

## Research Article

# Nurse-Led Cancer-Risk Reduction and Cardiometabolic Health Promotion among College Students: A Pre-Experimental Study of an Integrated Lifestyle and Psychological Support Intervention

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## Article History

**Received:** 15.07.2026

**Revised:** 30.07.2026

**Accepted:** 20.08.2026

**Published:** 22.08.2026

## Citations:

Chatterji A, Biswal S, Joshi D, Panda SS, Sahu P. Nurse-led cancer-risk reduction and cardiometabolic health promotion among college students: a preexperimental study of an integrated lifestyle and psychological support intervention. Chin. J. Cancer Prev. Treat, 33(7) 84-90, 2026

**Abstract:** **Background:** Cancer and cardiometabolic diseases share several modifiable behavioural risk factors, including tobacco exposure, physical inactivity, unhealthy dietary practices, excess body weight, inadequate sleep, psychological stress, and harmful alcohol use. College students represent an important population for early prevention because health behaviours established during young adulthood may influence future disease risk. Nurse-led interventions integrating lifestyle modification with psychological support may provide a feasible approach to promoting cancer-preventive and cardiometabolic health behaviours. **Objective:** To evaluate the effectiveness of a nurse-led integrated lifestyle modification and psychological support intervention on self-management behaviours, blood pressure, cardiometabolic risk-reduction behaviours, and cancer-risk reduction behaviours among college students. **Methods:** A one-group pre-test/post-test pre-experimental study was conducted among 100 undergraduate college students selected through purposive sampling. Participants received a structured 1-month nurse-led intervention consisting of four weekly sessions addressing healthy diet, physical activity, sedentary behaviour, sleep health, stress management, psychological support, self-monitoring, blood-pressure awareness, tobacco avoidance, healthy weight management, and cancer-risk reduction practices. Outcomes were assessed at baseline and immediately after the intervention. Pre-post differences were analysed using paired t-tests. **Results:** The mean self-management behaviour score increased from  $52.4 \pm 8.6$  to  $71.8 \pm 7.9$ , representing a mean improvement of 19.4 points ( $p < 0.001$ ). Mean systolic blood pressure decreased from  $126.8 \pm 9.4$  to  $121.3 \pm 8.1$  mmHg, while diastolic blood pressure decreased from  $82.1 \pm 6.8$  to  $78.4 \pm 6.2$  mmHg (both  $p < 0.001$ ). Cardiometabolic risk-reduction behaviour scores increased from  $24.8 \pm 5.2$  to  $34.1 \pm 4.7$ , and cancer-risk reduction behaviour scores increased from  $23.9 \pm 5.0$  to  $33.4 \pm 4.6$  (both  $p < 0.001$ ). **Conclusion:** The nurse-led integrated intervention was associated with significant improvements in self-management, cardiometabolic risk-reduction, and cancer-risk reduction behaviours, accompanied by reductions in systolic and diastolic blood pressure among college students. The findings support the potential role of nurses in delivering integrated cancer-prevention and cardiometabolic health-promotion interventions during young adulthood. However, the absence of a control group and the short follow-up limit causal inference and assessment of sustainability. Controlled studies with larger samples and longer follow-up are warranted.

**Keywords:** Cancer prevention; cardiometabolic risk; college students; lifestyle modification; nurse-led intervention; psychological support; self-management.

## INTRODUCTION

Cancer and other non-communicable diseases (NCDs) remain major public-health challenges worldwide. Although cancer development is influenced by genetic, environmental and other factors, a substantial proportion of the global cancer burden is attributable to potentially preventable exposures and behaviours. Tobacco use, alcohol consumption, unhealthy diet, physical inactivity, excess body weight and certain cancer-causing infections are important modifiable determinants of cancer risk. Recent WHO/IARC estimates indicate that approximately 37% of new cancer cases globally in 2022 were attributable to preventable causes, highlighting the importance of population-level cancer prevention.<sup>1, 2</sup>

