RESEARCH

Framing cervical cancer messages to improve uptake of screening among young women at a university in Botswana: Implications for practice and policy

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Although early screening is effective in its prevention, cervical cancer (CC) remains a leading cause of mortality in women. Framing health messages are vital for the uptake of screening for CC. Health-promoting messages can be framed to stress either the gains of engaging in a health behaviour (a gain-framed health message) or the costs of failure to engage in a health behaviour (a loss-framed health message). We assessed intentions to screen after exposure to either a gain- or loss-framed health message in a quasi-experimental design with a sample of 276 young women (mean (standard deviation) age 21.5 (1.91) years). Analyses of covariance were conducted to compare different groups. A total of 198 (71.7%) participants were willing to go for screening before exposure to the message frames (pre-test), which increased to 246 (89.1%) after exposure to the message frames (post-test). Exposure to gain-framed messages increased willingness to screen more than exposure to loss-framed messages, while positive attitudes towards screening increased intentions to screen more than negative attitudes. Interventions to improve health communication, attitudes towards CC and awareness about the aetiology of CC are urgently required, in addition to prioritising screening infrastructure and service capacity to reduce the burden of CC.

Worldwide, cervical cancer (CC) is ranked as the fourth-most frequently diagnosed form of cancer, and ranks second as the most common cause of cancer mortality in women, with about 311 000 fatalities and 570 000 incidents per year.[1,2] Most deaths from CC occur in resource-limited settings.[1] In Botswana, CC is the most frequently diagnosed form of cancer, and rated as a leading cause of cancer deaths and disease burden in women.[3-5] With a population of just >2 million, ~250 new cases of CC are diagnosed in Botswana yearly, and nearly half of these patients die.[6] Moreover, the number of young women at risk of CC continues to increase.[7]

Several risk factors have been implicated in CC, including early onset of sexual activities, multiple sex partners, smoking, a family history of CC and subdued immunity, particularly in seropositive women. Seropositive women have double the chance of developing CC compared with women who are HIV-negative.[1,8-11] However, 99.7% of CC incidents are linked to the human papillomavirus (HPV).[1,8,12,13] Yet, if detected early, CC is easily preventable.[8] Pap smear and HPV tests are recognised as the most effective ways of screening for CC, and can prevent up to 80% of CC cases and reduce morbidity and mortality, even in resource-limited settings.[14,15]

Although CC can be prevented, there are barriers to prevention, such as lack of knowledge and negative attitudes towards testing.[16] Negative attitudes towards screening may be influenced by lack of knowledge, the invasive screening procedures, cultural beliefs and the way public health messages are framed to empower young women to screen for CC.[3,4] Unfortunately, as is the case in many countries, low emphasis is placed on designing evidence-based public health communications to empower people to make health decisions in resource-limited settings such as Botswana. Yet decisions such as going for CC screening may depend on framing health messages, also known as the framing effect, anchored in the prospect theory postulated by Kahneman and Tversky.[17,18]

Theoretical framework
As grounded in the prospect theory,[17,18] framing health messages in terms of the costs of engaging in behavioural risks (i.e. loss-framed health messages) or the benefits of evading risky behaviour (i.e. gain-framed health messages) may influence the uptake of health behaviours. According to this theory,[17,18] the way health messages are framed influences individual health behaviours and choices, such as following a healthy diet, vaccination or screening.[19] The concept of message framing was borrowed from behavioural economics and communication sciences, and is constructed around gains or losses to influence perceptions and motivate health behaviour choices.[20,21]

The framing effect is seen when decisions are taken on the basis of gains (gain-framed messages) and losses (loss-framed messages) to elicit a health choice.[17] For example, the same health intervention may be presented in terms of health gains, such as rate of recovery or survival (gain frame), or mortality rate, severity or incidents (loss frame).

