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Nursing Students' Eating Habits, Subjective, and Mediterranean Nutrition Knowledge During the COVID-19 Pandemic

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Abstract

Background: Mediterranean nutrition knowledge, healthy eating habits, and subjective nutritional knowledge are crucially important to nursing students' health. The study strives to examine, during the COVID-19 pandemic period: (a) nursing students' eating habits and their subjective nutritional knowledge according to three groups: novice, advanced, and senior; and (b) subjective knowledge and its role as a mediator between Mediterranean nutritional knowledge and nursing students' eating habits.

Methods: A cross-sectional study design with a convenience sample consisting of 212 university nursing students. Participants volunteered to complete a questionnaire that examined their eating habits, subjective nutritional knowledge, and Mediterranean diet knowledge. The university's institutional review board provided permission to conduct the current study.

Results: Nursing students from the novice group had better eating habits than the advanced and senior groups, and no significant differences were found between the advanced and senior groups regarding eating habits. Additionally, Mediterranean nutritional knowledge had a positive indirect effect on eating habits through subjective nutritional knowledge. Therefore, subjective nutritional knowledge partially mediated the relationship between Mediterranean nutritional knowledge and eating habits.

Conclusion: First, especially for the advanced and senior groups, it is important to create opportunities for learning via seminars, symposia, and webinars. Interprofessional teams, such as clinical nutritionists or a registered certified dietitian and nursing student, can engage with important, authentic information. Second, since subjective nutritional knowledge was found to be a partial mediator, it may be assumed that there are other mediating variables that we did not examine in this study. Therefore, it is necessary to conduct further research to examine other factors that can serve as mediators for eating habits, in addition to subjective knowledge, especially during COVID-19 times.

Keywords

nursing students, eating habits, nutrition

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Introduction

Nutrition is crucial for health (Afshin et al., 2019). In clinics, nurses regularly conduct nutritional guidance and assessments (Lim et al., 2013) and have an important responsibility in ensuring that nutritional implications are provided to patients via nutritional care (Sauer et al., 2016). Therefore, it is essential that nursing students obtain theoretical and practical nutritional skills (Fletcher & Carey 2011), including knowledge of nutrition types and their benefits, not only for the patients but also for their own good eating habits. One of the common nutrition types considered healthy is the Mediterranean diet, which can support the prevention of some diseases (Galilea-Zabalza et al., 2018). It is important for nursing students to know for whom, how, and in what way a Mediterranean diet is recommended.

The COVID-19 pandemic has affected all aspects of people's lives, including their eating habits (Di Renzo et al., 2020). Stressful events, such as the pandemic, might cause concern and lead to poor eating habits (Acharya et al., 2018). Nursing students are at the frontline of the

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war against the pandemic, as they care for COVID-19 patients (Bauchner & Sharfstein, 2020), thus playing an important role in instructing people regarding their eating habits and how these may help or hinder the fight against the disease.

Review of Literature

Implications of COVID-19. In the last year, a global pandemic (COVID-19) has erupted (Lai et al., 2020; Schwartz et al., 2020; World Health Organization, 2020). The pandemic has affected people's quality of life, including physical distancing and isolation (Di Renzo et al., 2020). One of the subpopulations at the forefront of the war against the pandemic are students of therapeutic professions, such as medical and nursing students, who joined the frontline in caring for COVID-19 patients (Baker et al., 2020; Bauchner & Sharfstein, 2020; Rasmussen et al., 2020). Moreover, the effect of stressful events, such as the pandemic, on eating habits, is a cause for concern, as poor eating habits might correlate with depression and anxiety (Acharya et al., 2018).

Nursing Students' Eating Habits. Nursing students undergo practical training similar to nursing work in terms of long working hours and the nature of the work. In general, it is known that nurses might skip meals, not have regular meals, and have high coffee consumption due to long and demanding working hours (Phiri et al., 2014). Moreover, research conducted in Greece, which is geographically close to Israel, found that there were changes in normal eating habits when working in shifts, particularly for late-shift employees, who ate more, ate their last daily meal late, and had fewer meals as compared to the day-shift group (Geliebter et al., 2000). Research highlights the importance of healthy eating habits because diverse and balanced nutrition improves the immune response to viral infection (e.g., SARS-CoV-2) (de Araújo Morais et al., 2021), helping to relieve the severity of the disease (Martinez-Ferran et al., 2020) and any complications that may appear (Butler & Barrientos, 2020). During both routine and emergency periods, nursing students can assume the role of health promoters, leading to many positive health outcomes (Evagelou et al., 2014). Poor eating habits might worsen when coupled with stressful times or times of emergency, such as the COVID-19 pandemic. Therefore, especially in these challenging times, it is important to gain understanding of nursing students' eating habits and knowledge of healthy nutrition types at different points during their professional development.

