



DETERMINANTS OF HEALTH PROMOTING LIFESTYLE AMONG UNDER-GRADUATE NURSING STUDENTS IN INDONESIA: A POST-PANDEMIC ANALYSIS

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ABSTRACT

Background: Maintaining a health-promoting lifestyle is essential for nursing students, as it supports their well-being and prepares them to serve as role models in clinical practice. **Objective:** Study aimed to identify determinants of health-promoting lifestyle profiles among undergraduate nursing students. **Methods:** A cross-sectional design, 132 nursing students from a private university in North Sulawesi Province, convenience sampling. Instrument was HPLP-II. Analyzed using independent t-tests, one-way ANOVA, Pearson correlation, hierarchical linear regression. **Results:** Highest mean score was in spiritual growth with a mean of 2.89 (SD=0.47), while health responsibility had lowest score of 1.95 (SD=0.46). Overall lifestyle score was 2.41 (SD=0.33). Regression analysis revealed that variables exercise ($\beta=0.251$; $p=0.004$), religiosity ($\beta=0.245$; $p=0.005$), history of COVID-19 infection ($\beta=0.169$; $p=0.043$), COVID-19 vaccination status ($\beta=0.179$; $p=0.032$) significantly predicted health-promoting lifestyle behaviors, with an explanatory power of 18.4%. **Conclusion:** Targeted interventions should focus on enhancing spiritual growth, promoting regular physical activity, providing ongoing health education tailored to both pandemic, post-pandemic contexts to support development of healthier lifestyles among nursing students.

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BACKGROUND

Nursing students contribute to the healthcare system through education and clinical training that prepare them for promotive, preventive, curative, and rehabilitative roles in their future practice. In 2022, 38,154 (6.42%) were newly enrolled nursing students and 111,511 (5.60%) were registered in Indonesia. These figures reflect the substantial potential of future healthcare professionals who must be equipped with clinical competencies and adopt and model a health-promoting lifestyle in the communities they will serve (Ministry of Education and Culture, Republic of Indonesia, 2022).

As future professional nurses, nursing students are ideally expected to adopt health-promoting lifestyles to support their physical and mental capacity during their academic years and clinical practice. However, numerous studies indicate that the practice of a health-promoting lifestyle among nursing students often remains suboptimal. Academic pressures, emotional stress, and unhealthy behaviors such as physical inactivity and frequent fast food consumption are still commonly observed among students (Fashafsheh et al, 2021). Additionally, the stress experienced during clinical practice contributes significantly to the risk of adopting unhealthy lifestyles (Admi et al, 2018; Binks et al, 2020).

Conceptually, a health-promoting lifestyle is recognized as a key factor in preventing chronic diseases and improving overall quality of life. Nola J. Pender's Health Promotion Model emphasizes six significant dimensions of such behaviors: Health responsibility, physical activity, nutrition, spiritual growth, stress management, and interpersonal relations (Pender, Murdaugh, & Parsons, 2015). This model underpins the conceptual framework of the current study by highlighting the interplay between individual characteristics, perceived benefits and barriers, and behavioral outcomes. It provides a theoretical basis for examining how nursing students' personal beliefs, demographic factors, and contextual experiences influence their engagement in health-promoting behaviors.

Despite knowing the importance of health-promoting behaviors, nursing students often fail to translate this knowledge into practice. In Indonesia, the prevalence of unhealthy lifestyles among students in health-related majors, including nursing, has been reported at 57% (Sitorus, 2021). Cross-national studies reveal similar patterns. While spiritual growth is often reported as a strength, physical activity remains a challenge across many contexts, as seen in studies from Malaysia (Geok et al, 2018), Iran (Hosseini et al, 2015), and Palestine (Fashafsheh et al, 2021).

This gap is further exacerbated by sociodemographic and academic factors that shape students' health behaviors. A study by Macedo et al. (2023) in Brazil found that nursing students aged 18–24 were 2.7 times more likely to engage in unhealthy lifestyle behaviors than their older counterparts. The risk was also higher among female students (3.8 times) and those in semesters six to eight (1.8 times). Other factors, such as marital status, gender, and living arrangements, have also been identified as influencing health-promoting behaviors. Hosseini et al. (2015) reported that married nursing students exhibited higher scores in health-promoting behaviors. Similarly, students living with their families demonstrated better health responsibility than those living alone or in dormitories (Borle et al, 2017). Additionally, variations in lifestyle scores have been observed based on gender and age, with female students scoring higher in spiritual growth and interpersonal relations. In contrast, male students tend to excel in physical activity (Chow et al, 2018).

