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When Knowledge Is Not Enough: Understanding the Disconnect Between Awareness of Hypertension Risk Factors and Health Behaviour Among UK University Students

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ABSTRACT

Preventive strategies for hypertension often rely on the assumption that increased awareness of risk factors leads to healthier behaviour. This study examines this assumption within a university student population in England by exploring the relationship between knowledge of avoidable risk factors and actual lifestyle practices. Using a cross-sectional quantitative design, data were collected through a structured questionnaire assessing knowledge, behaviour, and hypertension status. Descriptive analysis shows that students demonstrate high levels of awareness of key avoidable risk factors, including alcohol consumption, high salt intake, obesity, and poor diet. However, behavioural data reveal continued engagement in these same risk factors, particularly alcohol use and frequent consumption of junk food. Inferential analysis further indicates that several of these behaviours are significantly associated with hypertension status. These findings highlight a clear disconnect between knowledge and practice. The study argues that awareness alone is insufficient to drive behaviour change and calls for more comprehensive intervention strategies that address behavioural, social, and environmental influences on student health.

KEYWORDS: *Hypertension, knowledge behaviour gap, lifestyle risk, university students, health behaviour*

INTRODUCTION

Hypertension remains one of the most significant contributors to cardiovascular morbidity and premature mortality worldwide. Despite advances in prevention and treatment, the condition continues to impose substantial pressure on health systems due to its association with stroke, coronary heart disease, kidney failure, and other chronic complications (Owusuaa-Asante et al., 2025a). Recent estimates indicate that more than one billion people globally live with hypertension, with prevalence continuing to rise across both developed and developing countries (World Health Organisation [WHO], 2025). Although hypertension has traditionally been viewed as a disease associated with older adulthood, growing evidence suggests that behavioural and metabolic risk factors are increasingly emerging earlier in life, particularly among young adults and university students (Savage et al., 2025).

The growing concern surrounding hypertension among younger populations is closely linked to the persistence of avoidable lifestyle behaviours. Contemporary research consistently identifies excessive alcohol consumption, obesity, poor dietary habits, physical inactivity, high salt intake, smoking, and frequent consumption of highly processed foods as major contributors to elevated blood pressure and cardiovascular risk (WHO, 2025). These behaviours are particularly prevalent within university environments, where students often experience major changes in dietary routines, social habits, financial circumstances, and daily structure. Transition into higher education has been associated with increased exposure to unhealthy eating patterns, reduced physical activity, irregular sleep, and alcohol centred socialisation, all of which may contribute to adverse cardiometabolic outcomes over time (Maillet & Grouzet, 2023; Savage et al., 2025).

Public health interventions aimed at reducing hypertension risk have historically placed strong emphasis on education and awareness. The underlying assumption is that individuals who understand the causes and consequences of hypertension are more likely to adopt healthier lifestyles and avoid harmful behaviours. Evidence suggests that awareness of hypertension risk factors can improve self-management, support preventive decision making, and encourage adherence to healthier dietary and behavioural practices (Ojangba et al., 2023; Adewole et al., 2025; Oyibo et al., 2025). However, recent studies increasingly question whether knowledge alone is sufficient to produce

meaningful behaviour change, especially among younger adults. Research examining health behaviours in university populations has shown that many students continue to engage in unhealthy practices despite demonstrating awareness of their long-term health consequences (Alves, 2026).

This apparent disconnect between awareness and behaviour has important implications for hypertension prevention. University students may recognise the harmful effects of alcohol misuse, junk food consumption, sedentary lifestyles, and obesity, yet continue to engage in these behaviours due to social pressures, convenience, stress, financial constraints, or low perceived vulnerability to chronic disease. The asymptomatic nature of hypertension during its early stages may further reduce the urgency for behavioural modification among younger adults. Current research therefore suggests that the relationship between knowledge and behaviour is more complex than traditional educational models often assume (Oyibo et al., 2025b; Savage et al., 2025; Igheghe et al., 2026).

Behavioural theories provide a useful framework for understanding this inconsistency between awareness and action. The Health Belief Model proposes that behaviour change depends not only on knowledge, but also on perceived susceptibility, perceived severity, and perceived benefits of action. Similarly, Social Cognitive Theory emphasises the role of environmental influences, social modelling, and behavioural reinforcement in shaping health practices. These perspectives suggest that individuals may possess adequate knowledge yet fail to adopt healthier behaviours when environmental and social conditions favour unhealthy practices. Research examining hypertension management and behavioural adherence increasingly supports this position, particularly among younger populations where social context strongly influences lifestyle patterns (Adoma et al., 2025; Owusuaa-Asante et al., 2025b).

