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Exploring the Associations Between Health Literacy, Self-Control, and Healthy Lifestyle Behaviors *

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Abstract

More than half of the total number of deaths worldwide in 2008 were due to non-communicable diseases such as cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases. Furthermore, three-fifths of health expenditures are due to poor health literacy. The present research aimed to explore the relationships among health literacy, self-control, and healthy lifestyle behaviors, and to reveal the mediating and moderating roles of self-control in the relationship between health literacy and healthy lifestyle behaviors. While the target population consisted of undergraduate students at a state university (N = 2,645), the sample included 1,046 voluntarily selected students. Findings showed that health literacy skills increased self-control skills and healthy lifestyle behaviors. Self-control skills also increase healthy lifestyle behaviors. Additionally, increased health literacy skills increase awareness and self-control, and greater self-control in turn increases healthy lifestyle behaviors, in a domino effect. Healthy lifestyle behaviors may be improved thanks to advanced health literacy and self-control. Bringing awareness of self-control and health literacy to students with non-communicable diseases such as diabetes, respiratory tract disease, and cancer, for which patient participation is critical, can make significant contributions to the treatment process and costs.

Keywords: Health Literacy, Healthy Lifestyle, Self-Control, Health Promotion, Health Behavior.

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1. INTRODUCTION

The World Health Organization proposes that three-fifths of health expenditures arise from poor health literacy (Schaeffer et al., 2018). Thirty-six million of the total number of deaths (57 million) or 63% of deaths worldwide in 2008 were due to non-communicable diseases such as cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases. Thus, these diseases account for more deaths each year than any other cause. Non-communicable diseases emerge due to various behavioral risk factors, particularly tobacco use, physical inactivity, alcohol consumption, and unhealthy nutrition. The burden and costs of these diseases can be alleviated through targeted interventions for large segments of the population (e.g., expanding access to essential healthcare services, alcohol control, salt reduction, regular health screenings, health literacy, and early diagnosis and treatment) (World Health Organization [WHO], 2011).

Previous research suggests that health literacy significantly affects important health outcomes, such as acquiring new disease-specific knowledge, developing self-efficacy, and adopting self-care behaviors (Cavanaugh, 2011). Besides, the literature proposes an association between limited functional health literacy and a set of healthy lifestyle behaviors. In general, individuals may have to fully understand what is needed to engage in healthy behaviors and acquire health literacy skills (Adams et al., 2013). In addition, health literacy skills are well known to be related to self-control (Geboers et al., 2016). Desirable improvements in health literacy are a significant part of self-control in health or disease (McKenna et al., 2020). For example, diabetes knowledge and health literacy skills can be important targets for interventions to promote diabetes self-management (Van Der Heide et al., 2014). Overall, improved health literacy skills are likely to result in increased health awareness and exhibiting more healthy lifestyle behaviors. In particular, individuals with greater self-control demonstrate lower depression symptoms, alcohol dependence, and, thus, higher levels of life satisfaction. In contrast, individuals with poor self-control may exhibit unhealthy behaviors, exacerbated by financial difficulties (Beenackers et al., 2018).

Health information is a significant factor for patients and non-patients in understanding the management of their health conditions, maintaining good health, and reducing their anxiety (Kutlu & Akbulut, 2019). People with robust health literacy are more likely to support activities that benefit society and enjoy better health and well-being. People with poor health literacy, on the other hand, show poor participation in health promotion, curative, and diagnostic activities and tend to engage in high-risk behaviors (WHO, 2013). Moreover, the risk of hospitalization is twice as high among patients with poor health literacy skills (Baker et al., 1998).

Self-control is the ability of individuals to control themselves and demonstrate appropriate behaviors without external force or direction, considering the future consequences of their actions and seeking immediate satisfaction (Lee & Cho, 2015). It also refers to one’s tendency to avoid committing crimes or engaging in undesirable behaviors. Negative behaviors, such as addiction (Bilge, 2025),

smoking, alcohol, consumption, drug use, and illegal affairs, are more common in individuals with poor self-control (Akers, 1991). Moreover, because such individuals are labeled as unwanted and unreliable by family members and friends, they may have difficulty establishing social relationships within their circles (Gottfredson & Hirschi, 1990).