Knowledge of Mediterranean Nutrition. Mediterranean nutrition is well known in Israel due to the country's geographic location. The Mediterranean diet is based on components such as olive oil, cereals, fruit, vegetables, and legumes, as well as fish, eggs, and dairy products (Ferro-Luzzi & Branca, 1995; Maiz & Balluerka, 2016; Martínez-González & Gea, 2012). The Mediterranean diet is known as healthy diet, can assist in the prevention of diseases such as diabetes, and decreases the likelihood of cardiovascular events (Antonopoulou et al., 2020; Bottcher et al., 2017; Maiz & Balluerka, 2016). Therefore, promoting the Mediterranean diet also promotes mental and physical quality of life (Alcubierre et al., 2016; Dernini et al., 2017; Galilea-Zabalza et al., 2018; Henríquez Sánchez et al., 2012; Knox & Muros, 2017). In addition, following the Mediterranean diet can affect nursing students' self-efficacy and improve their academic performance (Esteban-Cornejo et al., 2016; Fernández-Medina et al., 2020). In order to implement diet properly, one needs to understand it well.

Adherence to the Mediterranean diet and understanding its benefits can raise nursing students' subjective nutritional knowledge. Subjective knowledge is usually defined as people's individual sense of how much they understand a specific issue (Park et al., 1994). A study conducted among college students reported that increased dietary knowledge seems to be positively related to healthy eating habits (Kolodinsky et al., 2007). It is known that many young adults lack basic nutritional knowledge and need to be educated toward healthier dietary habits and food shopping (Baldini et al., 2009). Health scholarship and knowledge were shown to be positively related to healthier eating habits among nursing students during the COVID-19 pandemic (Duong et al., 2020). Accordingly, it is important to explore nursing students' nutritional knowledge which can mediate and affect their eating habits.

The study strives to examine two issues during the pandemic period: (a) the eating habits and subjective nutritional knowledge of nursing students in three groups: novice, advanced, and senior; and (b) subjective knowledge and its role as mediator between nursing students' Mediterranean nutritional knowledge and eating habits. Accordingly, the research questions are:

1. What are the nursing students' eating habits and subjective nutritional knowledge in the three groups—novice, advanced, and senior—characterized by different nutritional education?
2. Does subjective nutritional knowledge mediate the relationship between Mediterranean nutritional knowledge and eating habits?

Methods

Design

The present study used a cross-sectional study with a convenience sample.

Participants and Setting

The sample consists of 212 university nursing students aged 21–42 (26.23 ± 6.36 years), who had completed the course

Nutrition in Health and Well-being conducted during the pandemic, covering basic concepts in nutrition: the energy economy, physiological requirements, the role of nutritional components, nutritional evaluation indices, the food pyramid, daily ration values, and nutrition during the life cycle. The inclusion criterion was students from the second, third, and fourth years who had taken the course. The exclusion criterion was students from the first year who had not taken the course (with no basic nutritional knowledge). The students were divided into three groups according to their nutritional knowledge and experience: the novice group—second year students during the first semester with theoretical knowledge but no practical (clinical) experience in nutrition; the advanced group—third year students with theoretical and basic practical education in nutrition; the senior group—fourth year students with theoretical, basic, and advanced practical education in nutrition (see Figure 1).

Tools

The questionnaire was composed of four sections: the *first section* refers to background characteristics. The *second section* refers to participants' eating habits in the past 30 days, composed of 14 items in total with answers on a 7-level Likert scale, with higher scores reflecting healthier eating habits (e.g.,: "I ate a variety of foods"). The internal consistency of this section was 0.80. The questionnaire's previous Cronbach's α for internal validity was 0.82 (Dailey et al., 2010).

The third section refers to subjective nutritional knowledge, composed of four items in total with answers on a 7-level Likert scale, with higher scores reflecting higher agreement (e.g., "I have a lot of knowledge about how to evaluate the nutritional value of a food item"). The internal consistency in this section was 0.81. The questionnaire's previous Cronbach's α for internal validity was 0.81 (Hoefkens et al., 2012).

