

HEALTH-PROMOTING LIFESTYLES AND HEALTH CONCEPTS AMONG MACAO UNIVERSITY STUDENTS: THE PARADOXICAL ROLE OF SELF-RATED HEALTH AS A PREDICTOR

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Abstract

Objectives: The university years are a pivotal period for establishing lifelong health behaviors. While students in Macao face known lifestyle risks, local evidence on the psychosocial factors shaping their health choices is scarce. This study aimed to describe the health-promoting lifestyles and health concepts of university students in Macao and to identify key predictors to inform campus health initiatives.

Methods: A cross-sectional survey was conducted with 386 undergraduates at Macao Polytechnic University (Dec 2023–Jan 2024). The validated Chinese Health-Promoting Lifestyle Profile II (HPLP-II) and Health Concept Scale were used. Data were analyzed using descriptive statistics, correlations, and multiple linear regression.

Results: The mean HPLP-II score was 128.05 (SD=26.61), with Physical Activity scoring lowest. The multiple regression model predicting HPLP-II was significant ($F(11, 374) = 11.92, p < .001$), explaining 26.0% of the variance. Counter-intuitively, after controlling for other factors, better self-rated health ($\beta = -.302, p < .001$) was the strongest predictor of a poorer health-promoting lifestyle. For Health Concept, better self-rated health ($\beta = -.154, p < .01$) was the sole significant predictor, also in a negative direction.

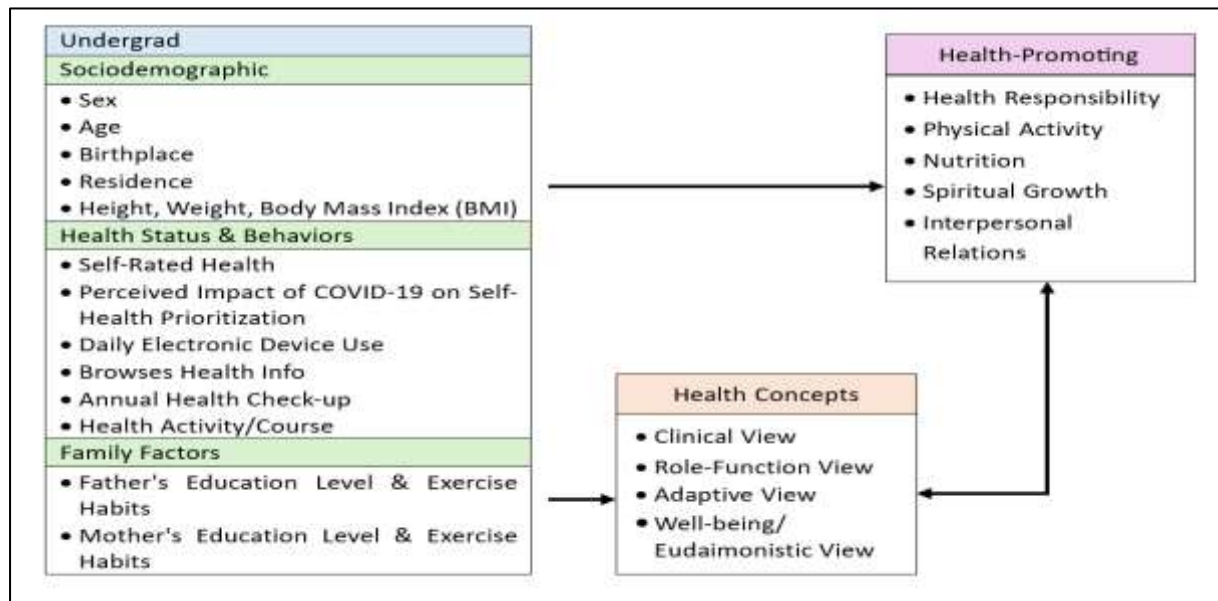
Conclusion: This study reveals a critical health paradox where a better subjective perception of health is associated with poorer health behaviors among Macao university students. This suggests that "health optimism" may be a significant barrier to preventive action, requiring campus health strategies to address not only information gaps but also these crucial psychological biases.

