

Preventing Obesity in Adolescents: Media Literacy, Decision-Making and Critical Thinking Skills

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ABSTRACT

Objective

To identify adolescents' media literacy levels and their ability to make sound decisions and use critical thinking skills in the context of obesity prevention behaviors.

Methods

Design

Cross-sectional study

Setting

An elementary and a middle school in İstanbul, Turkey.

Participants

Fourth, fifth and eighth-grade students (N=634).

Main Outcome Measures

Body Mass Index, the Media Literacy for Obesity Prevention, and the Sound Decision-making and Critical Thinking.

Analysis

Descriptive and chi-square analysis.

Results

The adolescents' critical thinking skills mean score was 25.85±4.54. The Media Literacy mean score was 16.21±4.19. The decision-making skills mean score was 9.65±2.10. In the context of preventing obesity, a statistically significant difference was seen between Media Literacy behaviors in the context of obesity prevention and critical thinking skills ($\chi^2:175.99$; $p<0.05$, 218.50; $p<0.05$, 233.72; $p<0.05$).

Conclusion

Adolescents have a low level of critical thinking skills in the context of obesity prevention. Their Media Literacy

and decision-making skills are at a moderate level. The fact that the adolescents who had low levels of critical thinking skills with respect to obesity prevention constituted the majority suggests that these young people will be unable to prevent obesity going forward and may face the risk of developing obesity-related chronic illnesses.

Keywords: Adolescent, Obesity, Decision Making, Critical Thinking, Thinking Skills

Introduction

The advances in technology in the 21st century have resulted in an increase in the number of adolescents spending their time watching television, using the computer and their cellphones [1]. According to the Canadian Institute for Health Information (2009), overweight adolescents spend 15 or more hours a week in front of some kind of screen (cellphone, TV, video games, computers) [2]. Young people in the U.S., it is reported, spend 53 hours of the week in front of a screen [3] and this represents more time than they spend on all other activities combined outside of sleeping [4].

The increase and difference in the use of mediachannels has encouraged a stationary lifestyle and a change in eating habits [5]. Advertising broadcast on the media can exacerbate an interest in unhealthy products, making adolescents choose a fast-moving but inactive lifestyle, also fostering a leaning toward fast-food and consequently leading to obesity [6]. In fact, many scientists argue that the present obesity epidemic is a direct outcome of aggressive food product marketing [7]. This is why taking early measures is so important in the prevention of obesity.

It is known that obesity is an increasingly prevalent issue among adolescents [8,9]. Childhood obesity is one of the most outstanding issues of public health in the twenty-first century. The problem is global and its prevalence has reached alarming proportions [10]. Obesity in children has risen more than twofold in the last 30 years; its prevalence among adolescents has surged more than fourfold. While in the U.S. in the 1980's, the rate of obesity among children between the ages 6-11 was 7%, this rate rose to about 18.4% in 2019. The rate among

adolescents of the ages 12-19 in the same periods climbed from 5% to about 20.6% [11].

According to the "Turkey Childhood (ages 7-8) Obesity Surveillance Initiative 2013 (COSI-TUR)," in the group of children, ages 7-8, 14.2% were overweight and 8.3% were obese [12].

The literature indicates that health literacy (HL) is still low in developing countries [13]. Media Literacy (ML) and HL are concepts that are very closely related [14], and knowing the degree of an individual's health literacy (HL) is the key to understanding which preventive behaviors will be displayed [15]. In a study conducted for the purpose of determining the health literacy levels of middle school students, Sönmez (2015) reported that 70.8% of the participants displayed a low level of health literacy [16]. In a study carried out with adolescents, it was reported that a low level of health literacy was one of the determining factors of body mass index (BMI) [17]. A low level of ML also brings about risks that are similar to those arising from low HL.

The literature reveals evidence that the use of the media contributes to obesity [18]. At the same time, it has been noted that low media literacy has a harmful effect on health, leading to obesity and to eating disorders [19,20].