Generally, health behaviours are described in terms of disease prevention (preventing or delaying the onset of disease, e.g. wearing sunscreen or eating a healthy diet) and disease detection (establishing the existence or discovering early signs of a disease, e.g. breast or testicular self-examination, Pap smear).[21] While little risk is involved in disease prevention, detection may risk the likelihood of discovering a disease, and is thus associated with fear or anxiety, which, in turn, may lead to low uptake of screening or testing. Previous studies indicate that loss-framed health messages encourage greater uptake of detective health behaviours that do not require resolute efforts such as vaccination.[21,22] On the contrary, past studies indicate that health messages framed as beneficial may have the edge over those framed as leading to losses when confronted with detective health behaviours that necessitate regular and repetitive actions, such as exercising or sun protection.[23,24] However, screening for CC can be both preventive and detective: that is, averting the risk of CC by identifying the presence of cancerous cells, or vaccination as part of screening to prevent the disease.[25] Therefore, it is unclear whether these findings apply to cervical screening, which is repetitive, invasive and regarded as a potentially taboo subject because of its association with sexual activities.[26] Consequently, how health messages are framed may help to improve uptake of health services. This study investigates the effectiveness of gain- v. loss-framed health messages in assessing the intentions of young women to screen for CC among students at a university in Botswana.

Several factors have been implicated in moderating the effects of gain- and loss-framed messages on the uptake of health behaviours, one of which is concern about one's health.[22] For instance, a previous study found that a gain-framed message on sunscreen protection was associated with greater motivation to use sunscreen, albeit only in those who cared about skin cancer.[27] Similarly, studies have shown that health communications that include graphic imagery to depict the health risks of tobacco use are effective because they attract attention, evoke an emotional response and raise awareness of the risks and attitudes toward tobacco use.[28-30] In the present study, we assessed attitude to and knowledge of CC as possible moderators of the influence of the framing effect on uptake of screening among young women at a university in Botswana.

Botswana has the second-highest rate of HIV prevalence globally, with 17.6% in the general population, 24% in those aged ≥15 years, 48.9% in females aged 30 - 34 years and 33.3% in pregnant women.[31] As indicated above, the incidences of HPV and CC are twice as high in seropositive women as in their HIV-negative counterparts. Consequently, young women must be prioritised for screening owing to the high prevalence of HIV/AIDS in this population.

Hypothesis 1: Exposure to a gain-framed message is associated with greater intention to go for CC screening than exposure to the loss-framed message.

Hypothesis 2: Young women exposed to a gain-framed message and with a positive attitude towards CC are more likely to go for screening than those with a negative attitude.

Hypothesis 3: Young women exposed to a gain-framed message and knowledgeable about CC are more likely to go for CC screening than those with less knowledge about CC.

Method
Research design
The design adopted for this study was a 2 × 2 quasi-experimental design: 2 message frames (gain v. loss) × 2 attitudes (positive v. negative) for message framing and attitude, and 2 message frames (gain v. loss) × 2 knowledge levels (high and low) for message framing and knowledge. The dependent variable was the intention to screen for CC after being presented with the message frames (post-test), and covariance was the baseline intention to screen (pre-test).

Population and sample
The population of young adult women enrolled in different study programmes at the University of Botswana provided a sample for this study. The sample size was determined *a priori* using G*Power 3.1.9.2 software (Heinrich-Heine-Universität Düsseldorf, Germany). Based on an effect size of 0.8, a significance level of α=0.05, and a statistical power of 1–β=0.8, the power analysis showed a sample size of 250 respondents.[32] The study utilised a convenient quota sampling strategy based on student enrolment to draw participants from the various faculties where students are registered to ensure that participants were representative of the population of students in the different faculties of the university. A total of 276 young women with a mean (SD; range) age of 21.70 (2.01; 18 - 25) years agreed to participate in the study.

Procedure
Participants were randomly assigned to gain- or loss-framed messages and accompanying graphic pictures about the significance of screening for CC, each titled 'Cervical cancer: What you should know' (see Tables 1 and 2). The preliminary experimental message frames were pretested in a sample of 30 young women, and later reviewed by 4 experts based on the feedback provided. Next, invitations to female students were posted on noticeboards of the various faculties to invite students to participate. Interested students were accepted until the quota was realised. Once the quota was realised, a time and place were appointed, and the experiment was carried out.