Keywords: health-promoting lifestyle, health concepts, university students, school nursing, Macao, , HPLP-II, health promotion, health paradox

INTRODUCTION

The transition to university represents a critical window for health promotion, as young adults establish lifestyle patterns that influence long-term health and risk for non-communicable diseases (Lalonde, 1974). In Macao, university students face lifestyle challenges such as high rates of sedentary time, yet there is a gap in evidence-based interventions tailored for this population (Macao Health Bureau, 2024; Pascoe et al., 2020). An individual's health behaviors are often guided by their underlying beliefs and health concepts, as theorized in models like the Health Belief Model (HBM) (Hochbaum, 1958; Smith, 1981). To address the local evidence gap, this study was designed to provide the first comprehensive profile of health-promoting lifestyles and health concepts among university students in Macao. Our conceptual framework (Figure 1), grounded in the HBM and Pender's Health-Promoting Lifestyle model, provides a basis for examining the relationship between individual/family factors and these two core constructs.

Figure 1. Conceptual Framework of the Study



METHODS

Study Design

A quantitative, descriptive cross-sectional survey design was employed to examine the variables of interest at a single point in time.

Participants and Setting

The target population was all undergraduate students enrolled in the 2023/2024 academic year at Macao Polytechnic University, a public university in Macao. A quota sampling strategy, with targets proportional to the enrollment in each of the university's seven faculties, was used to ensure a representative sample. Inclusion criteria were: (1) currently enrolled as an undergraduate student, (2) ability to read and understand Chinese, and (3) provision of voluntary consent to participate. Students enrolled in master's or doctoral programs were excluded.

Instrumentation

Data were collected using a three-part online questionnaire. The first section was a self-designed questionnaire gathering information on three key areas aligned with the study's conceptual framework: sociodemographic (e.g., age, sex, BMI, birthplace), health status & behaviors (e.g., self-rated health, perceived impact of COVID-19, health check-ups), and family context (e.g., parental education and exercise habits). The second section measured health-promoting lifestyles using the 52-item validated Chinese version of the Health-Promoting Lifestyle Profile II (HPLP-II). This instrument assesses six subscales: health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management, with responses captured on a 4-point Likert scale (1 = *Never* to 4 = *Routinely*). The final section assessed students' health concepts using the 26-item validated Chinese version of the Health Concept Scale. Based on Smith's (1981) framework, this scale measures four dimensions—clinical, role-function, adaptive, and well-being—on a 6-point Likert scale (1 = *Strongly Disagree* to 6 = *Strongly Agree*). A pilot test confirmed excellent internal consistency for both the HPLP-II (Cronbach's $\alpha = .945$) and the Health Concept Scale (Cronbach's $\alpha = .975$).

Data Collection

Following ethical approval from the university (Ethics Committee Approval No. FCSD/MSN-0060/2023), students were recruited between December 14, 2023, and January 23, 2024. Recruitment occurred via social media groups and in-person classroom visits, where students could scan a QR code to access the survey. The first page of the online survey served as an electronic informed consent form. After providing consent, participants completed the anonymous questionnaire on the Google Forms platform, a process that took approximately 15-20 minutes. A total of 428 responses were received, with 386 deemed valid after excluding incomplete surveys, yielding a 90.2% valid response rate.

Data Analysis

Data were analyzed using SPSS version 22.0. The analytical process began with the generation of descriptive statistics, including frequencies, means, and standard deviations, to summarize all variables. Subsequently, inferential statistics, such as independent-samples t-tests and one-way ANOVA (with Kruskal-Wallis for non-parametric data), were employed to compare group means. A Pearson product-moment correlation was then conducted to assess the relationship between HPLP-II and Health Concept scores. Finally, hierarchical multiple linear regression was used to identify significant predictors for the two main outcome variables. A p-value of $<.05$ was considered statistically significant throughout the analysis.

RESULTS

Participant Characteristics The sample consisted of 386 students (56.0% female, 93.3% aged ≤ 24 years). Over half (52.8%) had a normal BMI, though 47.2% were either underweight or overweight/obese. Most (85.0%) rated their health as average or better. A majority were from Macao (64.8%) and lived with their parents (75.4%). Detailed characteristics are presented in Table 1.