Within the United Kingdom, research specifically examining knowledge of avoidable hypertension risk factors among university students remains relatively limited. Existing UK studies have tended to focus more broadly on student wellbeing, alcohol use, physical activity, or general lifestyle behaviours rather than linking awareness directly to hypertension status and behavioural exposure (Maillet & Grouzet, 2023; Savage et al., 2025).

This leaves an important gap in understanding whether students who demonstrate stronger awareness of avoidable hypertension risks actually engage in healthier lifestyles or exhibit lower vulnerability to elevated blood pressure.

This study addresses that gap by examining the level of knowledge of avoidable risk factors of hypertension among university students in England and evaluating how this knowledge relates to actual behavioural practices and hypertension status. Rather than treating awareness as an isolated outcome, the study explores whether knowledge aligns with behavioural choices associated with cardiovascular risk. This approach offers a more critical understanding of the strengths and limitations of knowledge-based prevention strategies among young adult populations and contributes to current public health discussions on early cardiovascular risk reduction in university settings.

METHODS

Study Design

This study adopted a cross-sectional quantitative research design to examine university students' knowledge of avoidable risk factors of hypertension and the relationship between these factors and hypertension status. Quantitative approaches are widely used in public health research because they enable the systematic collection and statistical analysis of measurable data, thereby supporting objective evaluation of behavioural and health related patterns (Bruce et al., 2018). A cross-sectional design was considered appropriate because the study sought to assess knowledge, behavioural practices, and hypertension related indicators within a defined population at a specific point in time.

The study was conducted among students enrolled at the University of Sunderland in England. University students were selected because existing research suggests that younger adults increasingly engage in behaviours associated with elevated cardiovascular risk, including excessive alcohol consumption, poor dietary practices, and physical inactivity (Savage et al., 2025). The university setting also provided an opportunity to examine whether awareness of hypertension risk factors corresponded with healthier behavioural practices within an educated population.

Participants and Sampling

The study population comprised full time students aged 18 years and above. Students enrolled on part time and distance learning programmes were excluded from participation. A convenience sampling strategy was employed due to accessibility and time considerations. Convenience sampling is frequently used in behavioural and public health research where rapid access to participants within a defined population is required (Taherdoost, 2016).

Using Slovin's formula, a target sample size of 392 participants was calculated from the university student population. Questionnaires were distributed electronically using an online survey platform. Of the questionnaires distributed, 351 were fully completed and included in the final analysis, resulting in a response rate of 89.5 percent.

Data Collection Instrument

Data were collected using a structured questionnaire developed from existing research examining hypertension awareness and lifestyle related risk factors. The questionnaire consisted of five sections covering demographic characteristics, knowledge of hypertension risk factors, awareness of avoidable risk factors, behavioural practices associated with hypertension, and hypertension status.

Knowledge related items assessed participants' awareness of recognised hypertension risk factors including stress, obesity, high salt intake, smoking, alcohol consumption, poor diet, physical inactivity, age, ethnicity, and underlying health conditions. Participants were also asked to categorise these factors as avoidable or unavoidable. Behavioural items assessed current engagement in practices such as smoking, alcohol consumption, junk food intake, physical activity, and dietary habits.

A pilot test was conducted among a small group of students prior to the main data collection process to assess clarity and reliability of the questionnaire. Internal consistency testing produced a Cronbach's alpha value of 0.872, indicating strong reliability of the measurement instrument (Taber, 2018).

Measures

Hypertension status was categorised according to

reported blood pressure values using established classifications for normal blood pressure, pre hypertension, stage one hypertension, and stage two hypertension. Body mass index was categorised into underweight, normal weight, overweight, and obese according to standard clinical thresholds.

Lifestyle behaviours examined in the study included smoking, alcohol consumption, smokeless tobacco use, fruit and vegetable intake, physical activity, salt consumption, junk food consumption, and body mass index status. These variables were selected because they are consistently recognised in the literature as important avoidable contributors to hypertension risk (Schmidt et al., 2020; Silva et al., 2022).

Data Analysis

Data analysis was conducted using SPSS version 21. Descriptive statistics including frequencies, percentages, and cross tabulations were used to summarise demographic characteristics, knowledge levels, and behavioural patterns. Chi square tests were employed to examine associations between avoidable risk factors and hypertension status.