Cancer prevention therefore requires sustained attention to modifiable risk factors across the life course. Tobacco avoidance, maintenance of healthy body weight, regular physical activity, healthy dietary practices and avoidance or reduction of alcohol consumption are established components of cancer-risk reduction. Primary prevention also includes vaccination against cancer-causing infections, particularly human papillomavirus (HPV) and hepatitis B, as well as reduction of relevant environmental and occupational exposures.<sup>1-3</sup> Young adulthood provides an important window for cancer prevention because health behaviours established during this period may persist throughout later life. College students may experience irregular dietary patterns, insufficient physical activity, prolonged

sedentary behaviour, inadequate sleep, psychological stress and exposure to tobacco or alcohol. These behaviours are relevant not only to future cancer risk but also to cardiometabolic health. University students have been reported to spend substantial amounts of time in sedentary behaviour, supporting the need for preventive health interventions in this population.<sup>4</sup>

Cancer prevention and cardiometabolic disease prevention share several modifiable behavioural pathways. Physical inactivity, unhealthy dietary practices and excess body weight contribute to the risk of several cancers as well as cardiovascular and metabolic disorders. Consequently, interventions promoting regular physical activity, healthy dietary patterns and healthy body weight may provide benefits across multiple disease outcomes.<sup>5-7</sup>

Evidence suggests that multidimensional lifestyle interventions can improve health-related behaviours among university students. Systematic reviews have reported potential benefits of interventions addressing nutrition, physical activity and weight-related behaviours, although methodological limitations and uncertainty regarding the maintenance of behavioural changes remain.<sup>5,6</sup> Sleep and psychological well-being are also relevant to student health. Poor sleep and psychological stress are frequently associated among undergraduate students, while physical activity may provide both physical and psychological benefits.<sup>8,9</sup> Integrating psychological support with lifestyle modification may therefore help address barriers to behavioural change, improve coping and strengthen self-management.

Cancer prevention is particularly relevant in the Indian context, where tobacco exposure and other preventable lifestyle and infectious risk factors contribute to the cancer burden. National cancer-control strategies emphasize tobacco control, healthy diet, physical activity, healthy body weight and reduction of harmful alcohol exposure as important components of cancer prevention.<sup>10</sup> However, preventive interventions targeting these behaviours during the college years remain an important area for health promotion and nursing research.

Nurses are strategically positioned to deliver preventive interventions through health assessment, education, counselling, behavioural modification, self-management training and follow-up. Evidence from nurse-led interventions has demonstrated improvements in lifestyle behaviours and modest reductions in blood pressure, supporting the feasibility of nurse-led approaches to risk-factor modification.<sup>11</sup>

Despite the common behavioural pathways linking cancer and cardiometabolic disease, preventive interventions among college students are often focused on individual lifestyle domains rather than integrating cancer-risk reduction, cardiometabolic risk reduction and psychological support within a single nurse-led programme. An integrated approach may therefore provide a practical strategy for addressing multiple

modifiable risk factors during an important stage of the life course.

Therefore, the present study evaluated the effect of a nurse-led integrated lifestyle and psychological support intervention on cancer-risk reduction behaviours, cardiometabolic risk-reduction behaviours, self-management behaviours and blood pressure among college students.

## 1.1 OBJECTIVES

**Primary Objective** To evaluate the effectiveness of a nurse-led integrated lifestyle and psychological support intervention on cancer-risk reduction behaviours among college students.

## Secondary Objectives

- To compare cancer-risk reduction, cardiometabolic risk-reduction and self-management behaviours before and after the intervention.
- To compare systolic and diastolic blood pressure before and after the intervention.
- To examine associations between selected baseline characteristics and post-intervention outcomes.

## MATERIALS AND METHODS

### 2.1 Study Design and Setting

A one-group pre-test/post-test pre-experimental design was used. The study was conducted among undergraduate college students at Nursing college Sukma, Sukma, Chhattisgarh.

### 2.2 Sample and Sampling

A total of 100 undergraduate students were recruited using purposive sampling.

### 2.3 Eligibility Criteria

#### Inclusion criteria

Undergraduate students who:

- were enrolled in the selected institution;
- were willing to participate;
- were able to understand the study procedures;
- were available throughout the intervention period; and
- provided written informed consent.