Table 1. Characteristics of Participants (N=386)

Characteristic	Category	n	%
Sociodemographic			
Sex	Male	170	44.0
	Female	216	56.0
Age (years)	≤ 20	193	50.0
	21-24	167	43.3
	≥ 25	26	6.7
BMI (Asian)	< 18.5 (Underweight)	72	18.7
	18.5-22.9 (Normal)	204	52.8
	23-24.9 (Overweight)	51	13.2
	≥ 25 (Obese)	59	15.3
Birthplace	Macao	250	64.8
	Mainland China	122	31.6
	Other	14	3.6
Residence	With Parents	291	75.4
	Dormitory	66	17.1
	Other	29	7.5
Health Status & Behaviors			
Self-Rated Health	Very Good / Good	144	37.3
	Average	184	47.7
	Poor / Very Poor	58	15.0
COVID Impact	Very Strong / Strong	165	42.7
	Average	156	40.4
	None / No Impact	65	16.8
Daily Device Use	≤ 5 hours	172	44.6
	> 6 hours	214	55.4
Browses Health Info	Yes	210	54.4
Annual Health Check-up	Yes	79	20.5
Health Activity/Course	Yes	139	36.0
Family Context			
Mother's Education	Secondary or Below	268	69.4
	College or Above	118	30.6
Father's Education	Secondary or Below	269	69.7
	College or Above	117	30.3
Mother Exercises	Yes	141	36.5
Father Exercises	Yes	164	42.5

Health-Promoting Lifestyle and Health Concept Scores

The mean total score for the HPLP-II was 128.05 (SD=26.61), with Interpersonal Relations scoring highest (M=23.55) and Physical Activity lowest (M=18.28). The mean total Health Concept score was 98.35 (SD=25.90). Descriptive statistics for all subscales are presented in Table 2.

Table 2: Descriptive Statistics for HPLP-II and Health Concept Scales (N=386)

Scale / Subscale	Mean	SD	Min	Max
HPLP-II Total	128.05	26.61	57	208
Health Responsibility	20.58	5.31	9	36
Physical Activity	18.28	5.41	8	32
Nutrition	21.84	4.54	9	36
Spiritual Growth	23.20	5.80	9	36
Interpersonal Relations	23.55	5.24	10	36
Stress Management	20.60	4.43	10	32
Health Concept Total	98.35	25.90	27	156
Clinical	25.32	7.23	8	42

Role-Function	22.82	6.31	6	36
Adaptive	27.35	7.79	7	42
Well-being	22.87	6.51	6	36

Bivariate and Correlation Analyses

Bivariate analyses showed that students engaging in health-seeking behaviors and those with exercising parents had significantly higher HPLP-II scores ($p < .01$). A significant positive correlation was found between the total HPLP-II and Health Concept scores ($r = .336$, $p < .001$), as detailed in Table 3..

Table 3: Pearson Correlations Between HPLP-II and Health Concept Subscales

HPLP-II Subscale	Clinical	Role-Function	Adaptive	Well-being
Health Responsibility	.193**	.210**	.167**	.203**
Physical Activity	.162**	.159**	.108*	.154**
Nutrition	.300**	.303**	.253**	.281**
Spiritual Growth	.272**	.355**	.326**	.349**
Interpersonal Relations	.302**	.375**	.350**	.376**
Stress Management	.329**	.349**	.336**	.363**

* $p < .05$, ** $p < .01$

Regression Analyses

Multiple regression analyses were conducted, with results presented in Table 4. The model predicting HPLP-II was significant, $F(11, 374) = 11.92$, $p < .001$, explaining 26.0% of the variance. Counter-intuitively, after controlling for other variables, better self-rated health emerged as the strongest predictor with a negative coefficient ($\beta = -.302$, $p < .001$). This indicates that students who perceived their health more positively reported engaging in fewer health-promoting behaviors. Similarly, browsing health information ($\beta = -.219$, $p < .001$) and a greater perceived impact of COVID-19 ($\beta = -.103$, $p < .05$) also showed significant negative associations with HPLP-II scores. The model predicting Health Concept was also significant, $F(5, 380) = 5.89$, $p < .001$, where self-rated health was the only significant predictor, again demonstrating a negative relationship ($\beta = -.154$, $p < .01$).