Health behavior is a set of non-essential acts that exert significant impacts on health status and is an integral part of an individual's lifestyle (Wiley & Camacho, 1980). Besides, healthy lifestyle behavior is described as one's collective health-related behavior patterns based on the options available by their living conditions (Cockerham, 2000). It is suggested that individuals are more conscious of healthy lifestyle behaviors when they believe themselves to be at risk and have appropriate health information that may delay or prevent the onset or progression of disease. One's efforts are praised in promoting healthy lifestyle behaviors since public health consists of the sum of the health condition of each individual. It is claimed that one's health condition both affects and is affected by public health (Cihangiroğlu & Deveci, 2011).

Instilling health literacy skills and self-control awareness among university students seems critical to raising healthy individuals, adults, and future parents. Indeed, health literacy skills enhance healthy living behaviors through self-control skills (McKenna et al., 2020). Moreover, individuals with health literacy (Elkin, 2024) and self-control skills (Fan & Wang, 2022) tend to engage in more conscious and healthy behaviors. In this context, empirical findings on the impact of health literacy and self-control skills on healthy lifestyle behaviors are important for developing a comprehensive care plan and program. Additionally, the empirical findings will provide clearer, more accurate information on the interaction between variables in the relevant literature. However, in the sample of university students, studies have been identified that examine the relationship between health literacy and healthy lifestyle (Arıkan, 2020; Chu-Ko et al., 2021; Kasımoğlu et al., 2023; Sezer & Amarat, 2018; Ucar et al., 2025) and the relationship between self-control and healthy living behavior (Astolfi et al., 2021; Gilbert et al., 2023; Guo et al., 2023;). However, only one study has been found that examines the relationship between health literacy, self-control, and healthy lifestyle behaviors (Figueroa et al., 2024). The aforementioned study was conducted solely on patients with steatotic liver disease. Although studies in the literature share a similar purpose, they are limited because they were conducted on populations with specific characteristics. This situation indicates a lack of current, comprehensive scientific findings in the relevant field and underscores the need for research. Researchers have identified the need for research in the relevant field based on this reality. This situation constitutes the justification and originality of the research. In this respect, this study is the first. The aim of the research is to determine the relationships among health literacy, self-control, and healthy lifestyle behaviors among university students, and to examine the mediating and moderating roles of self-control in these relationships.

2. METHOD

2.1. Research Design

This was a cross-sectional study.

2.2. Research Hypotheses

We set our hypotheses in line with the purposes of the research as follows:

- H1. Health literacy has a statistically significant impact on healthy lifestyle behaviors.
- H2. Health literacy has a statistically significant impact on self-control.
- H3. Self-control has a statistically significant impact on healthy lifestyle behaviors.
- H4. Health literacy and self-control significantly predict healthy lifestyle behaviors.
- H5. Self-control serves as a mediator in the relationship between health literacy and healthy lifestyle behaviors.
- H6. Self-control moderates the relationship between health literacy and healthy lifestyle behaviors.

2.3. Population and Sample

The target population of the research consisted of undergraduate students studying at the Faculty of Economics and Administrative Sciences of a public university in Turkey (N = 2,645). We then recruited 1,046 students (39.54% of the population) for the study. Of the participants, 77.9% were female and 25.1% were first-year students.

2.4. Data Collection Tools

We collected the data via Google Forms between November 25, 2020, and January 14, 2021. A digital questionnaire booklet was delivered to students via various virtual channels (e.g., email, social media, WhatsApp, and Instagram). We supplemented the form with an informed consent sheet explaining the research purpose and procedures, and informed participants that they could not begin the survey without their voluntary consent.

The questionnaire booklet consists of four parts. The first part includes the *"Turkey Health Literacy Survey-32 (THLS-32)"*, developed by Okyay et al. (2016). It is a 5-point Likert-type scale with 32 items. The scale consists of eight components, resulting from two main factors (*Treatment and Services* [TS], and *Disease Prevention and Health Promotion* [DPHP]) crossed with four processes. The items are scored between 0 and 4; accordingly, one may score between 0 and 128 on the scale. However, the developers introduced a scoring model that yields scores between 0 and 50 to facilitate calculation (Okyay et al., 2016). In this study, we calculated the scale's internal consistency coefficient to be .92.