Data collection
Data were collected using three different sets of questionnaires: the first assessed participants' sociodemographic characteristics (age, year of study, maternal education, academic performance, knowledge of and attitudes towards CC, history of screening, perceived risk of CC and intention to go for screening) in three stages. At the beginning of each data collection session, the

number of participants was established, and a corresponding number of pieces of paper sequentially numbered (1, 2, 3, etc.) was wrapped up, placed in a box and shuffled before the participants were asked to draw one wrapped paper from the box to receive a number. All even numbers were assigned to the group with gain-framed health messages (Table 1), and the odd numbers were assigned loss-framed health messages (Table 2). Each participant retained the number that was subsequently linked to the questionnaire and group, to make it easier to capture the data. Second, the participants with even numbers linked to a gain-framed health message were presented with pictures (Fig. 1A and B), and the other group was presented with the loss-framed health message were given a different graphic image (Fig. 2). Third and finally, another questionnaire with only one item, on the intention to go for screening, was administered after the presentation of the message frames and graphic pictures. During this time, a research assistant, well trained in research methodology and experimental research design, was present

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Table 1. Gain-framed health messages

'In Botswana, cervical cancer is the most frequent cancer among women and the leading cause of cancer mortality and morbidity. Statistics show a continual steady increase in cervical cancer in Botswana.

It is recommended that every woman aged 20 - 65 screens for cervical cancer every 2 - 3 years. If you screen for cervical cancer early you will:

a) Detect the cancer early and treatment can prevent it from developing.

b) Have an eighty percent (80%) reduction in cervical cancer morbidity and mortality (death).

c) Improve the chances of recovery even when the cancer is already present.

d) Prevent or cure cervical cancer.

You may speak to your general practitioner about the risks and benefits of a **Pap smear**. The procedure will only take a few minutes, and you will have your results in a few days.'

Table 2. Loss-framed health messages

'In Botswana, cervical cancer is the most frequent cancer among women and the leading cause of cancer mortality and morbidity. Statistics show a continual steady increase in cervical cancer in Botswana. It is recommended that every woman aged 20 - 65 should screen for cervical cancer every 2 - 3 years. If you don't screen for cervical cancer you will:

a) Develop cervical cancer that will become impossible to treat.

b) Have only a twenty per cent (20%) chance of surviving death from cervical cancer.

c) Reduce the chance of recovery from cervical cancer to zero if the cancer is already present.

d) Surely die. If undetected or treated early, cervical cancer is a killer!

You must speak to your general practitioner immediately about the risks and benefits of a **Pap smear**. The procedure is invasive, will take a few minutes and you may have your results in a few days.'

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in the experimental room to brief the participants about the purpose of the study and voluntary participation, and to answer any query that would arise during the experiment. At the end of the experiment, the research assistant debriefed the participants and gave contacts for psychology services for those who, as a result of the study, needed psychological support or more information about CC.

Measures
The study used a sociodemographic measure made for the purpose. Knowledge of and attitudes towards CC and utilisation of CC screening services were assessed using measures adopted from previous studies.[35] The positive and negative framing of information about CC was adapted from several previous studies.[20,30,35]

Independent variables
Message framing
The experimental messages were described in an excerpt format on a single page with the heading, 'Cervical cancer: What you should know'. The messages contained ~150 words each, with information on benefits (gains) of early screening and risks (losses) of not screening for CC gathered from several sources. The pamphlets contained CC facts and the reasons why cervical screening should be performed. The message frames consisted of four sentences deliberately made to reflect gain-framed and loss-framed health messages (Tables 1 and 2). Messages framed as gains included texts indicating the benefits of screening for CC accompanied by positive images of a woman who has been screened for CC (Fig. 1A and B). Messages framed as loss included an image of a young woman's abdomen after surgery to remove a cancerous lesion (Fig. 2) and/ or a picture of skin with a malignant lesion, and texts conveying the risks of not screening for CC (messages framed as losses). The size of the pictures and text length and structure were consistent across all messages.

Knowledge and attitudes towards CC
Part of the scale of the study questionnaire developed by Ndejjo *et al.*[33] was used to assess knowledge and attitudes towards CC and screening.

Knowledge: The knowledge subscale comprised 20 items that assessed women's knowledge of CC, vaccination, screening, myths about CC, and other risks for CC such as multiple sexual partners, smoking, contraceptive use, genetics, past exposure to sexually transmitted infections and early onset of sexual activities.[34] An example of items on the knowledge scale included: 'Have you ever heard of cancer of the cervix (CC)?' The questions were coded as yes (1) and no (0), with a maximum possible score of 20 points. A higher score indicated greater knowledge. A median split was used on the scale to classify participants as either more or less knowledgeable about CC.

