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Soya, Sweat, And Sunlight: Predictors of Prostate Cancer Prevention Among Health Science Students

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ABSTRACT: Background: Prostate cancer remains a major global health concern, with increasing evidence highlighting the role of modifiable lifestyle factors such as diet, physical activity, and sunlight exposure in its prevention. Despite growing awareness, limited research has explored how these factors influence prostate cancer prevention literacy among health science students in Rwanda. This study examined the predictive role of soya milk consumption, physical exercise, and sunlight exposure on prostate cancer knowledge and preventive behavior among students from selected institutions.

Methods: A quantitative, descriptive-correlational research design was employed involving 303 health science students selected through stratified random sampling from the University of Gitwe, East African Christian College, and Institut Catholique de Kabgayi (ICK). Data were collected using a self-structured 24-item questionnaire assessing lifestyle practices and prostate cancer prevention literacy. Descriptive statistics, Spearman's rank-order correlation, and multiple regression analysis were used to analyze the data.

Findings: The results revealed moderate engagement in prostate cancer–preventive lifestyles, with composite means of 3.36 for soya milk consumption, 3.39 for physical exercise, and 3.31 for sunlight exposure. Significant positive correlations were found between lifestyle factors and prevention literacy, with sunlight exposure ($\rho = 0.861$), physical exercise ($\rho = 0.787$), and soya milk consumption ($\rho = 0.723$), all $p < 0.001$. Regression analysis indicated that sunlight exposure was the strongest predictor ($\beta = 0.672$, $p < 0.001$), followed by physical exercise ($\beta = 0.172$, $p = 0.006$) and soya milk consumption ($\beta = 0.100$, $p = 0.045$), explaining 76% of the variance.

Conclusion: The study concludes that integrated lifestyle practices significantly predict prostate cancer prevention literacy. Strengthening health education and promoting consistent healthy behaviors are essential to enhance preventive outcomes among health science students.

KEYWORDS: Prostate cancer prevention, soya milk consumption, physical exercise, sunlight exposure, health promotion, prevention literacy, health science students

BACKGROUND OF THE STUDY

Prostate cancer remains one of the leading malignancies affecting men worldwide, with lifestyle factors increasingly recognized as significant in its prevention. Globally, dietary patterns, physical activity, and sunlight exposure are linked to prostate cancer risk reduction. Regular consumption of soy products, including soya milk, has been associated with a lower incidence of prostate cancer, particularly in populations with high soy diets, such as in Asia, where men consuming soy milk more than once daily experienced up to a 70% reduction in risk (Applegate et al., 2018). Similarly, physical exercise demonstrates protective effects, with studies indicating a 10–30% reduction in prostate cancer risk among men engaging in regular aerobic and resistance activities (Carvalho et al., 2023). Sunlight exposure, by facilitating vitamin D synthesis, also plays a preventive role in prostate health, though evidence highlights a gap between awareness and actual sun-protective practices among university students (Yoon & Kim, 2021). Collectively, these factors underscore the importance of proactive lifestyle behaviors in mitigating global prostate cancer risk.

In the African context, research on prostate cancer preventive behaviors among health science students remains limited, yet evidence points to meaningful associations between lifestyle choices and risk reduction. Soya consumption has demonstrated a protective effect among African populations, including African Americans, with studies showing an odds ratio of 0.94 for reduced prostate cancer risk (Huang & Wang, n.d.). Awareness of prostate health positively influences dietary choices; for example, 62.5% of participants in Ghana with high prostate health knowledge were more likely to consume soy and other protective foods (Awuni et al., 2022). Physical activity and sunlight exposure similarly contribute to prostate cancer prevention; however, adherence to preventive practices, such as regular exercise and sun-protective behaviors, remains suboptimal, with only 48.1% of students reportedly practicing sun protection while outdoors (Pengpid & Peltzer, 2015). These findings indicate that while lifestyle modifications are recognized, there is variability in their implementation, largely influenced by knowledge, cultural practices, and accessibility.