The second part includes the *"Health-Promoting Lifestyle Profile-II (HPLP-II)"*, designed by Walker & Hill-Polerecky (1996) to measure healthy lifestyle behaviors. Bahar et al. (2008) adapted this

4-point Likert-type (1-4) scale into Turkish. The scale consists of 52 items within six subscales: *"Health Responsibility, Physical Activity, Nutrition, Spiritual Growth, Interpersonal Relations, and Stress Management".* One may score between 52 and 208 on the scale. We calculated Cronbach's alpha coefficient of the HPLP-II to be .92.

The third part of the questionnaire booklet includes the *"Self-control Self-management Scale (SCMS)"*, introduced by Mezo (2009) to assess one's self-control skills. Ercoşkun (2016) adapted this 5-point Likert-type (1-5) scale into Turkish. The scale consists of 16 items within 3 components: *"Self-Monitoring (SM)", "Self-Evaluating (SE)",* and *"Self-Reinforcing (SR)".* The items are scored on a scale ranging from 0 to 5. The internal consistency coefficient of the scale was found to be .86 in this study.

In the final part, one finds a demographic information form consisting of 8 questions inquiring about the sociodemographic and educational characteristics of the sample (e.g., gender, age, department, year of study, monthly income, and place of residence).

2.5. Data Analysis

The distribution characteristics of the participants were summarized using descriptive statistics (percentages, means, medians, minimums, and maximums). We assessed the construct validity of the instruments using Confirmatory Factor Analysis (CFA) and calculated their Cronbach's alpha coefficients for reliability. We tested the relationships between the variables through correlation and regression analyses. Moreover, we performed another hierarchical regression analysis to reveal the moderating and mediating effects of the relevant variable. We performed all statistical analyses on AMOS 23.0, IBM SPSS 22.0 and Process Macro v4.0 extension of SPSS 22.0.

2.6. CFA Findings of the Instruments

We performed separate CFAs to settle the construct validity of the instruments used in this research. Table 1 presents the goodness-of-fit indices of the models (Table 1).

Table 1. Fit Indices of the Measurement Models

			First-Order Multi-Factor CFA			Second-Order Multi-Factor CFA		
Indices	Very Good	Acceptable	THLS- 32	HPLP II	SCMS	THLS-32	HPLP II	SCMS
χ^2/df	$0 \leq \chi^2/df \leq 3$	$3 \leq \chi^2/df \leq 5$	3.59	2.80	4.57	3.59	2.75	4.80
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI \leq .95$	.90	.90	.94	.90	.90	.94
CFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI \leq .95$	.90	.87	.93	.90	.88	.93
SRMR	$.00 \leq RMSEA \leq .05$	$.05 \leq RMSEA \leq .08$	.04	.05	.04	.04	.05	.05
RMSEA	$.00 \leq RMSEA \leq .05$	$.05 \leq RMSEA \leq .08$	.05	.04	.05	.05	.04	.06

*** $p < .001$
THLS-32: Turkey Health Literacy Survey-32
HPLP II: Health-Promoting Lifestyle Profile II
SCMS: Self-control Self-management Scale

3. RESULTS

The findings reveal that the participants had a mean score of 2.51 on the HPLP II, 33.28 on the THLS-32, and 3.53 on the SCMS. We then conducted a correlation analysis to assess whether there are significant relationships among health literacy, self-control, and healthy lifestyle behaviors. Accordingly, we found that healthy lifestyle behaviors were moderately correlated with self-control ($r(1023) = .45$, $p < .01$) and health literacy ($r(1023) = .36$, $p < .01$), while self-control was moderately associated with health literacy ($r(1023) = .43$, $p < .01$) (Table 2).