Attitude: The attitude scale consisted of 10 statements measuring participants' perception of risks of, vulnerability to and severity of CC.[34] Similarly, the attitude scale also assessed perceived self-efficacy and the significance of CC screening.[34] Respondents were required
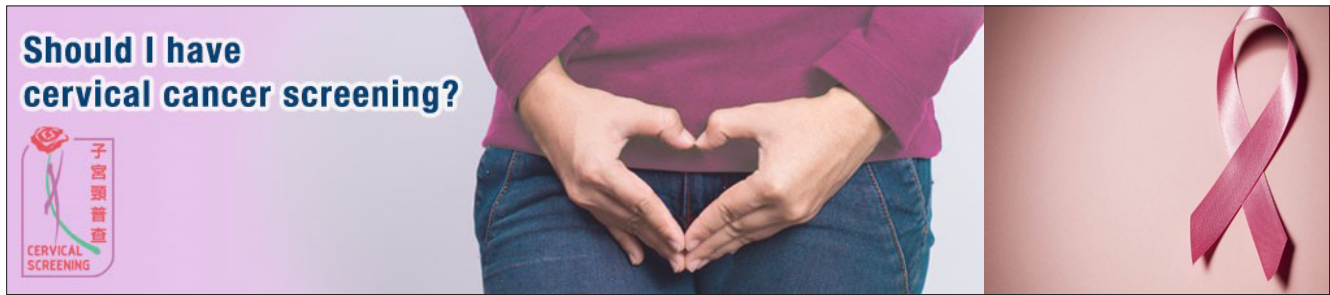
Fig. 1. Gain-framed health messages: positive images of a woman who has been screened for cervical cancer.
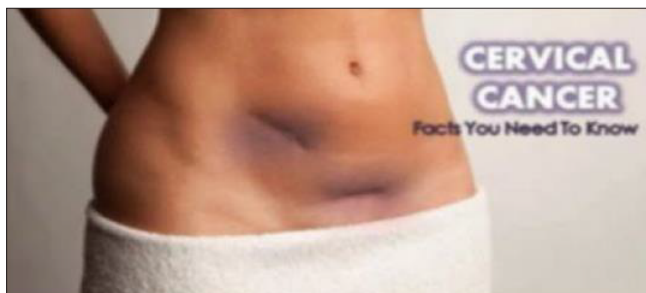

Fig. 2. Loss-framed health messages: image of a woman's abdomen after surgery to remove a cancerous lesion.

to indicate whether they agreed or disagreed with several statements regarding CC. The subscale included statements such as 'There is little a woman can do to reduce her chances of getting CC.' A 5-point Likert scale from strongly agree (1) to strongly disagree (5) was used to score the instrument, with higher scores indicating a negative attitude to CC.[34] A median split was used on the scale to classify participants as either of positive or negative predisposition towards CC. We chose the 50th percentile to demarcate positive or negative attitudes. Participants whose scores were above the 50th percentile were deemed to have a positive attitude, while those whose scores fell below the 50th percentile were deemed to have a negative attitude. The intention was to enhance the clinical implication of our study for greater public health relevance.

Ethical considerations

The Institutional Review Board (IRB) of the University of Botswana granted permission to conduct the study (ref. no. HREC/UG/2019/201503739/201504251). The purpose of the study, right to withdraw at any time during data collection, assurances about anonymity and confidentiality were given before the participants signed a consent form. The research assistant was present during data collection to ensure proper administration of the different sets of questionnaires and to answer any queries that arose. Contact details of both the psychology clinic and the student psychological services at the Student Centre were provided for those who might need psychological support as a result of participating in the study.

Statistical analyses

Descriptive statistics (means, (SDs, medians, etc.) were used to assess participants' demographic characteristics, and the results tabulated. Analyses of covariance (ANCOVA) were used to test the effects of the message frame (gain or loss) as the independent variable, post-

test intention to go for CC screening as the dependent variable and pre-test intention to screen for CC as a covariate. An ANCOVA test assessed the interaction between the message frame (gain or loss) and attitude. Message frame (gain or loss) and attitude were included in the model, with their interaction term as independent variable, pre-test intention to screen for CC as a covariate and post-test intention to screen for CC as the dependent variable. The same analysis was repeated with the variable 'knowledge'.