The COVID-19 pandemic has brought unprecedented challenges to global health, significantly altering lifestyle behaviors across populations, including nursing students. As future healthcare providers, nursing students are expected to maintain optimal health-promoting behaviors; however, the post-pandemic environment has introduced new barriers and stressors that may impact their physical activity, nutrition, sleep quality, and psychological well-being (Gadi et al, 2022; Özden & Parlar Kiliç, 2021; Rohde et al, 2023). Changes in academic delivery, prolonged isolation, and uncertainty about clinical placements have disrupted routines and increased vulnerability to sedentary behaviors and mental distress (Jardon & Choi, 2024; Kalal & Rana, 2022). Understanding how these post-pandemic dynamics influence lifestyle patterns is critical, as the ability of nursing students to adopt and model healthy behaviors can affect both their well-being and their professional effectiveness in promoting public health (Gipson, Deal, & Skinner, 2024).

The COVID-19 pandemic introduced a disruptive shift in nursing students' daily routines, academic experiences, and psychological well-being. Unlike other health stressors, the pandemic combined physical health risks with social isolation, academic uncertainty, and restricted clinical exposure, factors that collectively intensified the vulnerability of students to unhealthy lifestyle patterns (García-González et al, 2021;

Savitsky et al, 2020). Lockdowns and remote learning limited opportunities for physical activity, increased screen time, and contributed to irregular sleep and eating habits (Di Renzo et al, 2020; Vanoh & Juanis, 2023). Additionally, heightened anxiety related to infection risks and academic progression further undermined students' motivation to maintain health-promoting behaviors (Kwon & Oh, 2023).

Although several studies have explored the relationship between sociodemographic factors and health-promoting lifestyles among nursing students, research explicitly targeting this population in Indonesia remains relatively limited. Despite global evidence, studies focusing on Indonesian nursing students are still scarce, particularly in the post-pandemic context. The post-pandemic period has further complicated lifestyle behaviors, with changes in daily routines, increased mental health challenges, and reduced physical activity becoming more prevalent among students. Therefore, this study aimed to identify the determinants that influence the health-promoting lifestyle profiles of nursing students in Indonesia.

METHODS

This correlational study used a cross-sectional design, which was appropriate to capture a snapshot of nursing students' health-promoting lifestyle behaviors in the post-pandemic context. A convenience sampling technique was used to select the respondents from a nursing school at a private university in North Sulawesi Province, Indonesia, during February to March 2023. The inclusion criteria were undergraduate nursing students from the 1st to the 4th year who were willing to participate in the study. Students who were sick or absent during data collection were excluded. The required sample size was calculated using G*Power software version 3.1.9.7. Applying regression analysis based on Faul et al (2009), with an effect size of 0.15, a power of 0.80, an alpha level of 0.05, and 13 predictors, the minimum required sample size was 131. A total of 132 students participated in this study.

Respondent characteristics were collected using a self-developed questionnaire, including age, gender, year of study, residential status, reason to study nursing, subjective religiosity (assessed using a single-item self-report question), relationship status, body mass index (BMI), exercise, caffeine consumption, intensity of mobile phone use, history of COVID-19 infection, and COVID-19 vaccination status. Religiosity was included due to its cultural significance in Indonesia, where spiritual beliefs influence university students' health behaviors and coping strategies.

The Health Promoting Lifestyle Profile-II (HPLP-II) was used to measure the respondents' lifestyle (Walker, Sechrist, & Pender, 1995). The Health Promoting Lifestyle Profile-II consists of 52 items scored on a 4-point Likert scale (1=Never, 2=Sometimes, 3=Often, 4=Routinely). The instrument measures six dimensions: Health responsibility (items 3, 9, 15, 21, 27, 33, 39, 45, 51), physical activity (4, 10, 16, 22, 28, 34, 40, 46), nutrition (2, 8, 14, 20, 26, 32, 38, 44, 50), spiritual growth (6, 12, 18, 24, 30, 36, 42, 48, 52), interpersonal relationships (1, 7, 13, 19, 25, 31, 37, 43, 49), and stress management (5, 11, 17, 23, 29, 35, 41, 47). The overall and 6 dimension scores were calculated by averaging the responses for the relevant items. A higher mean score indicates a more health-promoting lifestyle. The HPLP-II demonstrated excellent internal consistency in this study, with a Cronbach's alpha of 0.917.