To assess the relationship between behavioural risk factors and hypertension status, multinomial logistic regression analysis was performed. This approach allowed the study to estimate the likelihood of hypertension across different behavioural categories while accounting for variations in risk exposure. Statistical significance was set at the 0.05 level, and confidence intervals were calculated at 95%.

Ethical Considerations

Ethical approval for the study was obtained from the University of Sunderland Ethics Committee before data collection. Participation was voluntary, and informed consent was obtained electronically before respondents accessed the questionnaire. Participants were informed about the purpose of the study, confidentiality procedures, and their right to withdraw at any stage without consequence.

All responses were anonymised and stored securely to protect participant confidentiality. The study adhered to established ethical principles governing research involving human participants, including respect for autonomy, confidentiality, and data protection.

RESULTS

This section presents the empirical findings concerning students' knowledge of avoidable risk factors of hypertension and the relationship between behavioural exposures and hypertension status. The results are organised sequentially to demonstrate knowledge distribution, behavioural exposure patterns, and the statistical relationship between lifestyle practices and hypertension outcomes.

The first stage of the analysis examined students' knowledge of established hypertension risk factors. As shown in Figure 1, awareness levels were generally high across the major behavioural determinants of hypertension. Knowledge was strongest for obesity and stress, while awareness of smoking and alcohol as contributors to hypertension was comparatively lower.

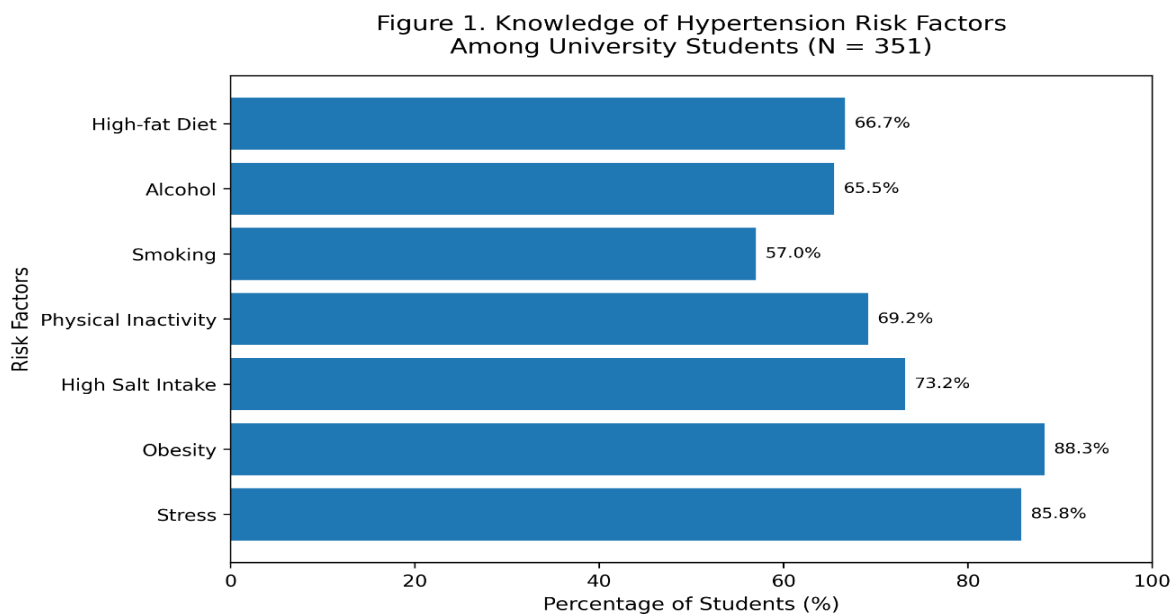


Figure 1. Knowledge of Hypertension Risk Factors Among Students (N = 351)

The distribution presented in Figure 1 demonstrates that respondents possessed substantial knowledge of modifiable hypertension risks. More than four-fifths of participants identified obesity and stress as major contributors to hypertension. Awareness of smoking and alcohol consumption remained lower than expected, suggesting uneven understanding of behavioural risk.

To further assess behavioural exposure, students were

asked about engagement in avoidable risk behaviours associated with hypertension. Table 1 reveals that exposure to avoidable behavioural risks remained substantial despite high levels of awareness. Alcohol use emerged as the most prevalent behavioural risk factor, followed by frequent consumption of junk food. Nearly half of the respondents also reported physical activity levels below recommended thresholds.