Table 2. Descriptive Statistics and Correlation Coefficients Belonging to Research Variables (Multiple Correlation Analysis)

No	Variables	1	2	3	*M*	*SD*
1	HPLP II Total	**(.90)**			2.51	.38
2	THLS-32 Total	.36**	**(.92)**		33.28	8.40
3	SCMS Total	.46**	.43**	**(.86)**	3.53	.71

Note: Internal consistency coefficients are shown in parentheses and bold; *** $p < .001$; THLS-32: Turkey Health Literacy Survey-32; HPLP II: Health-Promoting Lifestyle Profile II; SCMS: Self-Control Self-Management Scale

We performed a hierarchical regression analysis to explore whether the specified independent variables significantly predict healthy lifestyle behaviors. The findings of hierarchical regression analysis demonstrated that health literacy significantly predicted healthy lifestyle behaviors ($F = 156.74$, $R^2 = .133$, $p < .001$). The inclusion of self-control in the regression model explained an additional 11% of the variance in the dependent variable, and the change in R^2 was statistically significant ($F = 163.32$, $p < .001$). When health literacy and self-control were included in the regression analysis together (Model-2), both health literacy ($\beta = .209$, $p < .001$) and self-control ($\beta = .366$, $p < .001$) significantly predicted healthy lifestyle behaviors. The two variables explained 24% of the variance in healthy lifestyle behavior. It should be noted that there was no multicollinearity (VIF = 1.0) autocorrelation problem (DW = 2.021) between the variables. Therefore, we confirmed hypotheses H1 and H4 (Table 3, next page).

We also performed a regression analysis with bootstrapping to determine the mediating and moderating role of self-control in the impact of health literacy on healthy lifestyle behaviors. It is often claimed that the Bootstrap method produces more reliable results than the Sobel test (Hayes, 2018). The analyses were performed using the Process Macro v4.0 program introduced by Hayes (2018). We executed bootstrapping with 5,000 iterations. To confirm a research hypothesis in the mediation analysis with bootstrapping, the values in the 95% confidence interval should not contain the zero (0) value (MacKinnon et al., 2004).

Table 3. Findings of Regression Analyses and the Mediating and Moderating Role of Self-Control

	Model-1			**Model-2**		
Variables	**B**	***SE***	***β***	**B**	***SE***	***β***
THLS-32	.278	.067	**.365*****	.15	.02	**.209*****
Self-control				.19	.01	**.366*****
R		.365			.49	
R^2		.133			.243	
Adjusted R^2		.133			.241	
ΔR^2		.133			.109	
DW		1.998			2.021	
VIF		1.0			1.21	
Tolerance		> .2			> .2	
F		156,74			163,32	

The Mediating and Moderating Role of Self-Control

Predictor Variables	Outcome Variable					
	Self-control			Healthy Lifestyle Behaviors		
	b	*SE*	*t*	*b*	*SE*	*t*
(THLS-32 ➜ HPLP II) (pathway c)				**.277*****	.022	12.51
R^2				*.364*	-	-
(THLS-32 ➜ SCMS) (pathway a)	**.605*****	.04	15.03	-	-	-
R^2	*.18*	-	-	-	-	-
(SCMS ➜ HPLP II) (pathway b)	-	-	-	**.195*****	.016	12.14
R^2	-	-	-	*.242*	-	-
(THLS-32 ➜ SCMS ➜ HPLP II) Indirect Effect (a.b)	-	-	-	**.118***** (CI = .0927 , .1459)		
R^2	-	-	-	*.364*	-	-
THLS-32 (X) ➜ HPLP II (Y)	-	-	-	**.164*****	.023	7.16
SCMS (W) ➜ HPLP II (Y)	-	-	-	**.192*****	.016	11.95
THLS-32 SCMS (X.W.) ➜ HPLP II (Y)*			**.06***** (CI = 0.0142 - 0.1152)		.025	2.51

Note: Adjusted R^2 values were reported. *p < .05; **p < .01; ***p < .001, n = 1023, Lower and upper confidence intervals are shown in parentheses; CI = Confidence Interval; Bootstrap iteration = 5,000; *SE*: Standard Error. Unstandardized beta coefficients (*b*) are reported.