#### Exclusion criteria

Students who:

- were unable to participate in the intervention;
- were unable to complete the post-intervention assessment; or
- required medical or psychiatric care that interfered with participation.

### 2.4 Nurse-Led Integrated Cancer-Prevention and Cardiometabolic Intervention

A structured one-month nurse-led intervention was delivered through four weekly sessions of approximately 45–60 minutes each. The intervention was specifically organized around cancer prevention and cardiometabolic risk reduction, while psychological support was incorporated to facilitate behavioural change.

### Intervention components

#### Cancer prevention

- Tobacco avoidance and cessation awareness
- Avoidance of second-hand tobacco exposure
- Alcohol-risk education
- Healthy dietary practices
- Regular physical activity
- Healthy body-weight maintenance
- Awareness of HPV and hepatitis B vaccination
- Preventive-health and appropriate health-seeking practices
- Awareness of avoidable environmental and behavioural cancer risks

WHO identifies tobacco, alcohol, unhealthy diet, physical inactivity and excess body weight among important preventable cancer-risk factors.<sup>1, 2</sup>

#### Cardiometabolic risk reduction

- Physical-activity promotion
- Reduction of sedentary behaviour
- Healthy dietary practices
- Reduction of excess dietary salt
- Healthy weight management
- Blood-pressure awareness
- Sleep-health promotion
- Tobacco avoidance
- Stress management

#### Psychological support

- Supportive counselling
- Stress-management education
- Deep-breathing and relaxation exercises
- Coping strategies
- Problem-solving
- Positive reinforcement
- Self-efficacy enhancement

#### Self-management

- Individual goal setting
- Self-monitoring of diet, activity, sleep and stress
- Identification of behavioural barriers
- Behavioural reinforcement
- Maintenance planning

### 2.5 Outcome Measures

#### Primary Outcome

- **Cancer-risk reduction behaviour:** Assessed using a structured behavioural assessment covering tobacco avoidance, alcohol-risk reduction, healthy dietary practices, physical activity, healthy body weight and preventive-health practices. Higher scores indicated better cancer-risk reduction behaviour.

#### Secondary Outcomes

- **Cardiometabolic risk-reduction behaviour:** Assessed using a structured behavioural assessment covering physical activity, dietary practices, sleep, sedentary behaviour and tobacco exposure.
- **Self-management behaviour:** Assessed using a structured self-management behaviour questionnaire, with higher scores indicating better self-management.
- **Blood pressure:** Systolic and diastolic blood pressure were measured using an automated digital blood-pressure monitor following a standardized measurement procedure.

### 2.6 Data Collection Procedure

Baseline assessment was conducted before initiation of the intervention. Participants completed the structured questionnaires, followed by standardized measurement of systolic and diastolic blood pressure.

The nurse-led integrated intervention was delivered over one month, from **20 January 2026 to 22 February 2026, through four weekly sessions**. The intervention addressed cancer prevention, cardiometabolic risk reduction, lifestyle modification, psychological support, stress management, self-management, goal setting and behavioural reinforcement.

Post-intervention assessment was conducted using the same instruments and standardized blood-pressure measurement procedures. Pre- and post-intervention measurements were matched for each participant.

### 2.7 Statistical Analysis

Data were analysed using IBM SPSS Statistics. Categorical variables were presented as frequencies and percentages, while continuous variables were expressed as mean  $\pm$  standard deviation.

The paired *t*-test was used to compare pre- and post-intervention outcome measures. Appropriate inferential tests were used to examine associations between selected baseline characteristics and post-intervention outcomes. Statistical significance was set at a two-sided  $p < 0.05$ .

The final analysis included 100 participants who completed both pre- and post-intervention assessments.

