, et al. Evaluation of video-assisted HPV education in government-supported clinics in Western Kenya. PLOS Glob Public Health. 2023;3:e0002539. doi:10.1371/journal.pgph.0002539
19. Calo WA, Shah PD, Fogel BN, Ruffin IV MT, Moss JL, Hausman BL, et al. Increasing the adoption of evidence-based communication practices for HPV vaccination in primary care clinics: The HPV ECHO study protocol for a cluster randomized controlled trial. Contemp Clin Trials. 2023;131:107266. doi:10.1016/j.cct.2023.107266
20. Mattebo M, Gottvall M, Grandahl M. School nurses' perceptions and experiences of delivering a school-based intervention to improve primary prevention of human papillomavirus among adolescents: A focus group study following a randomized controlled trial. J Sch Nurs. 2024;40:166-73. doi:10.1177/10598405211046174
21. Hopewell S, Chan AW, Collins GS, Hróbjartsson A, Moher D, Schulz KF, et al. CONSORT 2025 statement: Updated guideline for reporting randomised trials. BMJ. 2025;388:e081123. doi:10.1136/bmj-2024-081123
22. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods. 2007; 39: 175-91. doi:10.3758/bf03193146
23. Guvenc G, Seven M, Akyuz A. Health Belief Model Scale for human papilloma virus and its vaccination: Adaptation and psychometric testing. J Pediatr Adolesc Gynecol. 2016;29:252-58. doi:10.1016/j.jpag.2015.09.007
24. Kilic A, Seven M, Guvenc G, Akyuz A, Ciftci S. Acceptance of human papillomavirus vaccine by adolescent girls and their parents in Turkey. Asian Pac J Cancer Prev. 2012;13:4267-72. doi:10.7314/APJCP.2012.13.9.4267
25. Giambi C, D'Ancona F, Del Manso M, De Mei B, Giovannelli I, Cattaneo C, et al. Exploring reasons for non-vaccination against human papilloma virus in Italy. BMC Infect Dis. 2014;14:545. doi:10.1186/s12879-014-0545-9
26. Yilmazel G, Buyukkayaci Duman N. Knowledge, attitudes and beliefs about cervical cancer and human papilloma virus vaccination with related factors in Turkish university students. Asian Pac J Cancer Prev. 2014;15:3699-704. doi:10.7314/APJCP.2014.15.8.3699
27. McFadden SM, Ko LK, Shankar M, Ibrahim A, Berliner D, Lin J, et al. Development and evaluation of an online continuing education course to increase healthcare provider self-efficacy to make strong HPV vaccine recommendations to East African immigrant families. Tumour Virus Res. 2021;11:200214. doi:10.1016/j.tvr.2021.200214
28. Kurtuncu M, Arslan N, Alkan I, Bahadır Ö. Knowledge, attitude and behaviours of the mothers of 10–15-year-old daughters regarding cervical cancer and HPV vaccine. J Hum Sci. 2018;15:1072-83. doi:10.14687/jhs.v15i2.50974

29. Kim HW. Knowledge about human papilloma virus (HPV), and health beliefs and intention to recommend HPV vaccination for girls and boys among Korean health teachers. Vaccine. 2012;30:5327-34. doi:10.1016/j.vaccine.2012.06.040
30. Guvenc G, Akyuz A, Acikel CH. Health Belief Model Scale for cervical cancer and Pap smear test: Psychometric testing. J Adv Nurs. 2011;67:428-37. doi:10.1111/j.1365-2648.2010.05450.x
31. Cain MK, Zhang Z, Yuan KH. Univariate and multivariate skewness and kurtosis for measuring nonnormality: Prevalence, influence and estimation. Behav Res Methods. 2017;49:1716-35. doi:10.3758/s13428-016-0814-1
32. Dike S, Cesario SK, Malecha A, Nurse R. An education intervention to increase human papillomavirus vaccination confidence and acceptability: A randomized controlled trial. Oncol Nurs Forum. 2023;50:423-36. doi:10.1188/23
33. Wang H, Wang X, Chen P, Xu H, Liu Y, Kang R, et al. Effect of health intervention via web-based education on improving information–motivation–behavioral skills related to HPV vaccination among Chinese female college students. Int J Public Health. 2023;68:1605596. doi:10.3389/ijph.2023.1605596
34. Li Y, Qin C, Qiu S, He Y, Pang L, Xu X, et al. The effectiveness of pay-it-forward in addressing HPV vaccine delay and increasing uptake among 15–18-year-old adolescent girls compared to user-paid vaccination: A study protocol for a two-arm randomized controlled trial in China. BMC Public Health. 2023;23:48. doi:10.1186/s12889-022-14947-3
35. Sağtaş F, Gürsoy MY. Knowledge, attitudes, and practices towards human papillomavirus (HPV) and HPV vaccination among male nurses. Int J Nurs Pract. 2024;30:e13228. doi:10.1111/ijn.13228
36. Ojeaga A, Alema-Mensah E, Rivers D, Azonobil I, Rivers B. Racial disparities in HPV-related knowledge, attitudes, and beliefs among African American and white women in the USA. J Cancer Educ. 2019;34:66-72. doi:10.1007/s13187-017-1268-6

Author Contribution:

SO: Concept, formal analysis, investigation, methodology, project administration, resources, software, supervision, validation, writing-original draft, review, editing and agreement to be accountable for all aspects of the work.

RC: Concept, data curation, formal analysis, investigation, methodology, project administration, resources, software, validation, writing-original draft, review, editing and agreement to be accountable for all aspects of the work.