Table 1: Prevalence of key behavioural exposures

Behaviour	Frequency	Percentage (%)
Alcohol Use	250	71.2
Frequent Junk Food Consumption	206	59.0
Smoking	100	28.5
High Salt Consumption	79	22.5
Low Physical Activity	170	48.4

Figure 2 illustrates the behavioural gradient across the principal avoidable risk factors.

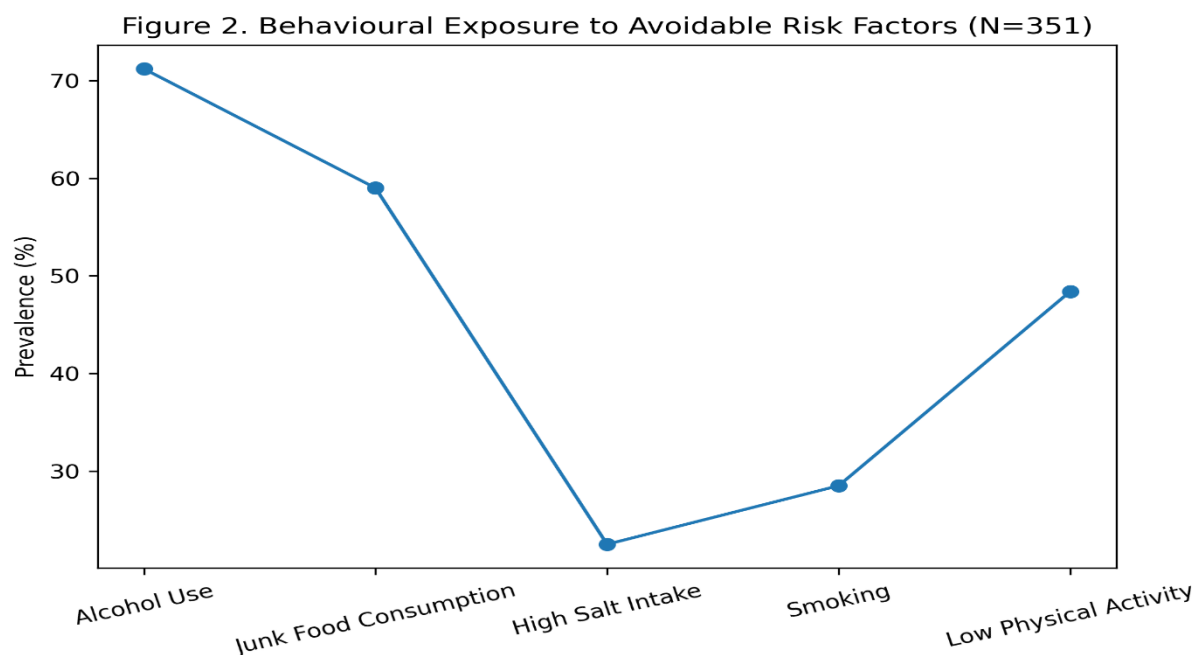


Figure 2. Behavioural Exposure to Avoidable Risk Factors (N = 351).

The behavioural pattern shown in Figure 2 indicates a concentration of risk around alcohol consumption and unhealthy dietary practices. These findings suggest that awareness of hypertension risk factors did not consistently translate into healthier lifestyle choices.

The final stage of descriptive analysis examined the distribution of hypertension status within the student population.