Data were analyzed using descriptive and inferential statistics. Descriptive statistics (means, standard deviations, frequencies, percentages, minimum, and maximum) were used to describe respondents' characteristics, lifestyle dimensions, and overall score. Bivariate analyses (independent t-tests, one-way ANOVA, Pearson correlation) were conducted as appropriate to examine the associations between respondent characteristics and lifestyle scores. Hierarchical linear regression analysis was performed to identify factors influencing the overall lifestyle score. Variables with $p < 0.20$ in bivariate analysis were included in the regression model (Heinze & Dunkler, 2017). Before the regression analysis, the year of study variable was transformed into dummy variables to allow inclusion as categorical predictors. It was recoded into four main categories, with one category selected as the reference (baseline) group. All independent variables were checked for multicollinearity, linearity, normality, and homoscedasticity assumptions, which were assessed and met. The regression results are presented using unstandardized coefficients (B) and standardized coefficients (β) to indicate each predictor's direction and relative strength. Confidence intervals (95% CI) were calculated to estimate the precision of coefficient estimates, while Variance Inflation Factor (VIF) values were examined to assess potential multicollinearity. A significance level of $p < 0.05$ was considered statistically significant.

The university's Institutional Review Board approved this study, approval number: 282/KEPK- FIK/EC/II/23. The head of the undergraduate nursing department referred eligible nursing students. The researcher or trained research assistants contacted those who expressed interest in participating individually. Data were collected using an online questionnaire. Before participation, students were given an informed consent form via the online platform, which they were asked to read and agree to before proceeding to the questionnaire. Participation was voluntary, and all responses were kept confidential and anonymous.

RESULTS

Table 1 presents the descriptive statistics of the lifestyle dimensions and the overall lifestyle score among the respondents. Among the six lifestyle dimensions, spiritual growth demonstrated the highest mean score at 2.89 (SD = 0.47), with scores ranging from 2 to 4. This finding may reflect the strong cultural and religious orientation among Indonesian nursing students, where spiritual beliefs and practices are deeply embedded in daily life and often used as coping mechanisms during stress. In contrast, health responsibility recorded the lowest mean score at 1.95 (SD = 0.46), ranging from 1 to 3. This suggests that while students may value spiritual well-being, they may be less proactive in seeking health-related information, scheduling check-ups, or taking preventive actions, possibly due to academic workload, limited access, or low prioritization. The overall lifestyle score was 2.41 (SD = 0.33), ranging from 2 to 3.

Table 2 presents a detailed overview of the respondent characteristics of the 132 respondents and their association with lifestyle. The respondents in this study had a mean age of 19.67 years (SD = 1.59). The majority were female ($n = 112$; 84.8%). Most respondents were first-grade nursing students ($n = 45$; 34.1%), lived in houses ($n = 76$; 57.6%), and reported choosing nursing as their field of study based on self-determination ($n = 99$; 75%). Additionally, 87 respondents (65.9%) had a good spirituality, and 71 (53.8%) were single. The majority had a normal Body Mass Index (BMI) ($n = 90$; 68.2%) and reported not engaging in regular exercise ($n = 114$; 86.4%). Most respondents also did not consume caffeine ($n = 109$; 82.6%) and had a high intensity of mobile phone usage ($n = 80$; 60.6%). Furthermore, 108 respondents (81.8%) had no history of COVID-19 infection, and 67 respondents (50.7%) had received both the first and second COVID-19 booster vaccinations.

There was a significant difference in lifestyle based on their religiosity, in which respondents with a good religiosity demonstrated a more health-promoting lifestyle ($t = -2.314$; $p = 0.022$). A significant difference in lifestyle score was also observed based on exercise ($t = -3.062$; $p = 0.003$); respondents who engaged in regular exercise exhibited a better score than those who did not. Respondents with a history of COVID-19 infection had higher mean lifestyle scores ($t = -2.029$; $p = 0.044$). Similarly, those who had received both the first and second booster doses showed a better health-promoting lifestyle ($t = -3.150$; $p = 0.002$).