Results

Background characteristics

Sociodemographic characteristics of the respondents are presented in Table 3. Altogether, 276 young women with a mean (SD; range) age of 21.7 (2.01; 18 - 25) years took part in the study. Fourteen reported having a family member, relative or friend diagnosed with CC (Table 3). Most participants reported that their mothers had attained tertiary education (n=173, 62.8%) and two-thirds (n=185, 67%) of the participants perceived no or low risk of getting CC.

Knowledge about CC and associated risk factors

Nearly all the young women in the study (n=270, 97.8%) knew about CC (Table 4). The majority (n=224, 81.2%) of participants identified at least one test used to screen for CC, while 168 (60.8%) knew that CC is curable upon early detection. Although the overall knowledge about CC and preventive measures was high, knowledge regarding vaccination was low. For example, the recommended age for vaccination, when to start undergoing CC screening and the recommended frequency of screening were all rather low (Table 4).

Generally, the risk factors of CC were widely known, apart from HPV. Overall, the participants were more knowledgeable about the signs and symptoms of CC (Table 5).

Hypothesis testing

The first hypothesis predicted that young women exposed to messages framed as gains would show a greater proclivity to go for CC screening than those who were exposed to messages expressed as losses. This hypothesis was tested with ANCOVA with message frame (gain or loss) as the independent variable, post-test intention to screen for CC as the dependent variable and pre-test intention to screen for CC as the covariate. The results yielded a significant covariate ($F_{(1, 274)}$=89.73, p<0.01, η^2=0.46) and main effect for gain- and loss-framed messages ($F_{(1, 274)}$=5.67, p<0.05, η^2=0.03), indicating that young women who received a gain-framed message (mean 2.55,

Table 3. Background characteristics of respondents (N=276)	
Characteristic	***n* (%)**
Age, years (mean (SD, range))	21.7 (2.01, 18 - 25)
Year of study	
1	39 (14.1)
2	60 (21.7)
3	87 (31.5)
4	90 (32.7)
Mother's highest educational attainment	
No education	11 (3.5)
Primary education	21 (7.1)
Secondary education	71 (25.7)
Tertiary education	173 (62.8)
Perceived risk of cervical cancer	
No risk	28 (10.1)
Low risk	157 (56.9)
Moderate risk	71 (25.8)
High risk	20 (7.2)
Pre-test willing to screen for cervical cancer	198 (71.7)
Post-test willing to screen for cervical cancer	246 (89.1)
Family member, relative, or friend screened for cervical cancer	96 (34.7)
Family member, relative, or friend diagnosed with cervical cancer	14 (5.1)
Exposure to message frames	
Gain frame	146 (52.9)
Loss frame	130 (47.1)
Knowledge of cervical cancer	
High	198 (71.7)
Low	78 (28.3)
Attitude towards cervical cancer	
Positive	116 (42.0)
Negative	160 (58.0)
Does the University of Botswana Health Clinic screen for cervical cancer? (Yes)	118 (42.8)

SD = standard deviation.
*Except where indicated otherwise.

Table 4. Knowledge about and risk factors for CC and its preventive and control measures (N=276)	
Item	***n* (%)**
Ever heard of cancer of the cervix (CC)	270 (97.8)
Knew at least one test used to screen for CC	224 (81.2)
Identified at least one preventive measure for CC	214 (77.5)
Knew CC can be prevented	190 (68.8)
Knew at least one symptom of CC	180 (65.2)
Knew CC is curable if detected early	168 (60.8)
Knew the recommended age for girls to get a vaccination against HPV[‡]	156 (56.5)
Knew someone can be vaccinated against CC	133 (49.3)
Knew the age to start undergoing CC screening	103 (37.7)
Knew the frequency for CC screening	97 (34.9)
Family history of CC	217 (78.3)
Early onset of sexual activity	201 (73.2)
Sexually transmitted diseases	199 (71.7)
Genetic factors	189 (68.1)
Multiple sexual partners	184 (66.7)
HPV[‡]	167 (60.9)
Uncircumcised male partner	163 (58.7)
Tobacco use	147 (52.9)
Human immunodeficiency syndrome[§]	120 (43.5)
Prolonged use of contraceptive pills	101 (37.0)

CC = cervical cancer; HPV = human papillomavirus.
*WHO recommends vaccination for girls aged 9 - 15 years old.
[†]WHO recommends starting screening for women aged 30 years and continuing at 3-year intervals.
[‡]HPV is implicated in about 99.7% of cervical cancer cases.
[§]HIV-positive women are twice as likely to develop cervical cancer as HIV-negative females.