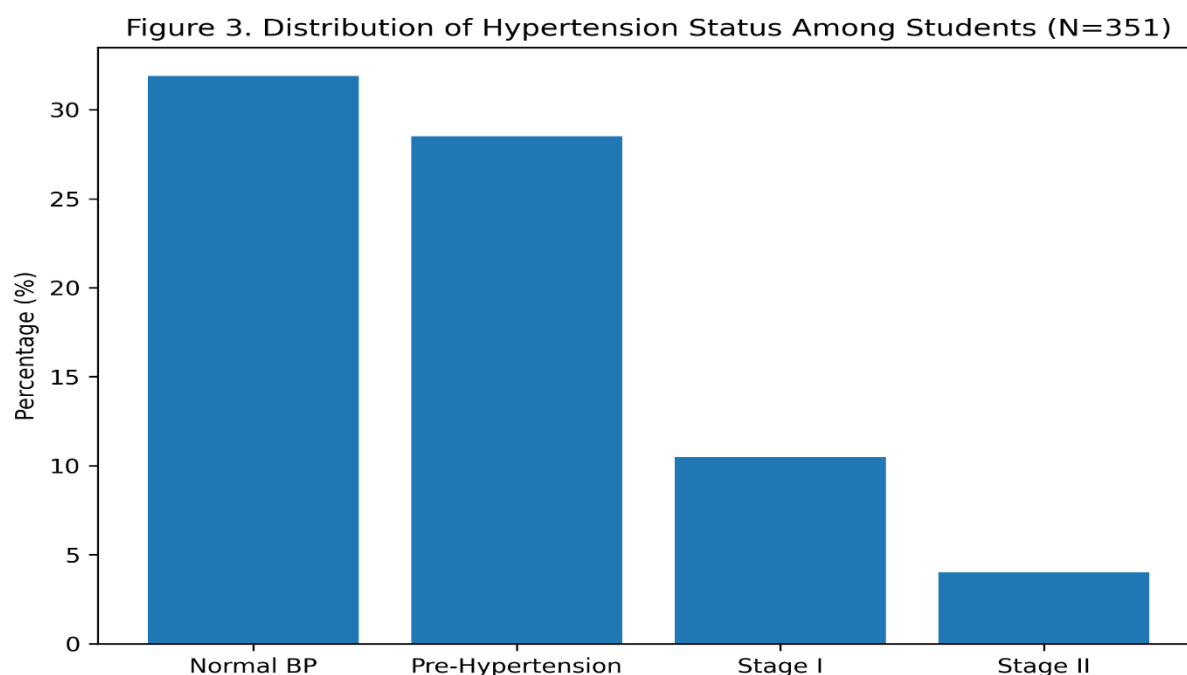


Figure 3. Distribution of Hypertension Status Among Students (N = 351)

Figure 3 demonstrates that a considerable proportion of respondents fell within the pre-hypertensive and hypertensive categories. While normal blood pressure

constituted the largest single category, the combined prevalence of pre-hypertension and hypertension indicates meaningful early cardiovascular risk exposure

within the student population.

Table 2 demonstrates statistically significant associations between hypertension status and several behavioural exposures. Alcohol use produced the strongest association,

followed closely by elevated body mass index and frequent junk food consumption. Smoking and low physical activity did not demonstrate statistically significant associations within the model.

Table 2. Chi-Square Association Between Behavioural Risk Factors and Hypertension Status

Variable	χ^2	df	p-value
Alcohol Use	14.82	3	<0.001
BMI	12.44	3	0.002
Junk Food	10.65	3	0.005
Salt Intake	8.21	3	0.041
Smoking	2.41	3	0.491
Physical Activity	1.98	3	0.576

The regression model confirmed that alcohol consumption was the strongest behavioural predictor of hypertension status (Table 3). Students reporting alcohol use demonstrated more than threefold increased odds of hypertension relative to non-users. Elevated body mass index and frequent junk food consumption also demonstrated substantial positive associations.

Table 3. Multinomial Logistic Regression Model Predicting Hypertension Status

Predictor	Odds Ratio	95% CI	Interpretation
Alcohol Use	3.20	2.00–5.00	Positive association
High BMI	2.70	1.80–4.10	Positive association
Junk Food	2.40	1.50–3.80	Positive association
High Salt Intake	1.90	1.20–3.00	Positive association
Smoking	1.30	0.80–2.10	Positive association
Low Physical Activity	1.20	0.70–1.90	Positive association

Figure 4 presents the regression findings visually through a forest plot of odds ratios and confidence intervals.