## RESULTS

**Table 1. Intervention Schedule**

| Week   | Main focus                                                                                               |
|--------|----------------------------------------------------------------------------------------------------------|
| Week 1 | Cancer-prevention awareness, lifestyle-risk assessment, healthy diet, physical activity and goal setting |

|        |                                                                                                                                   |
|--------|-----------------------------------------------------------------------------------------------------------------------------------|
| Week 2 | Psychological support, stress management, relaxation, coping and sleep health                                                     |
| Week 3 | Self-management, behavioural monitoring, cardiometabolic risk reduction and blood-pressure awareness                              |
| Week 4 | Tobacco/alcohol prevention, cancer-risk reduction, HPV/hepatitis-B prevention awareness, review of goals and maintenance planning |

**Table 2. Components of the Integrated Intervention**

| Intervention domain        | Major content                                                       | Nursing strategy                |
|----------------------------|---------------------------------------------------------------------|---------------------------------|
| Cancer prevention          | Tobacco, alcohol, diet, activity, healthy weight, preventive health | Education and counselling       |
| Cardiometabolic prevention | BP, diet, salt, weight and physical activity                        | Risk assessment and counselling |
| Psychological support      | Stress, coping, relaxation and emotional support                    | Supportive counselling          |
| Self-management            | Goal setting and self-monitoring                                    | Behavioural reinforcement       |
| Sleep health               | Sleep duration and healthy routines                                 | Education and counselling       |
| Follow-up                  | Progress and barriers                                               | Individualized reinforcement    |

### 3.1 Participant Characteristics

A total of 100 college students were included in the final analysis. The mean age was  $20.4 \pm 1.6$  years. Sixty-eight participants (68.0%) were female and 32 (32.0%) were male. Sixty-one participants (61.0%) were from rural areas. Sixty-three participants (63.0%) reported less than 150 minutes of physical activity per week, while 58 (58.0%) reported inadequate sleep. Tobacco exposure was reported by 9 (9.0%) participants. Forty-six (46.0%) reported regular breakfast consumption.

**Table 3. Sociodemographic and Lifestyle Characteristics**

| Characteristic    | Category      | n (%)     |
|-------------------|---------------|-----------|
| Age               | 18–20 years   | 58 (58.0) |
|                   | 21–23 years   | 42 (42.0) |
| Sex               | Female        | 68 (68.0) |
|                   | Male          | 32 (32.0) |
| Residence         | Rural         | 61 (61.0) |
|                   | Urban         | 39 (39.0) |
| Physical activity | <150 min/week | 63 (63.0) |
|                   | ≥150 min/week | 37 (37.0) |
| Adequate sleep    | Yes           | 42 (42.0) |
|                   | No            | 58 (58.0) |
| Tobacco exposure  | Yes           | 9 (9.0)   |
|                   | No            | 91 (91.0) |
| Regular breakfast | Yes           | 46 (46.0) |
|                   | No            | 54 (54.0) |

### 3.2 Effect of the Intervention

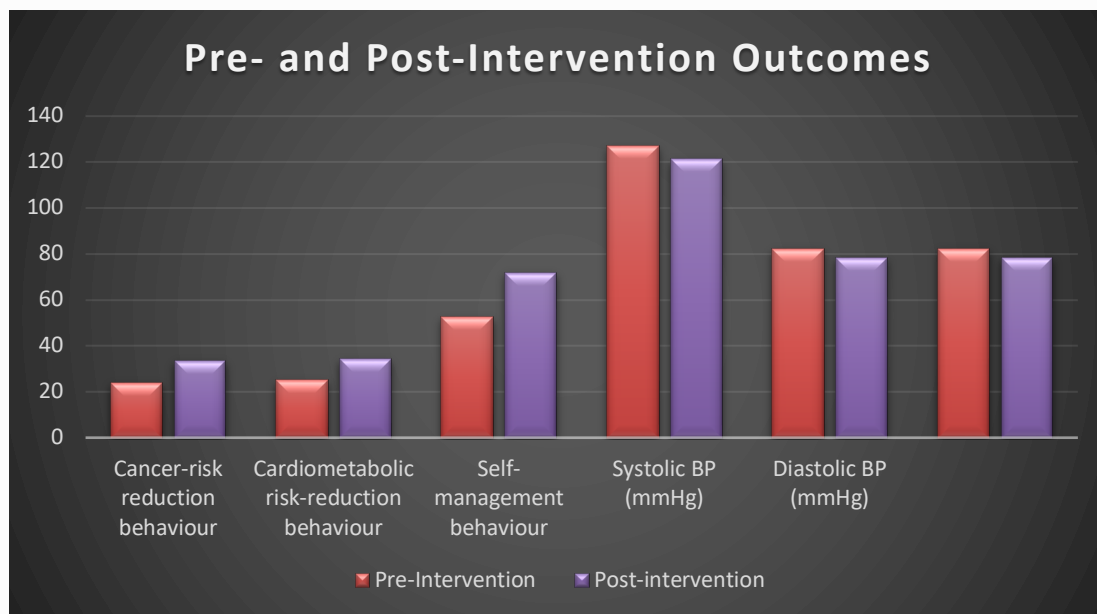
Following the intervention, the mean self-management behaviour score increased from  $52.4 \pm 8.6$  at baseline to  $71.8 \pm 7.9$  post-intervention, with a mean improvement of **19.4 points** ( $p < 0.001$ ). Mean systolic blood pressure decreased from  $126.8 \pm 9.4$  mmHg to  $121.3 \pm 8.1$  mmHg, while mean diastolic blood pressure decreased from  $82.1 \pm 6.8$  mmHg to  $78.4 \pm 6.2$  mmHg.