We computed the indirect effect of health literacy on healthy lifestyle behaviors using bootstrap confidence intervals. The findings of the regression analysis are shown in both Table 3 and Figure 1. The effect of the health literacy (X) on mediator variable self-control (M) is shown in pathway (a). Accordingly, health literacy significantly affected self-control (b= .61, 95% CI [.5268 - .6850] t = 15.0307, p < .001. Health literacy accounted for 18% of the change in self-control (R^2 = .181). Considering the effects of mediator variable self-control (M) (pathway b) and independent variable health literacy (X) (pathway c') on healthy lifestyle behaviors (Y), we discovered that self-control had a significant impact on healthy lifestyle behaviors (b = .20, 95% CI [.1640 - .2272] t = 12.14, p < .001). Health literacy also significantly affected healthy lifestyle behaviors (b = .16, 95% CI [.1143 - .2043] t = 6.95, p < 0.001). Therefore, we confirmed hypothesis H2 (Table 3). Health literacy and self-control together accounted for 24% of the variance in healthy lifestyle behaviors (R^2 = .24). All in all, we concluded that self-control had a significant mediating role in the relationship between health literacy and healthy lifestyle behaviors (b = .12, 95% BCA CI [.0924 - .1464]).

When it comes to the moderating role of self-control in the relationship between health literacy and healthy lifestyle behaviors, the findings revealed that the predictor variables included in the regression model explained 24% of the change in healthy lifestyle behaviors (R^2=.24). Table 3 presents unstandardized regression coefficients (b) indicating the effects of each predictor variable on the outcome variable. According to the findings, we concluded the moderating effect of self-control was statistically significant (significant b value of Int_1' (X.W): b = .07, 95% CI [.0142 - .1152], t = 2.51, p < 0.05).

Figure 1 presents a mediating-effect model in which health literacy significantly affects healthy lifestyle behaviors through self-control. Therefore, we accepted hypotheses H3 and H5.

Figure 1. Mediating Role of Self-Control Between Health Literacy and Healthy Lifestyle Behaviors

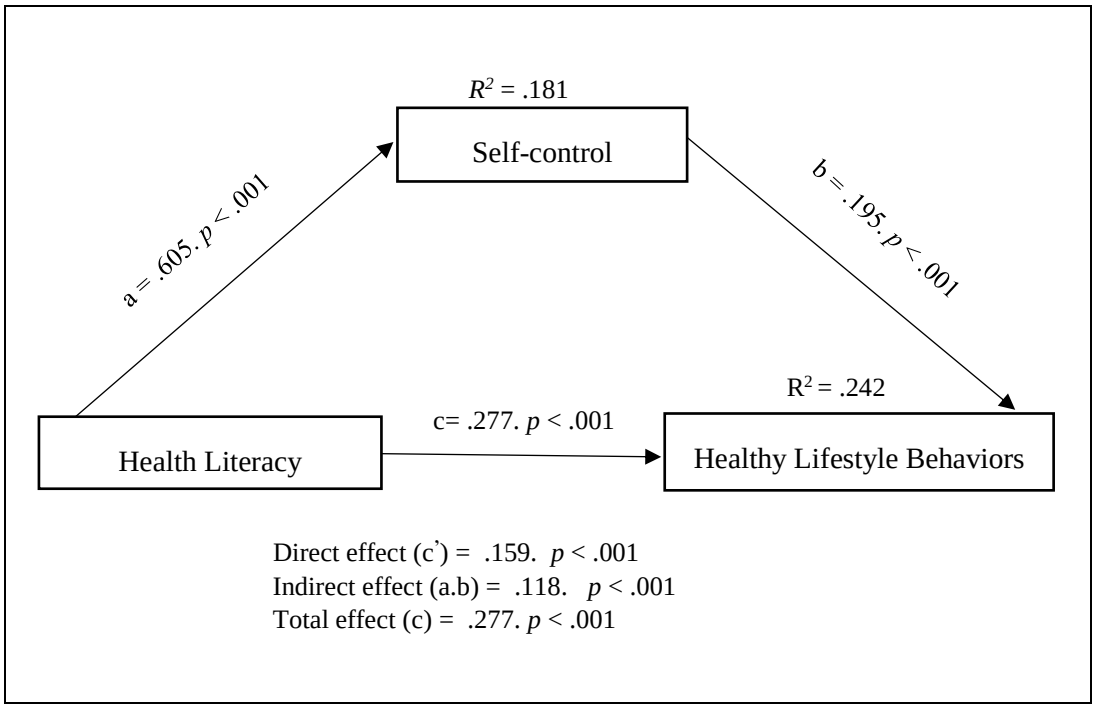
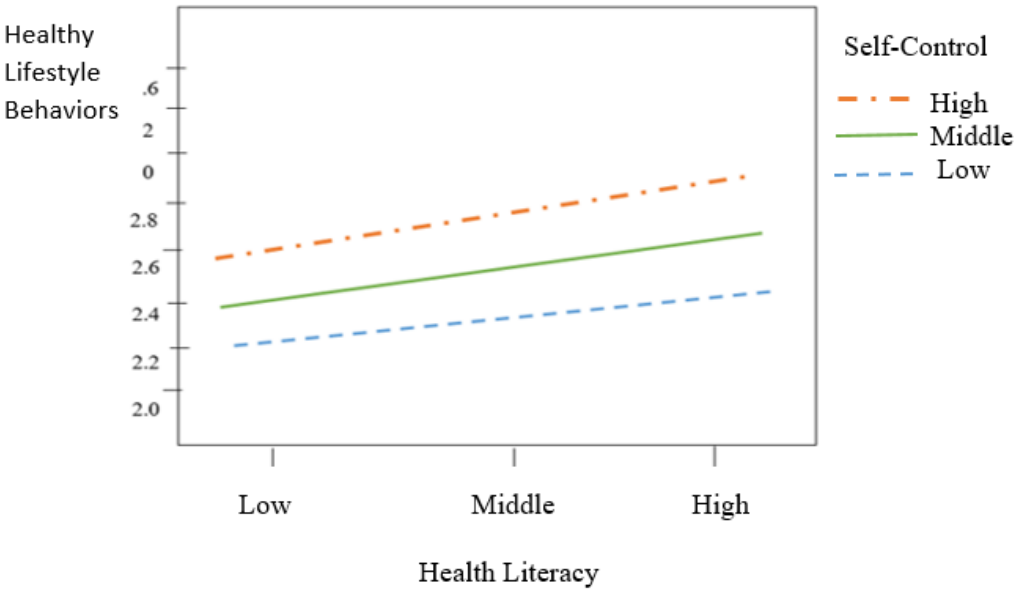