Health and education systems play important roles in protecting and improving children's health and are responsible for taking sound and effective measures to ensure children's wellbeing [21]. It is a fact that restricting screen-time can only partially counter the effects of the media. Since food marketing via the media is patently visible on the internet both in and out of home, in school, on billboards and giant screens, in the social media and almost everywhere, it has been asserted that improving media literacy as well as decision-making and critical thinking skills is one of the most effectual ways of protecting and enhancing children's health [22].

It is clear that students need to be taught many values and skills if the Social Studies course that is part of the National Program of Education is to meet the goals set forth in the syllabus. Considering that some of these skills carry the fundamental characteristics of disciplines related to the Social Sciences, these can be defined and expressed as various literacy skills [23]. Although preventing childhood and adolescent obesity, acquiring media literacy, critical thinking skills and self-control are targeted in this course [24] and despite the fact that the national health system has adopted a program to fight obesity, the issue still remains current. The targeted scope of learning of the social sciences course covers serious issues in the context of public health. Classroom teachers, Social Studies teachers, school nurses as well as the school community all carry responsibilities with respect to these issues [25]. We feel that this study will help all involved in adolescent health by shedding light on the matter of obesity prevention in adolescents.

Objective

To identify adolescents' media literacy levels and their processes of making critical health decisions in the context of obesity prevention behaviors.

Materials and Methods

Study Design

Participants and Recruitment

The study was carried out during the fall term of the 2018-2019 academic year with 4th graders and 5th-8th graders at a public primary (elementary & middle school) (N=634). Adolescents between the ages 9-14 who were willing to participate, whose parents consented to their participation, and who completely filled out the data collection forms were recruited into the study. Adolescents who handed in incomplete forms and those who did not wish to participate in the study were excluded from the research.

The school has a gymnasium and an infirmary, but no school nurse. It is located in a socioeconomically advantaged area. The school was chosen because the students there are eager to participate in social activities and the school administration is cooperative.

Research Questions

Regarding the Adolescents' Behavior in the context of Preventing Obesity:

What is the level of their Media Literacy (ML)?

How is their decision-making on matters of health (HDM)?

What is the level of their Critical Thinking Skills (CTS)?

What is the level of their obesity prevention behaviors (low, moderate, high)?

How are the adolescents distributed according to their CTS levels (low-moderate-high)?

The majority of the adolescents were found to have a low level of critical thinking skills.

The percentage of adolescents with poor critical thinking skills was 58.8%.

Those displaying a moderate level constituted 39.6% and 1.6% represented those with a high level of critical thinking skills.

Measures

Data collection instruments

The sociodemographic questionnaire, which queries sociodemographic characteristics, perceptions about body image and health and the individual's media usage, and the BMI evaluation form were used as data collection instruments in addition to the 5th (ML Scale for Obesity Prevention) and 6th (Sound Decision-making and Critical Thinking) subscales of the Causal Relationship-based Critical Thinking Skills Inventory of Behaviors to Prevent Childhood Obesity. This instrument was developed by Intarakamhang et al. and adapted to the Turkish culture by Gür and Ünver [15,26].

The 5th subscale measures media literacy. The items in this subscale consist of 5 positive questions that are expected to be answered on a Likert-type of scale where 5=always,

4=frequently, 3=sometimes, 2=rarely, 1=never. Cronbach's alpha coefficient for the original scale was 0.82; in this study, this value was 0.70.

The 6th subscale measures the extent of healthy, appropriate decision-making in preventing obesity. There are 5 multiple-choice questions in this subscale. Each question has 4 responses. The choices for each question indicate how the respondent makes a decision and acts on the issue of preventing obesity. The most appropriate response for each item receives a score of 4; the behavior that is least desired, a score of 1. Cronbach's alpha coefficient for the original scale was 0.65; in this study, this value was 0.70. The levels of preventing obesity and critical thinking are measured by adding the scores of the 5th and 6th subscales. The lowest possible total score is 10; the highest is 45. A total score of <27 represents a low level of critical thinking, a score of 27-35.99 a moderate level and a score of 36-45 (including 45) points to a high level of critical thinking skills. The term "media" in this study was taken to mean television, video game systems, computers, cell phones and other electronic devices such as tablets or laptops.