Within Rwanda, the literature on prostate cancer prevention among health science students is particularly sparse. While general cancer education and oncology training are expanding, specific studies examining the frequency of soya milk consumption, regular physical activity, and sunlight exposure among Rwandan students are lacking. Available evidence suggests that students may have high exposure to sunlight, yet gaps exist in translating awareness into preventive practices, such as balanced sun exposure and vitamin D optimization (Shaye et al., 2023; Sdrales et al., 2024). Similarly, while dietary awareness exists, the actual intake of soy products for prostate cancer prevention remains undocumented. The absence of context-specific data limits understanding of how Rwandan health science students engage in lifestyle practices that could reduce prostate cancer risk and highlights the need for targeted educational and behavioral interventions.

Despite global and African evidence linking dietary soy intake, physical exercise, and sunlight exposure to prostate cancer prevention, there is a significant scarcity of research examining these lifestyle predictors among health science students in Rwanda. Existing studies focus predominantly on general cancer knowledge, awareness, or population-level associations, without addressing preventive behaviors in the student population. Moreover, no comprehensive studies have simultaneously investigated the relationships between soya milk consumption, exercise frequency, sunlight exposure, and the students' prostate cancer knowledge and preventive behaviors. This gap underscores the necessity of conducting research in Rwanda to generate empirical evidence that can inform educational strategies, promote healthy lifestyles, and ultimately enhance prostate cancer prevention among future health professionals.

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Research Questions

This study aims to assess the lifestyle practices that influence prostate cancer prevention among health science students at University of Gitwe, East African Christian College, and Institut Catholique de Kabgayi (ICK). Specifically, the investigation seeks to address the following questions:

1. To what extent do health science students practice prostate cancer-preventive lifestyles in terms of:

A. Frequency of Soya milk consumption?

B. Regularity of physical exercise?

C. Duration of sunlight exposure?

2. Is there a significant relationship between these lifestyle predictors and the students' level of prostate cancer knowledge and preventive behavior?

A. Soya milk,

B. physical exercise,

C. sunlight

3. Which among the following variables significantly predicts the prostate cancer prevention literacy of health science students:

A. Dietary Soya intake

B. Physical exercise duration

C. Sunlight exposure frequency

CONCEPTUAL FRAMEWORK

1.8 Study outline

CHAPTER TWO: LITERATURE REVIEW

Introduction

2.1 Definition of key concepts

2.2 Theoretical framework

2.3 Related studies and their Achievements

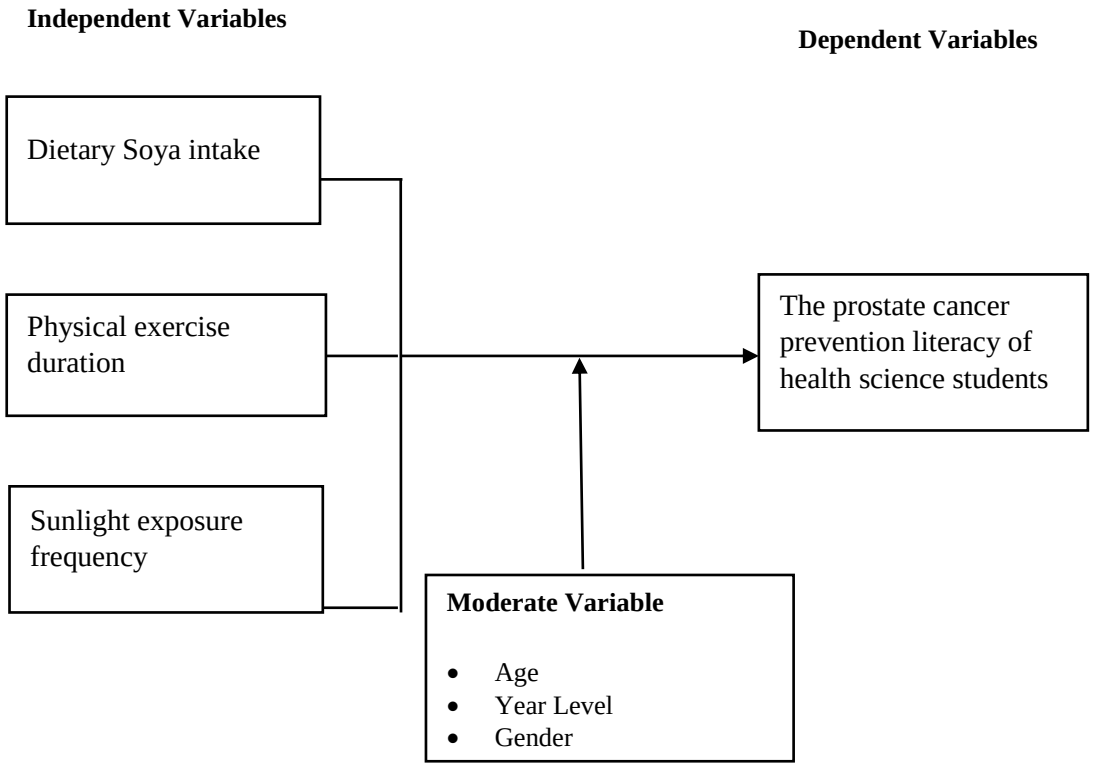


Figure 1. Conceptual Framework

METHODOLOGY

This study employed a quantitative, descriptive-correlational research design to examine the relationship between soya milk consumption, physical exercise, sunlight exposure, and prostate cancer prevention literacy among health science students from University of Gitwe, East African Christian College, and Institut Catholique de Kabgayi (ICK). A total of 303 participants from the Midwifery and Nursing departments (Year 1–4) were selected using stratified random sampling to ensure proportional representation across institutions, departments, and year levels, minimizing sampling bias and allowing accurate comparison between subgroups. Data were collected using a self-structured 24-item questionnaire covering dietary practices, physical activity, sunlight exposure, and prostate cancer knowledge and preventive behaviors. Reliability was confirmed through a pilot study, yielding Cronbach's alpha coefficients above 0.78, indicating good internal consistency. Ethical considerations were strictly observed,

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including obtaining Ethics Review Board (ERB) approval, institutional permissions, participant orientation, and informed consent, while ensuring confidentiality, anonymity, and voluntary participation.

THEORETICAL FRAMEWORK

The theoretical framework of this study is anchored on Pender's Health Promotion Model (HPM), originally developed by Nola J. Pender in 1982 and later revised in 1996, which illustrates the relationship between individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes. In this study, the key variables (frequency of soya milk consumption, regularity of physical exercise, and duration of sunlight exposure) that are positioned as health-promoting behaviors influenced by cognitive perceptions and leading to improved prostate cancer prevention literacy (knowledge and preventive behavior) (Cursos et al., 2025).

Theoretical framework

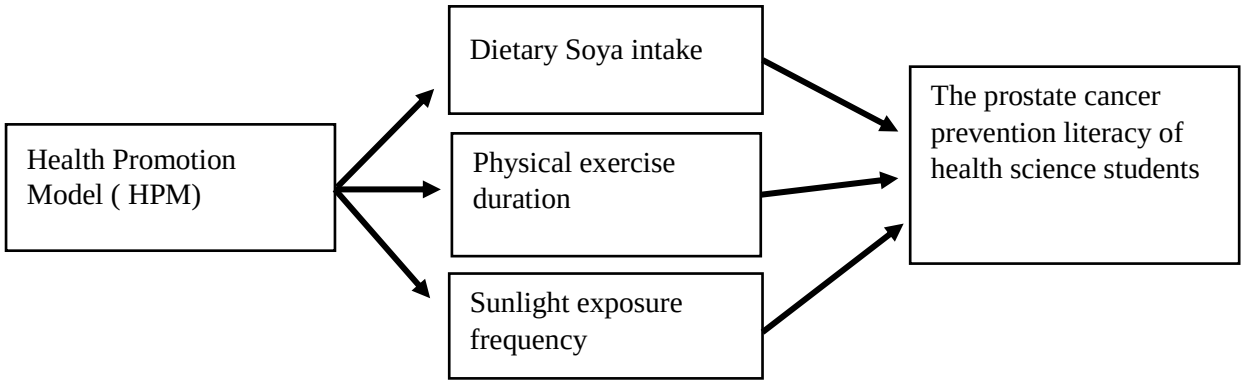


Figure 2. Theoretical Framework

Pender's Health Promotion Model provides a comprehensive framework for understanding how lifestyle practices influence health-related knowledge and preventive behaviors. In the context of this study, soya milk consumption, physical exercise, and sunlight exposure are conceptualized as behavior-specific cognitions and actions that individuals adopt to enhance their well-being. The model posits that individuals who perceive greater benefits, fewer barriers, and possess higher self-efficacy are more likely to engage in health-promoting behaviors (Rojas-Torres et al., 2025). Thus, students who are aware of the protective effects of plant-based diets, regular physical activity, and adequate sunlight exposure are more likely to integrate these practices into their daily routines .