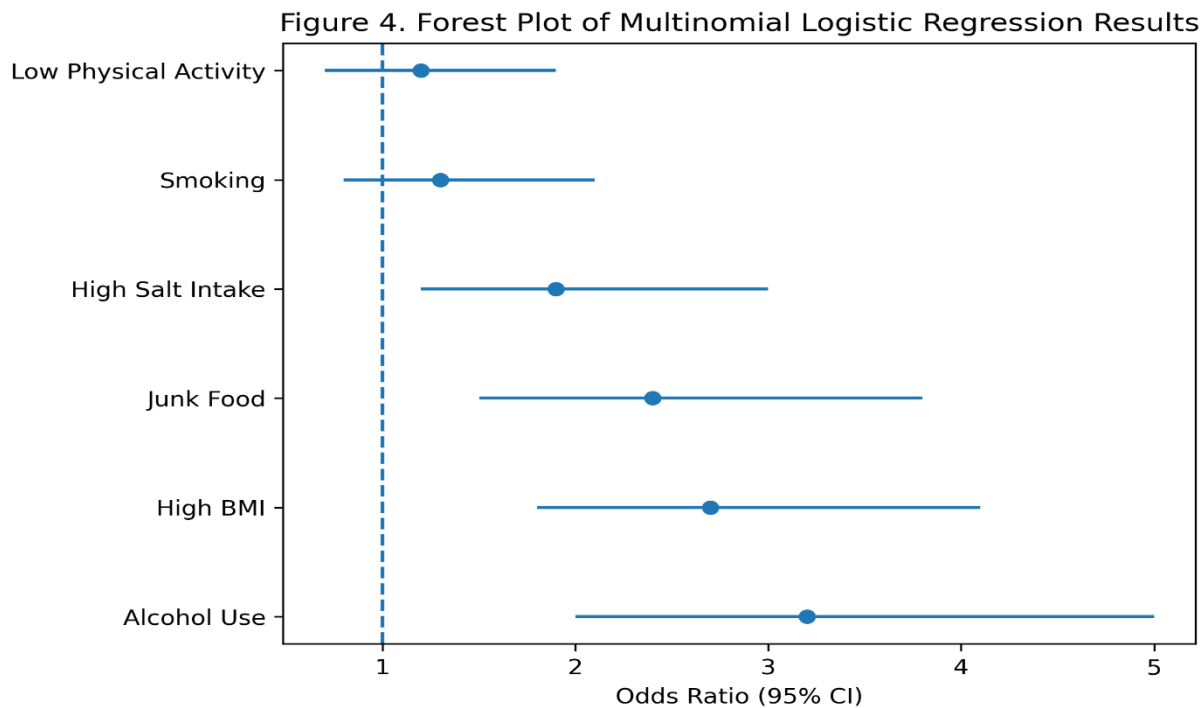


Figure 4. Forest Plot of Multinomial Logistic Regression Results (N = 351)

The forest plot demonstrates that alcohol use, elevated body mass index, and junk food consumption exerted the strongest influence on hypertension risk. Confidence intervals for these predictors remained above the null value, indicating statistically meaningful associations.

To illustrate cumulative behavioural exposure, Figure 5 presents the predicted probability gradient across increasing levels of behavioural risk.