Table 4: Multiple Regression Models Predicting Health-Promoting Lifestyle (HPLP-II) and Health Concept

	Health-Promoting Lifestyle (HPLP-II)	Health Concept
Predictor	Std. Beta (β)	Std. Beta (β)
(Constant)		
Browses Health Info	-.219***	
Self-Rated Health	-.302***	-.154**
Mother's Education	.134*	.098
COVID Impact	-.103*	
Marital Status		-.097
Model Summary		
R ²	.260	.072
F	11.92***	5.89***

* $p < .05$, ** $p < .01$, *** $p < .001$

DISCUSSION

This study provides the first comprehensive profile of health-promoting lifestyles among university students in Macao. While confirming expected challenges, such as a critical gap in physical activity consistent with global trends (Chao, 2023), the study's primary contribution is the uncovering of a significant "health paradox". This paradox, revealed in the multivariate analysis, presents a complex and nuanced challenge for health promotion efforts.

The core of this paradox lies in the robust, counter-intuitive finding that better self-rated health negatively predicts engagement in health-promoting lifestyles. This result diverges sharply not only from this study's own bivariate correlations but also from a large body of established literature (e.g., Wang et al., 2021). We postulate that this phenomenon stems from a form of "health optimism" or perceived invulnerability, particularly potent among young adults. Students who subjectively "feel healthy" may lack the perceived susceptibility necessary to motivate preventive action, creating a dangerous disconnect between their positive self-perception and their actual behaviors. This suggests that a positive self-rating of health may function less as an asset and more as a potential barrier to adopting a healthier lifestyle..

Beyond this central paradox, the findings highlight other actionable pathways. The positive influence of maternal education reaffirms the importance of the family context (Lee & Kim, 2022). Furthermore, the predictive power of browsing health information underscores the need to foster critical health literacy. The imperative for school nurses and campus health services is clear: they must equip students with the skills to not only find but also critically evaluate and apply health information, empowering them to bridge the crucial gap between feeling healthy and living healthily.

Limitations of the Study

This study has several limitations. Its cross-sectional design prevents the inference of causality, and the single-university sample may limit generalizability. Reliance on self-report data also introduces potential for bias. Future longitudinal or multi-site research is needed to address these issues.

CONCLUSION

This study uncovers a critical health paradox where a better subjective perception of health is associated with poorer engagement in health-promoting lifestyles among Macao university students. This suggests that perceived invulnerability or "health optimism" is a significant barrier to preventive action. Therefore, campus health promotion strategies must evolve beyond simple information provision to incorporate psychological strategies that address these cognitive biases, helping to translate students' positive health perceptions into tangible, lifelong healthy habits.

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Authors' contributions WIPP and PSI were responsible for the study's conceptualization and design. WIPP and PSI conducted data collection and data analysis. PSI drafted the initial manuscript. WIPP and PSI critically reviewed and revised the manuscript for essential intellectual content. All authors (PSI, WIP, CSI, and YMC) have read, edited, and approved the final version of the manuscript for publication.

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Data availability All data generated or analyzed during this study are included in this published article.

Declarations The study received ethical approval from the Human Research Ethics Committee at Macao Polytechnic University (approval certificate no. FCSD/MSN-0060/2023). All procedures involving human participants adhered to the ethical principles of the Declaration of Helsinki. Prior to participation, all subjects received comprehensive information regarding the study's objectives, procedures, and their rights, including confidentiality and the right to withdraw without penalty. Informed consent was obtained from all participants using a detailed consent form. Collected data were anonymized and maintained with strict confidentiality, used exclusively for research purposes, thereby safeguarding participants' rights and privacy throughout the study.

Consent for publication Not applicable

Competing interests The authors declare no competing interests.

Ethical Approval and Consent to Participate Ethical approval was obtained from Macao Polytechnic University's Faculty of Health Sciences and Sports Ethics Review Board. Participants were informed of the study's aims, procedures, confidentiality, and right to withdraw without penalty, and provided written consent. All data were anonymized and kept strictly confidential for research purposes only.

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