Data collection method

The data were filled out with pen/pencil on a self-reporting basis in the school setting. The authors measured and recorded the participants' height and weight in the classroom.

Height measurements

Height measurements were taken with a stadiometer, accepted as providing the most accurate measure. The stadiometer was placed flat on the floor and checked. The participants were asked to remove their shoes, socks, barrettes, hats and other extraneous items. The student's head, shoulders, back, calves and heels were arranged to lean against the stadiometer. By supporting the student's chin with the thumb and index finger, the head was fixed and arranged so that the student was looking straight ahead and parallel to the floor. To stabilize the position, the sliding ruler was pulled down and made to push down gently on the hair; the measurement was then taken and recorded in the screening form. The measurements were made at a sensitivity of 0.1 cm. The assessment of height was made with reference to the height percentiles determined according to age and gender [27].

Weight measurements

Weight measurements were taken with a digital scale. A digital scale was preferred for the measurement due to its relative accuracy, speed and its self-resetting property. The scale was placed flat on the floor and checked. The room lighting was adjusted, ensuring that the indicator on the scale pointed to "0" before each reading was made. The students were asked to remove their heavy clothing (e.g., jackets, coats, sweaters) as well as their shoes and any items in their pockets. To avoid fluctuations in the reading, the students were instructed to stand up straight without moving. The weight reading was recorded in the screening form. A sensitivity of 0.1 kg. was considered in the measurements. The assessment of weight was made with reference to the height percentiles determined according to age and gender [27].

The calculation and evaluation of body mass index was carried out based on the mathematical formula for Body Mass Index (BMI) after height and weight had been accurately measured. $BMI = \text{Kg}/m^2$. The BMI percentiles determined according to age and gender were used in the assessment of BMI [27].

Analysis

The data were evaluated in a computer program (SPSS version 24.0). The data were analyzed with parametric tests. Descriptive statistics (percentages, means, standard deviation, minimum, maximum) were used for the questionnaire. The differences between the cut-off points of the scale and the variables were assessed with chi-square analysis. The level of statistical significance was accepted as $p < .05$.

Ethical considerations

Permission for the study was obtained from the institution where the study was conducted, from the Provincial Directorate of National Education and the Ethics Committee (Date: 10.09.2018, No. 186). The adolescents were informed about the research and were invited to volunteer to participate. The parents were also informed, and their written consent was received.

Results

The mean age of the adolescents was 12.07 ± 1.36 ; 51.4% were boys and 48.6% were girls. In terms of family type, 81.5% lived in a nuclear family. The mothers' education was a maximum (34.7%) primary school; the fathers' educational background was at a maximum (36%) middle school level. The adolescents lived with their parents at a rate of 96.7%. Their transportation to school was mostly by walking (88.5%). Their mean height was 152.11 ± 11.24 cm and their mean weight was 44.71 ± 11.76 kilos.

Self-assessment and BMI	Groups		
Body image perception	Very poor	55	8.7
	Normal	457	72.1
	Overweight	111	17.5
	Obese	11	1.7
Body mass index	Below 18.5 Underweight	299	47.2
	18.5-24.9 Normal weight	294	46.4
	25-29.9 Overweight	31	4.9
	30-34.9 Severely obese	10	1.6

Table 1: The Adolescents' Body Image Perception, Health Perception and BMI (n = 634).

Habits	Groups		
Went to a birthday party	Never	162	25.6
	Once	116	18.3

how many times last year?	Twice	149	23.5
	Three times	100	15.8
	Four times	44	6.9
	Five times	63	9.9
	More than five	162	25.6
How many times ate out?	Every day	20	3.2
	A few times a week	223	35.2
	A few times a month	245	38.6
	A few times a year	95	15.0
	I never go	51	8.0
How frequently orders in?	Every day	6	.9
	A few times a week	114	18.0
	A few times a month	222	35.0
	A few times a year	123	19.4
	Never	169	26.7
Follows a diet promoted by the media and not by a specialist?	Yes, frequently	46	7.3
	Yes, sometimes	158	24.9
	No	430	67.8
How often is chocolate, chips, soda, etc. kept at home?	Always	114	18.0
	Frequently	479	75.6
	Sometimes	41	6.5
	Never	-	-

Table 2: The Adolescents' Eating Habits (n = 634).