Hierarchical linear regression analysis was performed to assess the predictive power of several independent variables on nursing students' lifestyle scores, as shown in Table 3. The analysis was conducted in two steps. Model 1 included the initial set of predictor variables in the first step. Model 1 showed a coefficient of determination (R^2) of 0.183 and an adjusted R^2 of 0.129. Approximately 18.3% of the variance in lifestyle scores could be explained by the predictor variables in Model 1. The effect size for Model 1, calculated using Cohen's f^2 , was 0.224, suggesting a medium to large practical significance. In the second step, two additional variables (history of COVID-19 infection and COVID-19 vaccination status) were added. Model 2 showed an increase in R^2 to 0.246 and an adjusted R^2 of 0.184, with the improvement being statistically significant ($F = 5.111$; $p = 0.007$). The effect size for Model 2 was 0.084, indicating a small to medium practical effect.

Interestingly, the history of COVID-19 infection ($\beta = 0.169$; $p = 0.043$) and vaccination status ($\beta = 0.179$; $p = 0.032$) emerged as significant determinants of a more health-promoting lifestyle. This finding may reflect a heightened health awareness among students who have experienced COVID-19 firsthand or taken preventive actions such as vaccination. Their personal or observed experiences with illness might have increased their motivation to engage in self-care and adopt healthier routines. Alongside these, exercise ($\beta = 0.251$; $p = 0.004$) and religiosity ($\beta = 0.245$; $p = 0.005$) were also found to be significant determinants of a health-promoting lifestyle.

Table 1. Description of lifestyle dimensions and overall score among respondents

Dimensions	Mean	SD	Min-Max
Health Responsibility	1.95	0.46	1-3
Physical Activity	2.19	0.51	1-4
Nutrition	2.13	0.37	1-3
Spiritual Growth	2.89	0.47	2-4
Interpersonal Relationships	2.84	0.46	2-4
Stress Management	2.46	0.41	1-4
Overall Lifestyle	2.41	0.33	2-3

Note: Max = Maximum; Min = Minimum; SD = Standard Deviation

Table 2. Respondent characteristics and their association with lifestyle

Variables	n	%	Lifestyle Scores		r/t/F	p-value
			Mean	SD		
Age [M=19.67, SD=1.59]					0.124	0.157
Gender						
Male	20	15.2	2.53	0.35	1.767	0.080
Female	112	84.8	2.39	0.32		
Year of Study						
1 st Grade	45	34.1	2.33	0.31	1.606	0.192
2 nd Grade	24	18.2	2.44	0.37		
3 rd Grade	27	20.5	2.44	0.35		
4 th Grade	36	27.3	2.48	0.31		
Residential						
House	76	57.6	2.45	0.29	1.669	0.098
Dorm	56	42.4	2.35	0.38		
Reasons to Study Nursing						
Self-Determination	99	75.0	2.41	0.34	-0.056	0.955
External Influence	33	25.0	2.41	0.30		
Religiosity						
Poor	45	34.1	2.32	0.29	-2.314	0.022*
Good	87	65.9	2.46	0.34		
Relationship Status						
Single	71	53.8	2.41	0.32	-0.097	0.923
In Relationship	61	46.2	2.42	0.35		
BMI [M=21.46, SD=3.68]					-0.036	0.684
Underweight	25	18.9	2.48	0.26	0.740	0.479
Normal	90	68.2	2.39	0.35		
Overweight	17	12.9	2.41	0.30		
Exercise						
No	114	86.4	2.38	0.30	-3.062	0.003**
Yes	18	13.6	2.63	0.42		
Caffeine Consumption						
No	109	82.6	2.41	0.32	-0.361	0.718
Yes	23	17.4	2.43	0.41		
Intensity of Mobile Phone Use						
Less	52	39.4	2.41	0.28	0.066	0.947
High	80	60.6	2.41	0.36		
History of COVID-19 Infection						
No	108	81.8	2.38	0.32	-2.029	0.044*
Yes	24	18.2	2.53	0.35		
COVID-19 Vaccine						
1 st & 2 nd Doses	65	49.3	2.32	0.32	-3.150	0.002**
1 st & 2 nd Boosters	67	50.7	2.50	0.32		

Note: *p < 0,05; **p < 0,01; ***p < 0,001; BMI = Body Mass Index; r = Pearson correlation; SD = Standard Deviation t = Independent t-test; F = One-way ANOVA.