Figure 2 shows health literacy on the X-axis and healthy lifestyle behaviors on the Y-axis. The moderating effects of low, medium, and high values of self-control on the interaction between health literacy and healthy lifestyle behaviors are shown using different linear lines. As seen in Figure 2, low (b = .12. 95% CI [.0612 - .1727], t = 4.1172, p = .000), middle (b = .17, 95% CI [.1209 - .2113], t = 7.2121, p = .000), and high levels (b = .21. 95% CI [.1523 - .2769], t = 6.7605, p = .000) of self-control generated a significant mediating effect between on the interaction between the specified variables. Accordingly, hypothesis H6 was verified.

Figure 2. A Model for the Moderating Role of Self-Control



4. DISCUSSION

Health literacy is the common currency of the 21st century shared by everyone who values health (Ratzan, 2001). Health literacy skills are an important indicator of a nation's success. Individuals with a high level of health literacy are more actively involved in economic prosperity, achieve higher returns and greater job opportunities, provide more support for activities that benefit society, and enjoy better health and well-being (WHO, 2013). In the present study, we found the participants' mean health literacy score to be 33.28, indicating a sufficient level of health literacy. In their study of undergraduate health administration students at a state university, Soysal and Obuz (2020) found that participants' mean health literacy score was high. Nevertheless, as a result of their research on 999 students, Sukys et al. (2017) found that students had problematic/limited health literacy (35.5), and similar results were reported across 8 European countries (35.1). Schaeffer et al. (2018) reported that more than half of Germany's population (54%) had limited or problematic health literacy. Accordingly, our findings overlap with the previous research. Thus, we may claim that the students recruited for our research do pretty well in reading, understanding, analyzing, and interpreting information about their health, but people of different ages and educational attainment may have poor health literacy.