Table 5. Knowledge of signs and symptoms of cervical cancer (N=276)	
Sign or symptom	***n* (%)**
Increased vaginal discharge	215 (77.5)
Vaginal or menstrual bleeding that is longer and heavier than usual	201 (72.5)
Bleeding after sexual intercourse	191 (69.6)
Pain during sexual intercourse	169 (61.6)
Others (e.g. vaginal itching, vaginal sores, backache, etc.)	154 (55.8)
Weight loss	113 (41.3)
Bleeding during menopause	106 (38.4)
Cervical alterations (malignancies)	74 (26.8)

SD 0.75) had greater intention to screen for CC than young women who received a loss-framed message (mean 2.15, SD 0.88).

The second hypothesis predicted that an interaction between exposure to gain-framed message and positive attitude would increase the intention to screen for CC over respondents who received a gain-framed message with a negative attitude towards CC. Again, this hypothesis was tested with ANCOVA with message frame (gain or loss) and attitude towards CC (positive or negative) as the independent variables, post-test intention to screen as the dependent variable and pre-test intention to screen for CC as the covariate. The results indicated a significant covariate ($F_{(1, 274)}$=111.86, $p<0.01$, η^2=–0.49) and significant interaction ($F_{(1, 274)}$=6.87, $p<0.01$, η^2=0.05). Respondents with positive attitudes who received a gain-framed message significantly indicated increased intention (mean 2.89, SD 0.59) to screen for CC than respondents with negative attitudes (mean 2.13, SD 0.67), and respondents with a positive attitude who received a loss-framed message showed an increased

(mean 2.26, SD 0.69) but insignificant intention to screen for CC over those with a negative attitude exposed to a loss-framed message (mean=2.01, SD 0.71).

The third hypothesis predicted that an interaction between exposure to gain-framed messages and more knowledge of CC would increase the intention to screen for CC among participants who received a gain-framed message over those with less knowledge of CC. This hypothesis was tested with ANCOVA with message frame (gain or loss) and knowledge of CC (more or less) as the independent variables, post-test intentions to go for screening as the dependent variable and pre-test intentions to screen for CC as the covariate. The analyses yielded a significant result for

the covariate ($F_{(1\ 273)}$=98.31, p<0.01, η²=−0.41) and main effect of message frame ($F_{(1\ 273)}$=7.35, p<0.01, η²=0.04) but a non-significant result for the interaction ($F_{(1\ 273)}$=1.53, p=0.094).

Discussion

Effective communication is a vital strategy to improve health behaviours and uptake of vaccination and screening in the health sector. The current study might be the first in Botswana that has sought to investigate the use of message framing to improve CC screening among young women at institutions of higher learning. Specifically, the current study aimed to assess: (*i*) intentions to screen for CC; (*ii*) young women's knowledge of and attitudes towards CC; (*iii*) the effects of gain- and loss-framed health messages on intentions to screen for CC in a quasi-experimental design; and (*iv*) whether attitude towards and knowledge of CC moderate the influence of health message frames on uptake of CC screening. The results showed that most young women were willing to go for CC screening, even more after being exposed to the gain-framed message. Although most of the participants in the study were generally knowledgeable about CC, specific knowledge regarding its main aetiological factor (HPV), vaccination, recommended frequency of CC screening and when to start screening were low.

The results of this study demonstrate that gain-framed health messages may lead to improved uptake of CC screening more than loss-framed health messages. Moreover, attitudes of the message recipients towards CC moderated the framing effects. Notably, young women with a positive attitude towards CC were more likely than those with negative attitudes to go for screening. Consequently, the results of the current study demonstrate the possible relative effectiveness of the framing effects of health messages in improving the uptake of critical health services such as screening for CC.