Furthermore, the model emphasizes that commitment to a plan of action leads directly to the adoption of sustained health behaviors (Bahrami et al., 2025). In this study, increased engagement in these modifiable lifestyle factors contributes to enhanced prostate cancer knowledge and preventive behavior, collectively referred to as prevention literacy. Therefore, Pender's HPM effectively explains how cognitive awareness and personal motivation translate into consistent preventive practices, making it the most appropriate theoretical foundation for examining the predictors of prostate cancer prevention among health science students.

RESULT AND DISCUSSION

Respondents' Level of Soya Milk Consumption as a Prostate Cancer–Preventive Lifestyle

Table 1 presents the level of soya milk consumption as a prostate cancer–preventive lifestyle among health science students. The overall composite mean of 3.36 (SD = 0.76) indicates a neutral level of agreement, suggesting that respondents demonstrate a moderate or average engagement in consuming soya milk for preventive purposes. The highest mean was recorded for "I regularly consume soya milk as part of my daily or weekly diet" (Mean = 3.50, SD = 0.84), interpreted as Agree (High), implying that some students have incorporated soya milk into their routine diet. However, most items fell within the moderate range (Means = 3.31–3.40), reflecting only average consistency in preventive dietary practices.

On the other hand, the lowest mean was observed for "I am aware that frequent consumption of soya milk may reduce the risk of developing prostate cancer" (Mean = 3.22, SD = 0.81), indicating limited specific knowledge regarding its protective role. This pattern suggests that while students may consume soya milk, their behavior is not strongly driven by informed awareness of its cancer-preventive benefits. Overall, the findings highlight a gap between knowledge and practice, emphasizing the need for enhanced health education interventions to promote evidence-based dietary behaviors for prostate cancer prevention.

Table 1. Respondents' Level of Soya Milk Consumption as a Prostate Cancer–Preventive Lifestyle

Soya Milk Consumption as a Prostate cancer - preventive lifestyle	Mean	Median	SD	Scale response	Qualitative Descriptor
I regularly consume soya milk as part of my daily or weekly diet.	3.50	4	0.841	Agree	High
I intentionally include soya milk in my diet because of its potential role in preventing prostate cancer.	3.33	3	0.707	Neutral	Average

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I am aware that frequent consumption of soya milk may reduce the risk of developing prostate cancer.	3.22	3	0.811	Neutral	Average
My knowledge about prostate cancer influences my decision to consume soya milk.	3.36	3	0.736	Neutral	Average
I prefer soya milk over other beverages due to its perceived health benefits related to cancer prevention.	3.39	4	0.759	Neutral	Average
I make a conscious effort to consume soya milk more than once a week.	3.40	4	0.697	Neutral	Average
My dietary habits reflect the inclusion of plant-based foods such as soya milk for disease prevention.	3.31	4	0.827	Neutral	Average
I believe that increasing my intake of soya milk can contribute to reducing my risk of prostate cancer.	3.36	3	0.722	Neutral	Average
Composite Mean	3.35875	3.5	0.7625	**Neutral**	**Average**

Legend: *1.0-1.49= Very low, 1.50-2.49= low, 2.50-3.49= average, 3.50-4.49=High ,4.50-5.0=Very High*

Respondents' Level of Physical Exercise as a Prostate Cancer–Preventive Lifestyle

Table 2 presents the level of physical exercise as a prostate cancer–preventive lifestyle among health science students . The overall composite mean of 3.39 (SD = 0.75) indicates a neutral level of agreement, suggesting that respondents sometimes engage in physical activity as part of their preventive health practices. This reflects a moderate or average level of participation, implying that while exercise is recognized, it is not consistently practiced at an optimal level for disease prevention.