The fourth section refers to Mediterranean diet knowledge, composed of 15 items in total, with an option to answer true, false, or not sure. Correct answers to questions indicated good knowledge (e.g., "Salad dressing made with mayonnaise is as healthy as the same dressing made with olive oil"). The questionnaire had been previously validated, and its Cronbach's α for internal validity was 0.65, acceptable for a short questionnaire (Bottcher et al., 2017).

Several nursing researchers with excellent English established the reliability and validity of the translation (back and forth) of the scales from English into Hebrew.

Procedure

Each group was invited to voluntarily partake and complete the survey online. An introductory e-mail specified the study's goal and importance, encouraging the participants (nursing students) to complete the survey, a link to which was included in the email. The participants did not receive any reward for participation in the study.

Data Analysis

Statistical analysis was performed using two software types. First, the Statistical Package for the Social Sciences (SPSS TM), 24.0 version: statistical analyses were performed for Cronbach's alpha, descriptive statistics, one-way ANOVA, Scheffe post hoc analysis, and correlations analysis. Second, process type by Hayes (2017) was performed to examine the mediation hypothesis.

Ethical Considerations

The university's institutional review board (IRB) provided permission to conduct the current study. The students participated voluntarily and were informed of the study's goals as well as signed an informed consent form in electronic form. The volunteer students were guaranteed that the data would be analyzed anonymously.

Results

For frequency and percentage of background characteristics and Chi-square according to three nursing students' groups, see Table 1.

Table 1 shows that, in the three groups together, the minority of participants were male and the majority female; more than half were single and the others married or divorced. Most of the students in the three groups were Jewish and a

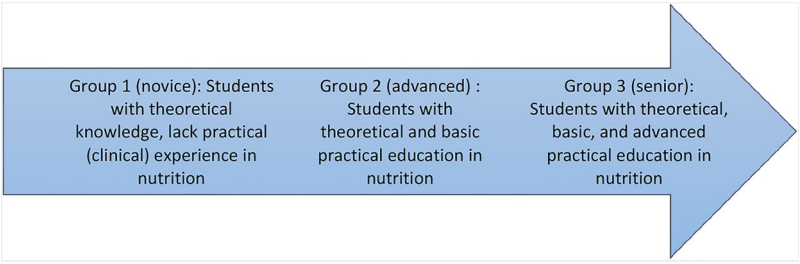

Figure 1. Nursing students' groups divided according to nutrition knowledge and experience.

Table 1. Frequency and Percentage of Background Characteristics and Chi-Square According to Three Nursing Students' Groups.

Background characteristics		$N = 212$			Chi-square (P value)
		Novice group, $n = 76$, f (%)	Advanced group, $n = 68$, f (%)	Senior group, $n = 68$, f (%)	
Gender	Male	5 (6.5)	7 (10)	4 (6.8)	0.57
	Female	71 (92.5)	61 (90)	64 (93.2)	
Status	Single	44 (58)	43 (63)	37 (54)	0.49
	Married	31 (41)	22 (32)	30 (44)	
	Divorced	1 (1)	3 (5)	1 (2)	
Religion	Jewish	76 (100)	65 (95)	68 (100)	0.41
	Christian	0 (0)	3 (5)	0 (0)	
Religiosity	Secular	19 (25)	15 (22)	14 (20)	0.6
	Traditional	5 (7)	12 (17)	13 (19)	
	Religious	52 (68)	37 (54)	41 (60)	
	Very religious	0	4 (6)	1 (1)	
Socioeconomic Status	Poor	3 (3)	3 (4)	2 (2)	0.77
	Reasonable	29 (38)	33 (48)	27 (39)	
	Good	31 (40)	24 (35)	27 (39)	
	Very good	13 (17)	7 (10)	11 (16)	
	Excellent	0 (0)	1 (1)	1 (1)	

minority or non Christian. In the novice group, most participants had a good or very good socioeconomic status, and in the other two groups most participants had a reasonable to good socioeconomic status, respectively. No significant differences were found among the groups in this respect.

To examine research question 1, we performed a one-way analysis of variance (ANOVA) and Scheffe post hoc analysis in an attempt to examine eating habits and subjective nutritional knowledge differences among the three groups of nursing students. The findings are presented in Table 2.

Table 2 shows significant differences among the three student groups regarding their eating habits (F [2, 209] = 4.90, $p = .02$), but not in their subjective nutritional knowledge (F [2, 209] = 0.21, $p = .99$). The subjective health knowledge of all three groups was at a medium to high level.

Additionally, a post hoc Scheffe type analysis revealed that the novice group had better eating habits than the advanced and senior groups ($p = .02$ and $p = .03$, respectively). Moreover, there were no significant differences found between the advanced and senior groups as to eating habits.