Two major factors appear to mediate the effects of message framing on health behaviours: personal factors (e.g. attitudes or motivation), and the type of health behaviour (e.g. obesity that requires regularly eating healthy food or exercise, or vaccination that is done on one or two occasions only, or whether the disease is a taboo subject or not, e.g. sexually transmitted disease). The results of this study agree with our hypothesis that the gain-framed health messages would lead to increased intentions to screen for CC in participants with positive attitudes more than in those with negative attitudes. In addition, the results lend support to previous studies that have found that framing effects were more pronounced in those for whom the messages were personally meaningful or significant.[27,35] In another study on the impact of message frame on the intention to vaccinate against HPV, loss-framed messaging was associated with a greater rise in vaccination intentions than a gain-framed message in participants with an avoidance-oriented motivational style.[22,35] These mixed results indicate that health communication might be different for different health outcomes. For instance, health messages framed as losses may be more effective on health conditions that pose an immediate danger (e.g. Ebola) than on conditions with long-term gestation periods such as diabetes mellitus or hypertension. A previous study demonstrated that women were more willing to vaccinate against HPV when it was framed as prevention against CC rather than against a sexually transmitted infection.[26] Consequently, considering personal factors and types and the nature of health behaviours as outlined above suggests that the prospect theory might have neglected moderating and mediating factors such as attitudes, motivation and nature of health conditions as critical determinants of behavioural intentions.[17]

In addition to the theoretical implications discussed above, the results of this study may have implications for healthcare practitioners. The overall knowledge about CC and preventive measures was high. However, awareness of vaccination, the recommended age for girls to get a vaccination, when to start screening and the recommended frequency of screening were low (Table 5). Yet HPV, which is the most potent risk factor for CC, can be effectively prevented through HPV vaccination and testing. Health workers and policymakers need to design effective communication strategies to educate young women about CC, its aetiology and how to deliver healthcare messages effectively. Previous studies have shown that, even among health workers, awareness of the aetiology and risk factors of CC is low.[35] Consequently, there is a critical need for education among young women on the aetiology of CC (especially the role of HPV) and on the process, stigma and myths around screening.[34,35] The government should intervene to improve the required infrastructure needed to meet the screening programme required to lower the incidence of CC among young women in Botswana.

Study limitations and strengths

The limitations of the current study may provide opportunities for future research in many ways. First, framing health message was investigated only for CC screening. Future research should assess the impact of framing health communication on health decision-making options such as vaccination against HPV, the leading cause of CC. Second, several factors, such as personality, attitudes, personal experiences, type and nature of health condition and meaning and stigma attached to such conditions, may moderate or mediate the influence of message framing on health decision-making. These moderating and mediating factors should form the basis for future research on the framing effect. Studying mediators and moderators is critical in illuminating the pathways from message frames to health decision-making. Third, the convenience sampling strategy used in this study is prone to bias, as the sample is unrepresentative of the population of young women in Botswana. Nevertheless, the quasi-experimental design might have improved the validity of the study by creating a more realistic and real-life situation, unlike in real experimental conditions. Fourth, the recorded intention to go for CC screening was based on self-report, which could be biased because it is difficult to know whether the intentions reported will translate into actual screening for CC. Finally, this study is unique in that no previous study in Botswana has assessed the effects of message frames on health decision-making. Further studies on the impact of message framing on health decision-making are recommended in resource-constrained settings where disease burden is a huge barrier to development.

Conclusion

The findings in this study demonstrate the importance of framing health messages in decision-making. Notably, the results show that

attributes of recipients, such as attitudes, moderate health message framing. Consequently, framing health messages can be leveraged to enhance the uptake of screening services for CC as an efficient prevention strategy among young women, a critically important subpopulation in the fight against CC in a country with a very high prevalence of HIV/AIDS. Gain-framed health messages may be effective for the uptake of screening, particularly in young women with positive attitudes towards CC, with practical implications for practice and policy. A critical need exists among young women for education regarding CC, especially on its aetiology, screening methods and vaccination. Improving health communication and infrastructure to meet education, screening and vaccination needs to reduce the burden of CC should be prioritised by the government.

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