According to Rosenstock's (1974) health belief model, health literacy skills act as a motivating factor that directs individuals toward healthy behaviors. In other words, as health literacy skills increase, individuals' sensitivity, seriousness, perception of risk and benefit, and rational approach to perceiving their illness/health status also increase. Individuals with inadequate health literacy (reading) participate at lower levels in health-promoting, health-improving, and disease-detection activities, tend to engage in high-risk behaviors (such as higher smoking rates, poor nutrition, and high alcohol consumption), struggle to manage chronic diseases (such as diabetes, HIV infection and asthma), and may not use medications effectively (WHO, 2013). We discovered a significant positive correlation between the

participants' health literacy and healthy lifestyle behaviors. Arıkan (2020) concluded similar results in his study on undergraduate students. Hyman et al. (2020), in their research on 8th-graders in three primary schools in Canada, found that students exhibited significant healthy lifestyle behaviors following two months of digital health literacy training. The literature has a plethora of studies reporting similar findings as ours (Gallè et al., 2020; Olisarova et al., 2021; Park et al., 2017; Rueda-Medina et al. 2020; Yang et al., 2017). Our empirical findings not only validate Rosenstock's (1974) health belief model and the literature but also enrich and explain them. Indeed, the main findings of our study indicate that the students who participated were generally successful in reading, understanding, analyzing, and interpreting health information. In this context, it suggests that students can make rational decisions about their own health and exhibit healthier behaviors.

According to the limited resource model of self-regulation developed by Baumeister et al. (1998), self-control is not an unlimited willpower; rather, every choice an individual makes in daily life, every impulse suppressed, and every complex problem solved reduces self-control. One of these complex problems that reduces self-control is low health literacy. Indeed, low health literacy depletes an individual's self-control capacity because it requires greater cognitive effort in health-related decision-making. Therefore, positive developments in health literacy capacity are important for self-management of health or illness (McKenna et al., 2020). As health literacy skills increase, health awareness rises, and individuals tend to exhibit more healthy lifestyle behaviors. Our findings also demonstrated a significant moderate link between the participants' health literacy and self-control. Similarly, Wang et al. (2016) concluded a significant relationship between critical health literacy and self-control behaviors. Poelman et al (2018) found a significant association between perceived food literacy and self-control. The literature also presents many other overlapping findings (Chen et al., 2018; Federman et al., 2014; Kim & Utz, 2019; Muscat et al., 2019; Zhang et al., 2020). Our empirical findings not only validate the limited resource model of self-regulation theory Baumeister et al. (1998) but are also consistent with existing studies in the literature. Accordingly, it can be stated that health literacy indirectly contributes to improving self-control skills by acting as a buffer that reduces self-control demands.

According to the reflective-impulsive model developed by Hofmann et al. (2009), the impulsive system is automatic, fast, effortless, and pleasure-oriented, while the reflective system is slow, rule-based, knowledge-based, and goal-oriented. In the model, healthy lifestyle behavior is formed not only by knowing, i.e., the reflective system, but also by the balance between self-control skills, which is expressed as managing impulses. High self-control is effective in achieving long-term health goals. Indeed, Junger & van Kampen (2010) state that individuals with high self-control tend to exhibit healthier behaviors. Especially individuals with higher self-control exhibit lower levels of depression, alcohol dependence, and consequently higher levels of life satisfaction (Boals, 2011). There was a significant positive association between the participants' self-control and healthy lifestyle behaviors.

Previous research has consistently reported similar results (Beenackers et al., 2018; Boals et al., 2011; Junger & van Kampen, 2010). In parallel with our findings, Szabo et al. (2019) found a positive relationship between self-control and healthy eating behaviors. In their study of American children, Ha et al. (2019) found that self-control was associated with unhealthy food behaviors. Our empirical findings confirm the reflective-impulsive model and present results consistent with the existing literature. Accordingly, as students' self-control increases, their engagement in healthy behaviors also increases.