Media Literacy, Decision-making, Critical Thinking Skills	Mean	sd
5. Subscale: Media literacy (min:5; max:25) Possible score min:5 max:25	16.21	4.19
6. Subscale: Making a sound decision about health (min:4; max:15) Possible score min:4 max:16	9.64	2.10
Health Literacy - Critical Thinking Skills (min:10; max:38) Possible score min:4 max:45	25.85	4.54
Health Literacy - Critical Thinking Skills Levels	f	%
If total score <27, low level of CTS	373	58.8

If 27-35.9, moderate level of CTS	251	39.6
If 36-45 or 45, high level of CTS	10	1.6

Table 3: Preventing Adolescent Obesity: ML, Critical Thinking and Decision-making Skills Mean Scores and Distribution of CTS levels (n = 634).

Preventing Obesity Questions on Media Literacy	Critical Thinking Skills in	Statistics						X ²	p
		Low	Moderate	High					
	f	%	f	%	f	%			
1. How often do you research different sources before you believe an ad on TV?	Never	54	93.1	4	6.9	0	0	175.99 0.00*	
	Rarely	74	90.2	8	9.8	0	0		
	Sometimes	126	70.4	53	29.6	0	0		
	Frequently	83	53.2	73	46.8	0	0		
	Always	36	22.6	113	71.1	10*	6.3		
3. How often do you think about something before trying a product advertised in the media?	Never	100	94.3	6	5.7	0	0	218.50 0.00*	
	Rarely	118	72.4	45	27.6	0	0		
	Sometimes	108	62.1	66	37.9	0	0		
	Frequently	37	34.9	69	65.1	0	0		
	Always	10	11.8	65	76.5	10*	11.8		
5. How often do you ask for advice before	Never	103	89.6	12	10.4	0	0	233.72 0.00*	
	Rarely	116	85.9	19	14.1	0	0		
	Sometimes	104	56.8	79	43.2	0	0		

trying an advertised health product?	Frequently	39	38.2	63	61.8	0	0
	Always	11	11.1	78	78.8	10*	10.1

Table 4: Adolescents' Responses to Questions on Media Literacy in Preventing Obesity, by their Critical Thinking Levels (n = 634).

*Phi and Cramer's V, ** p<0.001

The study results showed that 32% of the adolescents spent more than two hours watching TV on weekdays while 46.4% watched TV for over 2 hours over the weekend. Of the adolescents, 43.6% spent more than two hours on the internet during the week and 52.6% spent more than 2 hours on the internet over the weekend.

While 8.7% of the adolescents perceived themselves to be very thin, the measurements showed that 47.2% were underweight. While 72.1% of the adolescents perceived their body image to be normal, 46.4% were normal according to BMI; 17.5% perceived themselves to be overweight, whereas 4.9% were overweight by BMI calculations. While 1.7% of the adolescents perceived themselves to be obese, according to BMI, 1.6% were severely obese (Table 1).

When the adolescents were asked how many times a year they went to a birthday party, 18.3% said once and 25.6% said they went to more than 5 parties a year. In the case of the adolescents' eating out, 35.2% said they ate out a few times a week; 38.6% said they did so a few times a month. When they were asked how frequently they ordered in, 18% of the adolescents said a few times a week while 35% said they ordered in a few times a month. In terms of the adolescents' tendency to follow a diet advertised in the media rather than consulting a dietician, 7.3% defined their frequency of doing so as "frequently," 24.9% said "sometimes" and 67.8% said they never dieted. As far as making snacks available at home, 18% of the adolescents said they did this all the time, and 75.6% said they frequently made snacks available at home (Table 2).