To examine research question 2, investigative subjective nutritional knowledge as a mediator between Mediterranean nutritional knowledge and eating habits, we conducted Pearson correlations among sociodemographic variables, eating habits, and subjective nutritional and Mediterranean nutritional knowledge, as described in Table 3.

Table 3 shows significant relationships among eating habits, financial status, and education group and age ($r = .17$, $p < .05$; $r = -.18$, $p < .00$; and $r = .18$, $p < .00$ respectively). Moreover, relationships were found among eating habits and subjective nutritional and Mediterranean nutritional knowledge ($r = .47$, $p < .00$; and $r = .24$, $p < .00$, respectively). Significant relationships were also found between subjective nutritional knowledge and Mediterranean nutritional knowledge ($r = .18$, $p < .00$). Therefore, in an effort to explore relationships among three variables, of research question two we conducted a series of regression analyses via process analysis (Hayes, 2017). The mediation model is described in Figure 2.

Figure 2 shows the relationship among Mediterranean nutritional knowledge eating habits and subjective nutritional knowledge as a mediation variable. In Step 1, the regression of Mediterranean nutritional knowledge on eating habits was significant ($\beta = 0.24$, $p < .00$).

Table 2. Nursing Students' Three Groups and Their Eating Habits and Subjective Nutritional Knowledge.

Variables	Groups	N	Mean (SD)	F	p-value
Eating habits	Novice	76	4.83 (0.75)	4.90	*N versus A = .02
	Advanced	68	4.46 (0.80)		*novice versus S = 0.03
	Senior	68	4.47 (0.87)		A versus S = NS
Subjective nutritional knowledge	Novice	76	4.72 (1.16)	0.21	N versus A = NS
	Advanced	68	4.62 (1.24)		A versus S = NS
	Senior	68	4.75 (1.33)		A versus S = NS

*$p < .05$.

Abbreviations: SD = standard deviation; N = novice; A = advanced; S = senior; NS = no significant.

Table 3. Pearson Correlations Between Students' Variables of Background, Eating Habits, and Subjective Nutritional and Mediterranean Nutrition Knowledge.

Variables	Age	Eating habits	Subjective nutritional knowledge	Mediterranean nutrition knowledge	Financial status	Education group
Age	1	0.18**	0.15*	0.11	0.06	0.05
Eating habits		1	0.47**	0.24**	0.17*	−0.18**
Subjective nutritional knowledge			1	0.18**	0.059	0.01
Mediterranean nutrition knowledge				1	−0.043	−0.03
Financial status					1	0.01
Education group						1

*$p < .05$;**$p < .00$.

Step 2 shows that Mediterranean nutritional knowledge on subjective nutritional knowledge mediator was also significant ($\beta = 0.18$, $p < .00$). Step 3 shows that regression of the mediator (subjective nutritional knowledge) with eating habits controlling Mediterranean nutritional knowledge was also significant ($\beta = 0.44$, $p < .00$). Step 4 of the analyses revealed that controlling the mediator (subjective nutritional knowledge) Mediterranean nutritional knowledge was a significant predictor of eating habits ($\beta = 0.16$, $p = .00$). In addition, Mediterranean nutritional knowledge had a positive indirect effect on eating habits through subjective nutritional knowledge ($\beta = 0.08$, $SE = 0.02$, 95% CI [0.01, .14]). Accordingly, it was found that subjective nutritional knowledge partially mediated the relationship between Mediterranean nutritional knowledge and eating habits.

Discussion

The study had two main goals: first, examining the eating habits and subjective nutritional knowledge of nursing students according to three groups: novice, advanced, and senior. Second, exploring the role of subjective knowledge as a mediator between nursing students' Mediterranean nutritional knowledge and eating habits during the COVID-19 pandemic.

First, it was found that there were significant differences among students' groups regarding their eating habits: the novice group had better eating habits than the other two. However, no differences were found in subjective nutritional knowledge among the three groups. A similar study that investigated the general population found that the pandemic has negatively changed people's eating habits (Di Renzo et al., 2020; Rodríguez-Pérez et al., 2020). In addition, similarly to students from other academic institutions, the pandemic had also negatively affected the participants' eating habits, mostly regarding increased food quantities, having more snacks, and adopting unbalanced eating patterns, such as eating at irregular times and skipping meals. During this period, students experienced emotional eating or a tendency to eat even when not hungry (Son et al., 2020). In addition, a significant portion of nursing students from the advanced and