Among the indicators, the highest mean score was observed for "I believe that increasing my level of physical activity can improve my overall health and reduce cancer risk" (Mean = 3.47, SD = 0.76), followed by "My knowledge about prostate cancer influences my participation in physical exercise" (Mean = 3.44, SD = 0.71), both interpreted as Neutral (Sometimes). These findings suggest that students generally acknowledge the benefits of physical activity, but this awareness does not always translate into consistent behavior. Conversely, the lowest mean was recorded for "I perform at least 20–30 minutes of moderate to vigorous physical activity on most days of the week" (Mean = 3.34, SD = 0.76), indicating inconsistent adherence to recommended exercise guidelines. Overall, the uniformity of moderate scores across items highlights a gap between awareness and actual practice, emphasizing the need for structured interventions and behavioral motivation strategies to promote regular physical activity as a key component of prostate cancer prevention.

Table 2. Respondents' Level of Physical Exercise as a Prostate Cancer–Preventive Lifestyle

Physical exercises as a prostate cancer-preventative Lifestyle	**Mean**	**Median**	**SD**	**Scale Response**	**Qualitative Descriptor**
I engage in regular physical exercise as part of my weekly routine.	3.35	3	0.753	**Neutral**	**Sometimes**
I perform at least 20–30 minutes of moderate to vigorous physical activity on most days of the week.	3.34	3	0.763	**Neutral**	**Sometimes**
I intentionally exercise to reduce my risk of developing prostate cancer.	3.35	3	0.712	**Neutral**	**Sometimes**
I am aware that regular physical activity can help lower the risk of prostate cancer.	3.35	4	0.778	**Neutral**	**Sometimes**
My knowledge about prostate cancer influences my participation in physical exercise.	3.44	4	0.711	**Neutral**	**Sometimes**
I participate in both aerobic and resistance exercises as part of my health routine.	3.39	4	0.741	**Neutral**	**Sometimes**
My lifestyle reflects a consistent commitment to physical activity for disease prevention.	3.40	4	0.743	**Neutral**	**Sometimes**
I believe that increasing my level of physical activity can improve my overall health and reduce cancer risk.	3.47	4.00	0.762	**Neutral**	**Sometimes**
Composite Mean	**3.38625**	**3.625**	**0.745375**	**Neutral**	**Sometimes**

Legend: *1.0-1.49= Very low, 1.50-2.49= low, 2.50-3.49= average, 3.50-4.49=High ,4.50-5.0=Very High*

Respondents' Level of Sunlight Exposure as a Prostate Cancer–Preventive Lifestyle

Table 3 presents the level of sunlight exposure as a prostate cancer–preventive lifestyle among health science students. The overall composite mean of 3.31 (SD = 0.73) indicates a neutral level of agreement, suggesting that respondents sometimes engage in sunlight exposure as part of

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their health practices. This reflects a moderate level of engagement, implying that while students are somewhat exposed to sunlight, the practice is not consistently maintained as a deliberate preventive behavior.

Among the indicators, the highest mean score was recorded for "I consider the benefits of sunlight exposure for prostate health when planning my daily activities" (Mean = 3.40, SD = 0.73), followed by "My lifestyle includes consistent sunlight exposure as a form of disease prevention" (Mean = 3.36, SD = 0.72), both interpreted as Neutral (Sometimes). These findings suggest a moderate awareness of the health benefits of sunlight, though not strongly translated into routine practice. In contrast, the lowest mean was observed for "I expose myself to sunlight for at least 15–30 minutes per day" (Mean = 3.18, SD = 0.89), indicating inconsistent adherence to recommended sunlight exposure duration. Overall, the narrow range of moderate scores highlights a gap between knowledge and consistent behavioral practice, emphasizing the need for enhanced health promotion strategies to encourage safe and regular sunlight exposure as part of prostate cancer prevention.