The adolescents' critical thinking skills mean score was 25.85±4.54. Adolescents with a low level of critical thinking skills constituted 58.8% of the study group, 39.6% were at a moderate level, while 1.6% displayed a high level of critical thinking skills. The ML mean score was 16.21±4.19. The decision-making skills mean score was 9.65±2.10.

Adolescents with a low level of critical thinking skills constituted 58.8%, 39.6% were at a moderate level, while 1.6% displayed a high level of critical thinking skills (Table 3).

While 93.71% of the adolescents who never did research in different sources exhibited a low level of critical thinking skills, 71.1% of those who always did so were at a moderate and 10.1% showed a high level of critical thinking skills (χ^2 : 175.99; p<0.001). Of the adolescents who never thought about a media-advertised product before trying it out, 94.3% had low critical

thinking skills, while 11.8% of those who always thought about it before trying a product out showed low, 76.5% showed moderate, and 11.8% exhibited a high level of critical thinking skills (χ^2 : 218.50; p<0.001). While 89.6% of those who never sought advice before trying out an advertised health product exhibited a low level of critical thinking skills, 11.1% of those who always sought advice had a low level, 78.8% had a moderate level and 10.1% had a high level of critical thinking skills (χ^2 : 233.72; p<0.001) (Table 4).

Discussion

In this study, we examined the critical thinking skills of adolescents in the context of preventing obesity and in terms of their levels of media literacy, their decision-making skills in dealing with their health and their health literacy. Although there are studies that have investigated the effect of the use of the media on childhood obesity [28-30], we found no studies that reveal the role of decision-making and critical thinking skills in preventing adolescent obesity. In the 2018 study by Austin, E.W., it was reported that in order to prevent obesity, young people needed to develop the skills that would facilitate the development of their critical thinking and decision-making abilities in the context of media literacy [31]. In their efforts to protect adolescents from obesity in the face of the adverse effects of the media, experts can use the results of this study to help young people develop their critical thinking and decision-making skills and increase their media literacy.

It is known that in today's world, the media is the most effective socialization tool that plays a role in the formation and shaping of adolescent health behaviors [32]. The negative effects of the media on both weight loss and weight gain have been reported [20]. In particular, it is asserted that adolescents pay great attention to body image and eat an insufficient or unbalanced diet to control their weight [33], even resorting to such unfavorable weight loss methods as skipping meals, taking drugs and vomiting. One study carried out with adolescents of ages 14-19 has revealed that 34.6% of these young people follow a diet promoted in the media [34]. We obtained similar results in our study, in which 32.2% of the participating adolescents practiced a diet inspired by what they saw and heard over the media, without consulting a dietician (7.3%, frequently; 24.9%, sometimes). It is worrisome to think that adolescents will be influenced by the media to implement a diet without consulting a dietician or other specialist.

The media makes use of confusing and misleading commercial content to produce peer-supported food marketing techniques [1]. At the same time, adolescents tend to be more under the influence of their friends and peers rather than their families [35]. There is also the reality that adolescents tend to eat and snack in front of the various forms of the media. Moreover, in recent years, young people are generally in contact with their friends over the social media, socializing over this medium rather than outside and accordingly spending great amounts of time in front of a screen [36]. In our study too, we found that more than half of the participants were spending more than the maximum two hours accepted as a limit in the literature [37]. Additionally, as in this study, if adolescents have a low level of

ML, the negative impact of the media will be even more intensive, which significantly suggests that this will leave adolescents even more vulnerable. The study by Chang (2015) in Taiwan revealing a low level of ML among seventh and ninth grade students is consistent with our own results [38]. What is more is that in our study, although the participating adolescents had a low level of ML related to preventing obesity, the participants who did not research different sources, did not think about a media-recommended product before trying it, who never consulted anyone before trying out an advertised product also were significantly lacking in critical thinking skills. All of these point to the extent to which our participants were at risk in terms of obesity. In a systematic review by Fleary, Joseph, & Pappagianopoulos et al. (2018), a significant and linear correlation was found between media and health literacy and adolescent health behaviors [39]. Similarly, Levin, Zamir et al. (2011) reported a correlation between positive health behaviors and high Media Health Literacy in a study they conducted with 13-17 year-old students in Israel. In a study conducted by Hoffman, Austin, Pinkleton, & Austin (2017), the authors reported a correlation between a high level of media health literacy and low consumption of alcohol as well as an inverse relationship between high media health literacy and alcohol abstinence. In other words, the media can lead adolescents into adopting unfavorable health behaviors [40, 41].