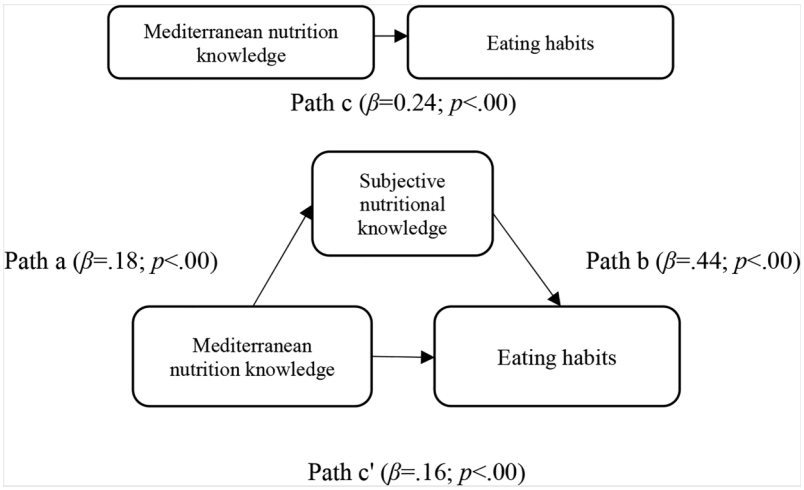

Figure 2. Students' subjective nutritional knowledge as mediating between Mediterranean nutrition knowledge and eating habits.

senior groups worked as nursing aids in COVID-19 hospital wards, thus being at the forefront of the pandemic and dealing with extremely stressful situations. Handling complex situations might cause changes in eating habits resulting from a complex emotional state. The effect of the stressful events caused by the pandemic on eating habits should raise concern, as poor eating habits may correlate with symptoms of depression and anxiety (Acharya et al., 2018).

The second goal of the present study was to explore subjective knowledge and its role as a mediator between nursing students' Mediterranean nutritional knowledge and eating habits during the pandemic. Following an extensive search, we did not find research that examined a model like ours. The present study found that subjective knowledge was a significant partial mediator between participants' knowledge of Mediterranean nutrition and eating habits. Similarly, a study that examined the relationship between health scholarship and eating habits among nursing students during the pandemic found a positive relationship (Duong et al., 2020), but this study did not examine subjective knowledge as a mediator. We believe that there are other factors that may mediate between these elements, in addition to subjective knowledge, such as symptoms of depression and anxiety, which are relevant to nursing students serving as aids in COVID-19 hospital wards.

Implications for Practice

There are three recommendations for practice. First, students can be encouraged during their studies to write an eating diary in which they will record what they eat and drink routinely, which will allow them to track and monitor their eating habits and, if necessary, improve them. Second, it is important to provide them with "knowledge bytes" regarding healthy nutrition types and eating habits, not only in the first year but throughout their studies and beyond. Third, it is necessary to conduct further research to examine other factors that might serve as mediators for eating habits, in addition to subjective knowledge. Suggested factors include anxiety and stress, which are particularly relevant during the pandemic, and might serve as mediating variables for eating habits.

Strengths and Limitations

Attention should be given to some of the study's strengths and limitations. The study highlights the fact that nursing students in an advanced stage of their studies have inferior eating habits as compared to students at the initial stage. Therefore, this issue should be addressed in advance to prevent such habits and maintain good eating habits throughout students' studies. Additionally, this study seems to be the first that found subjective knowledge to be a partial mediator between nursing students' Mediterranean nutritional knowledge and eating habits.

However, the present study also suffers from several limitations. First, in relation to the partial mediating role, we believe there are other mediating variables that we did not examine in this study, which need to be examined, and we recommend that future research does so. Second, the small sample size used ($N = 212$) is another limitation, and thus generalization of the findings to other populations should be undertaken cautiously.

Conclusions

The present study found no differences among the three groups as far as their subjective nutritional knowledge. Moreover, nursing students from the advanced and senior groups exhibited eating habits inferior to those of the novice group. Therefore, especially for the advanced and senior groups, it is important to teach and impart research-based information through diverse channels, such as seminars, symposia, and webinars. Interprofessional teams, including clinical nutritionists, registered certified dietitians, and nursing students, can share important, authentic information. In addition, it is important to teach nursing students how to correctly read research-based articles, so that they can enrich themselves (lifelong learning) both independently and over time with nutrition evidence-based information.

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Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical Approval

The University IRB approved this study. Participation voluntary participants and were informed the purposes of the study. In addition, they signed informed consent form. The participants assured that their questionnaire would be analyzed anonymously.

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