The mean cardiometabolic risk-reduction behaviour score increased from  $24.8 \pm 5.2$  to  $34.1 \pm 4.7$ , while the mean cancer-risk reduction behaviour score increased from  $23.9 \pm 5.0$  to  $33.4 \pm 4.6$ . **All outcome measures showed statistically significant improvements following the intervention ( $p < 0.001$ ).**

**Table 4. Pre- and Post-Intervention Outcomes**

| Outcome                                  | Pre-intervention Mean $\pm$ SD | Post-intervention Mean $\pm$ SD | Mean change | p-value |
|------------------------------------------|--------------------------------|---------------------------------|-------------|---------|
| Cancer-risk reduction behaviour          | $23.9 \pm 5.0$                 | $33.4 \pm 4.6$                  | +9.5        | <0.001  |
| Cardiometabolic risk-reduction behaviour | $24.8 \pm 5.2$                 | $34.1 \pm 4.7$                  | +9.3        | <0.001  |
| Self-management behaviour                | $52.4 \pm 8.6$                 | $71.8 \pm 7.9$                  | +19.4       | <0.001  |
| Systolic BP (mmHg)                       | $126.8 \pm 9.4$                | $121.3 \pm 8.1$                 | -5.5        | <0.001  |
| Diastolic BP (mmHg)                      | $82.1 \pm 6.8$                 | $78.4 \pm 6.2$                  | -3.7        | <0.001  |

**Figure 1 Pre- and Post-Intervention Outcomes**



Pre- and post-intervention changes in cancer-risk reduction behaviour, cardiometabolic risk-reduction behaviour, self-management behaviour, systolic blood pressure and diastolic blood pressure.

### 3.3 Overall Intervention Effect

The largest numerical improvement was observed in self-management behaviour, followed by cancer-risk reduction and cardiometabolic risk-reduction behaviours. Both systolic and diastolic blood pressure demonstrated reductions following the intervention.

The findings indicate improvement across behavioural and physiological outcomes following the one-month integrated intervention.

## DISCUSSION

The present study demonstrated significant improvements in cancer-risk reduction behaviours following a nurse-led integrated lifestyle and psychological support intervention among college students. Improvements were also observed in cardiometabolic risk-reduction behaviours and self-management, accompanied by reductions in systolic and diastolic blood pressure. These findings suggest that a brief, structured nursing intervention may be feasible for integrating cancer prevention with broader cardiometabolic health promotion in young adults.

The improvement in cancer-risk reduction behaviours is important because several major cancer determinants are modifiable, including tobacco exposure, alcohol consumption, excess body weight, physical inactivity and unhealthy dietary practices.<sup>1,2</sup> Addressing these factors during young adulthood may help reduce cumulative exposure to preventable risks across the life course. The present findings therefore support incorporating cancer prevention into early health-promotion programmes rather than focusing exclusively on older populations.