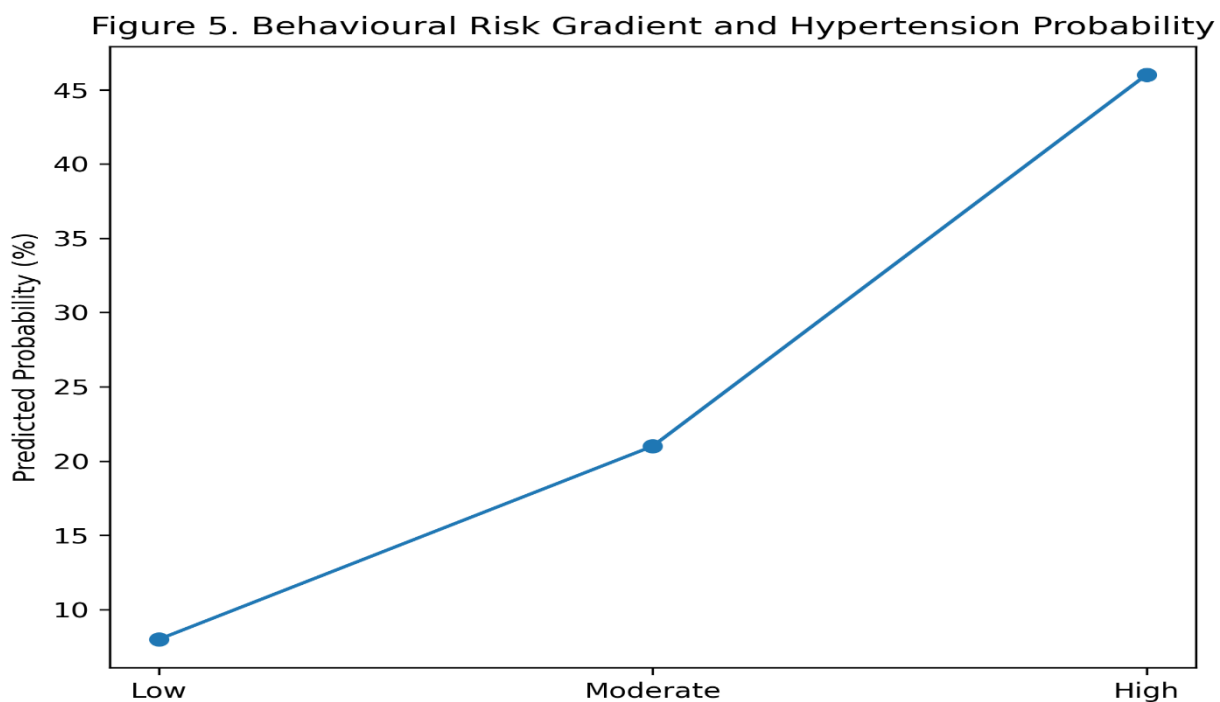


Figure 5. Behavioural Risk Gradient and Hypertension Probability (N = 351)

Figure 5 demonstrates a clear escalation in predicted hypertension probability as behavioural risk exposure increases. Students within the highest exposure category demonstrated markedly greater predicted hypertension risk than those within the low-risk category. This pattern suggests clustering of unhealthy behaviours and cumulative cardiovascular vulnerability.

DISCUSSION

This study examined the relationship between knowledge of avoidable risk factors of hypertension, behavioural practices, and hypertension status among university students in England. The findings reveal an important contradiction. Although students demonstrated substantial awareness of major behavioural contributors to hypertension, engagement in unhealthy lifestyle practices remained widespread. Significant associations between alcohol consumption, elevated body mass index, junk food intake, salt consumption, and hypertension status further indicate that awareness alone did not provide meaningful protection against behavioural risk exposure.

One of the most important findings concerns the persistence of unhealthy behaviours despite relatively strong knowledge levels. Participants demonstrated high awareness of obesity, stress, high salt intake, poor diet, and physical inactivity as contributors to hypertension. Similar patterns have been observed in recent studies examining cardiovascular risk awareness among younger adults, where knowledge frequently coexists with poor behavioural adherence (Savage et al., 2025). This suggests that the relationship between awareness and behaviour is considerably more complex than traditional educational models often assume.

Alcohol consumption emerged as the strongest behavioural predictor of hypertension status within the study population. This finding aligns with substantial evidence linking excessive alcohol use with elevated blood pressure and increased cardiovascular risk (Algharably et al., 2024). University environments may intensify this risk due to the normalisation of alcohol centred socialisation within student culture. Students may therefore continue engaging in harmful drinking practices despite understanding their long-term health implications. Research increasingly suggests that social reinforcement, peer acceptance, and perceived lifestyle identity often exert stronger influence on behaviour than health knowledge alone (Samakosky et al., 2025).

The association between body mass index and hypertension

status also reinforces current evidence concerning obesity related cardiovascular risk. Excess body weight contributes significantly to vascular dysfunction, metabolic disturbance, and elevated blood pressure among younger populations (Litwin & Kułaga, 2021). The present findings are particularly concerning because hypertension risk emerging during young adulthood may persist across the life course, increasing the likelihood of later cardiovascular disease. Current research increasingly emphasises the importance of early preventive intervention before sustained behavioural patterns become established (Mbata et al., 2024).

Frequent consumption of junk food and high salt intake similarly demonstrated meaningful relationships with hypertension status. These findings reflect broader dietary concerns within university populations, where convenience-based eating patterns frequently dominate due to financial pressures, time constraints, and campus food environments (Watso et al., 2023). Ultra-processed foods remain highly accessible within student settings and are often cheaper and more socially convenient than healthier alternatives. Consequently, awareness of dietary risk does not necessarily translate into healthier food choices when environmental conditions continue to favour unhealthy consumption patterns.

The findings also highlight important limitations within knowledge based public health interventions. Traditional health education strategies frequently assume that individuals behave rationally once they possess adequate information concerning health risks. However, behavioural theories increasingly challenge this assumption. The Health Belief Model suggests that individuals are unlikely to modify behaviour unless they perceive themselves to be personally vulnerable to disease (Rosenstock et al., 1988). Many university students may not perceive hypertension as an immediate threat because the condition is commonly associated with older adulthood and often remains asymptomatic during its early stages.