Table 3. Respondents' Level of Sunlight Exposure as a Prostate Cancer–Preventive Lifestyle

Sunlight Exposure	Mean	Median	SD	Scale Response	Qualitative Descriptor
I spend time in direct sunlight as part of my daily routine.	3.19	3.00	0.664	**Neutral**	**Sometimes**
I expose myself to sunlight for at least 15–30 minutes per day.	3.18	3.00	0.887	**Neutral**	**Sometimes**
I ntentionally seek sunlight exposure to support my overall health.	3.32	3.00	0.723	**Neutral**	**Sometimes**
I consider the benefits of sunlight exposure for prostate health when planning my daily activities.	3.40	4.00	0.733	**Neutral**	**Sometimes**
My knowledge about prostate cancer influences how often I expose myself to sunlight.	3.34	3.00	0.695	**Neutral**	**Sometimes**
I maintain a regular pattern of sunlight exposure throughout the week.	3.30	3.00	0.782	**Neutral**	**Sometimes**
My lifestyle includes consistent sunlight exposure as a form of disease prevention.	3.36	3.00	0.717	**Neutral**	**Sometimes**
I balance my sunlight exposure with protective measures (e.g., avoiding excessive exposure) during outdoor activities.	3.35	3.00	0.672	**Neutral**	**Sometimes**
Composite Mean	**3.305**	**3.125**	**0.734125**	**Neutral**	**Sometimes**

Legend: *1.0-1.49= Strongly Disagree, 1.50-2.49=Disagree, 2.50-3.49= Moderate , 3.50-4.49=Agree ,4.50-5.0=Strongly Agree*

Relationship Between Lifestyle Predictors and Prostate Cancer Knowledge and Preventive Behavior

Table 4 presents the analysis of Spearman's rank-order correlation, which revealed strong positive relationships between lifestyle practices and prostate cancer knowledge and preventive behavior among health science students at the University of Gitwe, East African Christian College, and Institut Catholique de Kabgayi (ICK). Sunlight exposure had the strongest correlation ($\rho = 0.861$, $p < 0.001$), followed by physical exercise ($\rho = 0.787$, $p < 0.001$) and soya milk consumption ($\rho = 0.723$, $p < 0.001$), indicating that students who regularly engage in these practices are more likely to have higher awareness and preventive behaviors. All results were statistically significant, leading to rejection of the null hypotheses. Overall, these findings suggest that integrative lifestyle behaviors, particularly consistent sunlight exposure, play a crucial role in enhancing prostate cancer prevention literacy, emphasizing the importance of promoting a balanced diet, regular physical activity, and safe sun exposure among health science students.

Table 4. Relationship Between Lifestyle Predictors and Prostate Cancer Knowledge and Preventive Behavior

Variable	Spearman's rho	P-value	Decision	Interpretation
Soya Milk Consumption	0.723***	< 0.001	Reject H0	Strong positive correlation
Physical Exercises	0.787***	< 0.001	Reject H0	Strong positive correlation
Sunlight Exposure	0.861***	< 0.001	Reject H0	Strong positive correlation

Legend: *0.00–0.29 = weak, 0.30–0.49 = low, 0.50–0.69 = moderate, 0.70–0.89 = strong, 0.90–1.00 = very strong*

Predictors of Prostate Cancer Prevention Literacy Among Health Science Students

The multiple regression analysis revealed that sunlight exposure, physical exercise, and soya milk consumption all significantly predict prostate cancer prevention literacy among health science students at the University of Gitwe, East African Christian College, and Institut Catholique de Kabgayi (ICK). Sunlight exposure was the strongest predictor ($\beta = 0.672$, $p < 0.001$), followed by physical exercise ($\beta = 0.172$, $p = 0.006$) and soya milk consumption ($\beta = 0.100$, $p = 0.045$), with the model explaining 76% of the variance ($R^2 = 0.760$). These findings indicate that integrated lifestyle practices, particularly consistent sunlight exposure, play a critical role in enhancing students' prostate cancer prevention literacy,