DISCUSSION

The findings of this study demonstrate that undergraduate nursing students tend to adopt a moderately health-promoting lifestyle, particularly in the domains of spiritual growth and interpersonal relationships. This aligns with previous literature suggesting that nursing students often report higher levels of health consciousness due to their academic exposure to health concepts and their perceived role as future health promoters (Bani et al, 2023; Capan et al, 2024; Kwon, Kim, & Kwak, 2024; Nakagawa & Sasai, 2021). The spiritual and interpersonal dimensions of health promotion were the most prevalent among the respondents, underscoring the relevance of holistic well-being in this population.

Spiritual well-being has been identified as a protective factor that enhances coping abilities and resilience among students in demanding academic environments (Arfianto et al, 2023; Parviniannasab et al, 2023). In the context of nursing education, where students face high levels of stress and emotional exhaustion, spiritual engagement may provide a framework for meaning-making and emotional regulation (Dwidiyanti, Munif, & Handayani, 2022; Fabbri et al, 2017; Jin, 2023; Munif et al, 2024). The strong spiritual health reported in this study may also reflect cultural and religious values deeply rooted in the students' backgrounds.

Interpersonal relationships also played a significant role in health-promoting behaviors. Previous studies have emphasized that peer support, mentorship, and social connectedness are crucial for academic success and psychological health among nursing students (Shehadeh et al, 2020). The collaborative nature of nursing education, including group projects and clinical rotations, might further strengthen students' interpersonal skills and promote relational well-being (Bani et al, 2023; Butterworth et al, 2018; Kwon et al, 2024; Nakagawa & Sasai, 2021).

Spirituality has emerged as a significant determinant of a health-promoting lifestyle among nursing students. Spiritual well-being provides a sense of purpose, connectedness, and inner peace, which may encourage students to adopt positive health behaviors such as stress management, interpersonal relationship building, and regular self-reflection (Fabbri et al, 2017; Jin, 2023). In the demanding context of nursing education characterized by academic pressures, clinical responsibilities, and emotional labor, students who engage in spiritual practices often demonstrate enhanced resilience and coping strategies that support a more balanced lifestyle (Dwidiyanti et al, 2022; Sari & Sutarto, 2023). Furthermore, spiritual engagement may motivate students to act in alignment with their future roles as health promoters, reinforcing consistent engagement in behaviors aligned with overall well-being (Akkus & Aydin, 2022; Putri, Sunarya, & Waluyo, 2023). Practical interventions, such as collaborations between nursing institutions and religious leaders or spiritual counselors, could be implemented to strengthen this dimension further. These collaborations can help integrate spiritual values into health education and provide culturally sensitive avenues for promoting holistic well-being.

Exercise emerged as a determinant of a healthy lifestyle. This is consistent with existing evidence that although nursing students are knowledgeable about the benefits of exercise, their actual engagement in physical activity is often limited due to academic demands and time constraints. Strategies to incorporate structured physical activity within the nursing curriculum may address this gap and enhance students' overall health profiles (Bani et al, 2023; Capan et al, 2024; de Almeida et al, 2020; Koa et al, 2024). Contrary to findings in Brazil, where Macedo et al. (2023) reported that female nursing students were 3.8 times more likely to engage in unhealthy lifestyle behaviors than their male counterparts, our study found no significant gender differences in health-promoting lifestyle scores. This divergence may be attributed to cultural or educational factors unique to the Indonesian context, such as uniform gender expectations in nursing programs or shared religious and familial influences that support healthy behaviors regardless of gender.