Social Cognitive Theory offers further explanation by emphasising the influence of environmental and social conditions on behaviour (Bandura, 1986). Within

university settings, behaviours such as alcohol use, poor dietary habits, and sedentary lifestyles may be reinforced socially despite widespread awareness of their consequences. Students may therefore experience a conflict between health knowledge and the immediate social rewards associated with unhealthy behaviours.

Implications for Research and Practice

The study contributes to current public health research by demonstrating that knowledge of avoidable hypertension risk factors does not necessarily correspond with healthier behaviour among university students. This distinction is important because it challenges prevention models that rely predominantly on information dissemination. These findings therefore have clear implications for hypertension prevention in higher education settings, highlighting the need for approaches that extend beyond awareness-raising alone.

While educational campaigns remain valuable, awareness alone is insufficient to produce sustained behavioural change. Effective prevention therefore requires a shift from information-only approaches to combined structural and behavioural strategies that reshape the environments in which students make choices.

Interventions should target the social and physical contexts of student life. Healthier campus food environments, targeted alcohol-reduction initiatives, and accessible opportunities for physical activity can reduce exposure to key risk factors. Complementary measures, such as behavioural support services, peer-led programmes, and targeted health promotion, can address social norms, stressors and convenience factors that often undermine knowledge-based intentions. Together, structural changes and individual support increase the likelihood that awareness translates into durable behaviour change.

Policy and practice should also recognise the limits of standalone education: campaigns must be designed and evaluated as part of multi-component interventions that alter choice architecture and provide ongoing reinforcement. Embedding prevention within campus planning, catering contracts, student societies and wellbeing services will help align the environment with the health messages students receive.

Future research should investigate the mechanisms that

sustain the gap between knowledge and behaviour among university populations. Longitudinal and mixed-methods studies can identify which combinations of environmental modification, social influence and behavioural support produce the most durable reductions in hypertension risk. Future research should also examine the behavioural, psychological, and environmental mechanisms that sustain unhealthy lifestyle practices despite high levels of health awareness within younger populations. Understanding these drivers is essential for developing interventions that not only increase awareness but also produce lasting improvements in student cardiovascular health.

CONCLUSION

This study examined the relationship between knowledge of avoidable risk factors of hypertension, behavioural practices, and hypertension status among university students in England. The findings demonstrate that although students possessed substantial awareness of major behavioural contributors to hypertension, engagement in unhealthy lifestyle practices remained widespread. Significant associations between alcohol consumption, elevated body mass index, junk food intake, and hypertension status indicate that awareness alone did not consistently translate into healthier behavioural choices.

The study highlights an important challenge within contemporary public health prevention strategies. Educational approaches that rely primarily on increasing awareness may have limited effectiveness when behavioural practices are shaped strongly by social norms, environmental conditions, convenience, and perceived invulnerability to chronic disease. Within university settings, unhealthy dietary practices, alcohol centred socialisation, and sedentary behaviours appear capable of persisting despite relatively high levels of health knowledge.

Alcohol consumption emerged as the strongest behavioural predictor of hypertension risk within the study population, followed closely by elevated body mass index and unhealthy dietary practices. These findings reinforce growing concern regarding the early emergence of cardiovascular risk among younger adults. The presence of pre hypertension and hypertension within a student population further suggests that behavioural exposures

occurring during early adulthood may contribute to long term cardiovascular vulnerability if left unaddressed.

The study contributes to existing research by demonstrating the limitations of knowledge driven prevention models within university populations. Rather than assuming that awareness automatically produces behavioural change, the findings suggest that hypertension prevention requires more comprehensive approaches that address behavioural, environmental, and social influences simultaneously. Interventions within higher education settings may therefore benefit from combining education with structural and behavioural support strategies that encourage healthier lifestyle practices.

Overall, the findings underscore the importance of early cardiovascular prevention among university students and highlight the need for public health interventions that move beyond information dissemination towards more sustained behavioural engagement and environmental support.

AUTHOR CONTRIBUTION

All authors played a substantive role in shaping this study and developing the manuscript. F.N.I. conceptualised the work and designed the overall study framework, with supervision from K.O.O. Data analysis, interpretation of data and validation of findings were carried out collaboratively, with each author contributing to the discussions that informed the final results. G.M.Y., C.O. and K.O.O. prepared the initial manuscript draft, covering the introduction, methods, results and discussion. Co-authors strengthened the analysis, offered detailed revisions and enhanced the clarity and coherence of the final document. Every author reviewed the complete manuscript, approved the final version and accepted responsibility for the integrity of the work.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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