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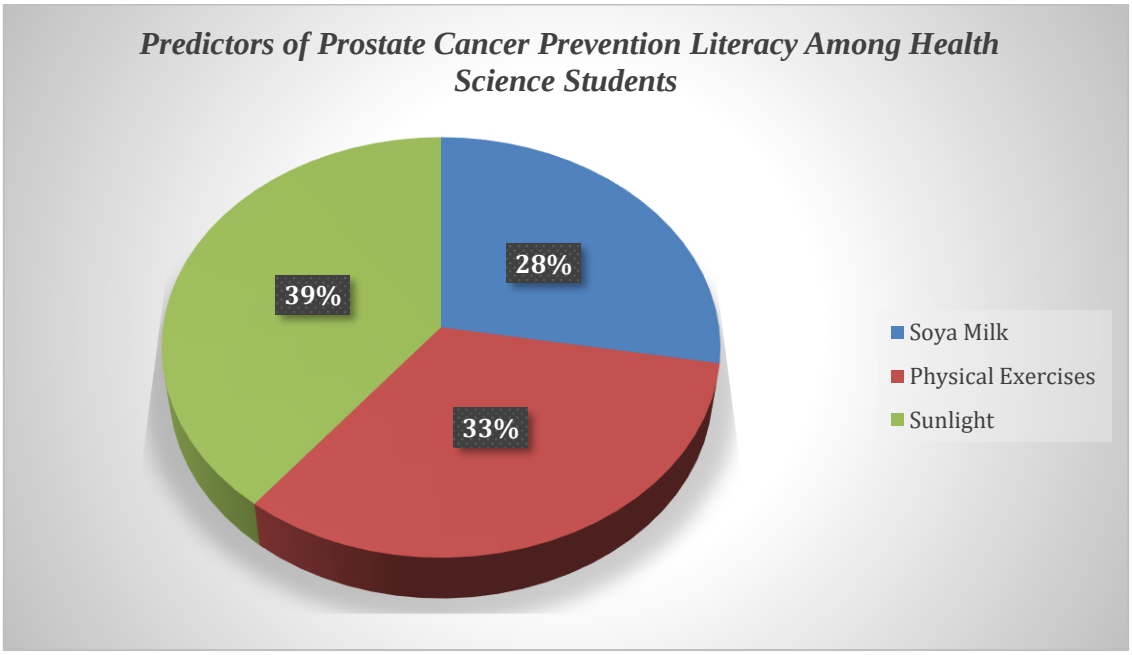
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underscoring the importance of promoting balanced sun exposure, regular physical activity, and dietary awareness as part of effective preventive strategies.

Table 5. Predictors of Prostate Cancer Prevention Literacy Among Health Science Students

Predictor	Estimate	SE	t	p	R^2 Change	Percentage (%)
Intercept	0.1818	0.1052	1.73	0.085		
M_Soya Milk	0.1000	0.0498	2.01	0.045	0.522	27.72
M_Physical Exercises	0.1724	0.0618	2.79	0.006	0.620	32.93
M_Sunlight	0.6723	0.0546	12.32	< .001	0.741	39.35

Legend : *P-value <0.001*, R^2 *=0.760*



CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

This study concludes that health science students demonstrate a moderate level of engagement in prostate cancer–preventive lifestyles, including soya milk consumption, physical exercise, and sunlight exposure. Although students show awareness of these health-promoting behaviors, their practices remain inconsistent and not strongly driven by informed knowledge. Furthermore, the findings reveal strong and statistically significant relationships between lifestyle factors and prostate cancer knowledge and preventive behavior, with sunlight exposure emerging as the strongest predictor, followed by physical exercise and soya milk consumption. Overall, the study confirms that integrated lifestyle practices significantly enhance prostate cancer prevention literacy among students.

The implications of this study highlight the critical role of health education and behavioral interventions in promoting preventive lifestyles among future health professionals. Educational institutions should strengthen curriculum integration of cancer prevention, emphasizing evidence-based lifestyle practices such as balanced nutrition, regular physical activity, and safe sunlight exposure. Additionally, the findings support the application of Pender's Health Promotion Model, reinforcing that improving self-efficacy, reducing perceived barriers, and increasing awareness can enhance students' commitment to preventive behaviors. This has broader implications for public health strategies, as health science students can serve as key agents in disseminating cancer prevention knowledge within communities.

Despite its contributions, the study has several limitations that must be acknowledged. The study was confined to selected institutions with a sample size of 303 participants, which may affect the generalizability of the findings to other populations. Therefore, future research is recommended to include larger and more diverse samples and explore additional factors influencing preventive behaviors to provide a more comprehensive understanding of prostate cancer prevention among students.

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