The intervention addressed tobacco avoidance, alcohol-risk reduction, healthy diet, physical activity, healthy

weight and preventive-health practices. These behaviours overlap substantially with risk pathways for cardiovascular and metabolic diseases, which may explain the concurrent improvement in cardiometabolic risk-reduction behaviours. Previous systematic reviews have reported beneficial effects of nutrition, physical activity and weight-focused interventions among university students, although the sustainability of behavioural change remains uncertain.<sup>5,6</sup>

Improvement in self-management behaviour may be related to goal setting, self-monitoring, individualized counselling, behavioural reinforcement and psychological support. These components may have helped participants translate health information into practical daily behaviours. This is particularly relevant for college students, who increasingly make independent decisions regarding diet, physical activity, sleep and other health behaviours.

The observed reduction in systolic and diastolic blood pressure is consistent with evidence that nurse-led lifestyle interventions can produce modest improvements in blood-pressure outcomes.<sup>11</sup> Although participants were young adults without a requirement for established hypertension, the findings suggest that early lifestyle-focused nursing interventions may have



measurable cardiometabolic benefits. However, the short follow-up and absence of a control group prevent conclusions regarding long-term cardiovascular benefit.

Psychological support was incorporated because stress, sleep problems and unhealthy lifestyle behaviours frequently coexist among university students.<sup>8,9</sup> Addressing psychological barriers alongside lifestyle education may improve engagement with healthy behaviours and strengthen self-management. The multidimensional approach therefore addresses several interconnected determinants of cancer and cardiometabolic risk simultaneously.

From an oncology-prevention perspective, the findings support the importance of establishing healthy behaviours before the development of chronic disease. The college setting may provide a practical opportunity for nurses to deliver cancer-prevention education, behavioural counselling, risk assessment and follow-up through existing student health services.

Nevertheless, the findings require cautious interpretation. The single-group pre-test/post-test design does not exclude maturation, regression to the mean, exposure to other health information or measurement effects. Behavioural outcomes were also questionnaire-based and may be affected by self-report bias. Furthermore, the study measured preventive behaviours rather than cancer incidence, biomarkers or long-term cancer outcomes. Therefore, the findings should be interpreted as short-term pre-post improvements in cancer-preventive and cardiometabolic behaviours, rather than evidence that the intervention reduced cancer occurrence.

Future studies should use controlled or randomized designs, validated assessment tools and longer follow-up to determine the sustainability and causal effectiveness of the intervention. Objective measures of physical activity, anthropometry, dietary behaviour and tobacco/alcohol exposure could further strengthen the evidence.

Overall, the findings support the potential value of nurse-led integrated cancer-prevention and cardiometabolic health-promotion interventions among college students. Combining lifestyle modification, psychological support and self-management education may provide a practical strategy for addressing shared modifiable risk factors during young adulthood.

## 5. STRENGTHS AND LIMITATIONS

### Strengths

The study addressed cancer prevention as an integral component of a broader health-promotion intervention. It combined cancer-risk reduction, cardiometabolic prevention, self-management and psychological support within a nurse-led programme. The intervention was

brief and potentially feasible for implementation within college health and nursing education settings.

### Limitations

- The one-group pre-test/post-test design limits causal inference. Purposive sampling and recruitment from a single institution limit generalizability.
- The follow-up period was only one month; therefore, sustainability of behavioural changes cannot be established.
- The behavioural outcomes were assessed using structured questionnaires and may have been influenced by self-report bias.
- The study measured cancer-prevention behaviours rather than cancer incidence or cancer biomarkers. Consequently, the findings demonstrate improvement in preventive behaviours and should not be interpreted as evidence that the intervention reduced cancer incidence.

## CONCLUSION

A one-month nurse-led integrated lifestyle and psychological support intervention was associated with significant improvements in cancer-risk reduction behaviours, cardiometabolic risk-reduction behaviours and self-management, together with reductions in systolic and diastolic blood pressure among college students.

The findings support the potential role of nurse-led cancer-prevention and cardiometabolic health-promotion interventions during young adulthood. Early interventions addressing tobacco avoidance, healthy diet, physical activity, healthy body weight, psychological well-being and other modifiable risk factors may provide an important strategy for primordial prevention.

However, because of the uncontrolled pre-experimental design and short follow-up, controlled studies with larger samples and longer follow-up are required to determine the durability and causal effectiveness of the intervention.

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