The COVID-19 pandemic introduced new variables that influenced lifestyle behaviors. Respondents' infection history and vaccination status were associated with specific lifestyle changes, suggesting that pandemic-related experiences may have heightened health awareness and self-care behaviors (Savitsky et al, 2020). The pandemic also underscored the importance of preventive health behaviors and the role of nursing students in advocating for public health, which may have reinforced their commitment to health-promoting lifestyles (Kim et al, 2023; Kusol & Kaewpawong, 2023; Listavia, Eko, & Agustinus, 2021;

Table 3. Determinants of respondents' lifestyle

Variables	B	Model 1			Model 2			
		β	95% CI	VIF	B	β	95% CI	VIF
Age	-0.004	-	-0.055, 0.019	2.269	-0.010	-	-0.059, 0.039	2.290
Gender (Female)	-0.147	-	-0.312, 0.160	1.232	-0.128	-	-0.289, 0.032	1.247
2 nd Grade ¹	0.128	0.150	-0.035, 0.292	1.411	0.111	0.130	-0.049, 0.271	1.433
3 rd Grade ¹	0.090	0.111	-0.084, 0.265	1.748	0.077	0.094	-0.093, 0.246	1.768
4 th Grade ¹	0.155	0.210	-0.048, 0.358	2.894	0.153	0.206	-0.047, 0.353	2.993
Residential (Dorm)	-0.039	-	-0.171, 0.058	1.501	-0.024	-	-0.152, 0.104	1.510
Religiosity (Good)	0.163*	0.234	0.043, 0.282	1.131		0.245	0.053, 0.287	1.155
Exercise (Regular)	0.254*	0.264	0.088, 0.419	1.140		0.251	0.081, 0.402	1.146
History of COVID-19 (Infected)					0.144*	0.169	0.005, 0.284	1.092
COVID-19 Vaccine (Boosters)					0.118*	0.179	0.010, 0.225	1.086
<i>F</i>	3.434				5.111			
<i>R</i> ²	0.183				0.246			
ΔR^2	0.129				0.184			
<i>R</i> ² Change	0.183**				0.064**			
<i>Cohen's f</i> ²	0.224				0.084			

Note: * $p < 0,05$; ** $p < 0,01$, *** $p < 0,001$; B = Unstandardized coefficient; β = Standardized coefficient; COVID-19 = Coronavirus Disease 2019; CI = Confidence Interval; VIF = Variance Inflation Factors; 1 = Reference group: Grade 1; Cohen's $f^2 = 0.224$ for Model 1 (medium effect) and 0.084 for Model 2 (small-to-medium effect).

Payaprom, Manasatchakun, & Chandeekaewsakoon, 2024).

Moreover, the experience of COVID-19 has been linked to increased anxiety, disrupted routines, and altered social interactions among university students globally (Son et al., 2020). However, in the case of nursing students, their training and exposure to health education may have buffered some of these negative impacts, allowing them to maintain or even enhance their health practices (Bani et al., 2023; Fung et al., 2023; Kwon et al., 2024; Nakagawa & Sasai, 2021).

This study has several limitations. The cross-sectional design prevents causal inferences, as data were collected simultaneously. Using a convenience sampling method at a single private university limits the generalizability of the findings to a broader population of nursing students. Since participants were not randomly selected, the sample may not be fully representative regarding academic background, regional diversity, or institutional characteristics, which may reduce the external validity of the study results. Additionally, self-reported data may introduce response biases, including social desirability bias. The online questionnaire format may have excluded students without reliable internet access, contributing to selection bias. Religiosity was assessed using a single-item self-report question, which, although practical, lacks the depth and psychometric rigor of standardized multi-item scales and may not fully capture the multidimensional nature of religiosity. Lastly, while key lifestyle predictors were included, other potentially important factors, such as socioeconomic status and mental health, were not considered.

CONCLUSION

This study identified post-pandemic determinants of HPLP among Indonesian nursing students. The findings highlight that nursing students generally maintain a relatively balanced lifestyle, supported by positive spiritual and interpersonal well-being. Key factors influencing their lifestyle include regular exercise, spiritual engagement, and experiences associated with the COVID-19 pandemic, such as infection history and vaccination status.

To promote healthy living among nursing students, targeted interventions should emphasize spiritual development, consistent physical activity, and ongoing health education tailored to both pandemic and post-pandemic contexts. Future longitudinal studies with multisite sampling are warranted to examine nursing students' health-promoting behaviors over time, with particular attention to diet, exercise, and mental health, to capture a broader and more dynamic understanding of their lifestyle trajectories. Additionally, qualitative studies could explore why health responsibility scores remain low despite students' exposure to health education, providing deeper insights into perceived barriers, motivation, and contextual factors influencing personal accountability in health management.

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