The existing literature already strongly supports the direct relationships between health literacy and healthy lifestyle behaviors (Arıkan, 2020; Gallè et al., 2020) and between health literacy and self-control (Wang et al., 2016). The most significant and distinctive contribution of our study to the literature is that it has identified self-control as a mediating factor. Our study clearly demonstrates that self-control has a significant mediating role in the relationship between health literacy and healthy lifestyle behaviors, elucidating this framework from a holistic perspective. This might be thought of as a "domino effect": People with adequate health literacy become more conscious of their own self-control, as they become more aware of the detrimental effects of unhealthy behaviors and the importance of adhering to treatment plans. This developed self-regulation ability enhances both the quality and quantity of healthy lifestyle practices by rendering students' health-related choices more logical. Finally, it was found that self-control moderates this relationship. While health literacy affects healthy behaviors even at low levels of self-control, this effect increases exponentially at moderate and high levels of self-control. This finding is significant because it demonstrates that self-control acts as a multiplier, amplifying the impact of health literacy. Our empirical findings richly illustrate the Health Action Process Approach developed by Schwarzer (2008) and the social cognitive theories developed by Bandura (1991) in a unique context (a sample of university students). Indeed, according to the health action process approach, health literacy alone is insufficient to change behavior. Behavior can only be strongly realized through self-control, which is the fundamental determinant of a volitional process. According to social cognitive theory, behavior cannot be changed solely through information. The theory suggests that various environmental factors (e.g., impulsive pleasures) hinder the transformation of information into behavior, and that these obstacles can be overcome by the missing link, self-control skills. In our study, we revealed the bridging (mediating and regulating) role of self-control in the relationship between knowledge (health literacy) and behavior (healthy lifestyle behavior), as predicted by both the model and the theory.

5. CONCLUSION

Our findings suggested that the participating students demonstrated moderate health literacy, self-control, and healthy lifestyle behaviors. It was found that health literacy significantly contributed to their perceptions of self-control and healthy lifestyle behaviors. In addition, perceptions of self-control significantly increased the adoption of healthy lifestyle behaviors. Our empirical findings

indicate that knowledge alone (health literacy skills) is not sufficient to significantly influence healthy lifestyle behavior; self-control skills also require an intermediary/regulatory mechanism. Indeed, while health literacy skills tell an individual what to do, self-control skills help with how and for how long this knowledge will be applied.

5.1. Recommendations

5.1.1. Recommendations for Education

To further enhance health literacy among university students, it is recommended that health literacy education be integrated into current education policy and taught as a subject at all levels, from preschool to higher education. However, these trainings should not be limited to mere information transfer; they should be supported by practical application. At the same time, psycho-education should be provided to students in areas such as self-control, self-efficacy, and self-awareness, which are skills for transforming knowledge into practice, in order to facilitate the understanding and assimilation of the process.

5.1.2. Recommendations for the Economy

By equipping broad segments of society, especially university students, with health literacy skills and awareness, we can help individuals avoid high-risk behaviors (such as smoking and poor nutrition) and use their prescriptions more effectively (medication adherence). Thus, by protecting society from the dangers posed by high-risk factors, less use of treatment services can be ensured. Additionally, medication adherence can improve treatment outcomes and shorten its duration.

5.1.3. Recommendations for Future Researchers

It is recommended that future research be conducted on different samples (such as cancer patients or those with diabetes). Again, it is recommended to demonstrate the relationship between health literacy and healthy lifestyle behavior through variables such as self-efficacy and self-discipline. Finally, it is recommended that the relationship between the variables in question be examined longitudinally to better capture their interaction. This will contribute to a clearer understanding of the findings to be obtained.

5.2. Limitations

Our research is not free of a few limitations. Above all, we conducted the study among undergraduate students enrolled in the aforementioned faculty; hence, the findings are limited to the study sample. Then, since the participants were engaged in distance education due to the pandemic, we collected the data online and ensured that all participants understood the scale items and provided sincere and correct responses. Finally, we collected the data in a single time period (a cross-sectional study). Social desirability bias and common method bias in cross-sectional data may influence research findings.

Ethics committee approval for the study was obtained from the Burdur Mehmet Akif Ersoy University Ethics Committee on November 4, 2020, with decision number GO 2020/295.

The authors declare that the study was conducted in accordance with research and publication ethics.

The authors confirm that no part of the study was generated, either wholly or in part, using Artificial Intelligence (AI) tools.

The authors declare that there are no financial conflicts of interest involving any institution, organization, or individual associated with this article. Additionally, there are no conflicts of interest among the authors.

The authors declare that they contributed equally to all processes of the study.

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