It was found in our study that those adolescents who always thought about a media-recommended product before trying it displayed a moderate level of critical thinking skills. Those who always consulted before trying something related to health that was advertised in the media had a moderate level of critical thinking skills. This showed us that critical thinking skills lie at the foundation of acquiring desired ML behavior. It was also seen that adolescents displaying moderate and high levels of critical thinking skills were less negatively affected by the media and, if it is considered that these adolescents made an analysis before acting upon their thoughts, it might be said that they are more able than others to prevent obesity. Contrary to this, however, it was seen that those adolescents with low levels of critical thinking skills did not analyze what they saw and heard in the media and did not display the behavior desired in terms of media health literacy, leading to the worry we share with **Kupersmidt et al., (2010)** that these children might not have the means to protect themselves from obesity. Individuals tend to make healthy decisions when they are able to develop the skills to define, understand and resist the temptations presented by seemingly convincing media messages [42]. At the same time, instead of controlling their children's screen time, parents should, as recommended in this study, find out about and be aware of their adolescent's ML. It has also been shown that an adult's (parent/specialized expert) discussions with an adolescent increases the young person's critical thinking abilities and helps them to develop strategies to use in managing the media. Researchers report that determining adolescents' ML levels can have a diminishing effect on the adverse impact of food marketing [43,44].

We found that 58.8% of the adolescents in our study had a low level of critical thinking skills in the context of health literacy. It must be said that adolescents need to be more critical

in their regard for advertising in the media since critical analysis is decidedly important in making sound health decisions [1]. Since it is only adolescents with high levels of sound decision-making skills who can cope with such problems, the key to achieving obesity prevention is to maintain high levels in the HL components of critical decision-making and critical thinking [42]. A comparison of European countries has revealed that there are differences in students' levels of health literacy. The HL rate was lowest, at 1.8%, in the Netherlands, and was followed by rates of 7.5% in Spain, 10.2% in Poland, 10.3% in Ireland, 11% in Germany, 13.9% in Greece, 18.2% in Australia and 26.9% in Bulgaria [45]. Sönmez (2015) has found in a study conducted with middle school students that most adolescents (70.8%) had low health literacy levels [16]. As can be seen, promoting and improving the health of children/adolescents is still an important and current issue for health and educational sciences.

This study has a cross-sectional design that limits interpretations of associations and the research findings are limited to these schools and cannot be generalized.

In this article, adolescents' how to practice critical thinking, when it comes to media messages about health is revealed by using media literacy scale and decision-making skills scales.

Implications for research and practice

Although not overweight or obese, the adolescents participating in this study displayed low levels of critical thinking skills in their obesity-preventing behaviors.

Most had low levels of critical thinking skills.

Their ML and decision-making skill scores were at a moderate level.

There were statistically significant differences between ML and critical thinking skills in terms of obesity prevention. While most of the adolescents who never looked into different resources before buying a product they saw advertised, those who never thought about it much before trying a media-promoted product, those who never asked for advice before trying a health-related product were found to have low levels of critical thinking skills, most of the adolescents who thought about the product and sought advice exhibited moderate and high levels of critical thinking skills.

Programs should be developed to ensure cooperation among school health professionals (e.g., nurses, pediatricians), teachers, school administrators, parents, canteen and cafeteria managers so that adolescents' critical thinking skills, HL and decision-making skills can be improved in the context of obesity prevention.

All domains of HL and ML should be developed to achieve an improvement in adolescents' obesity-preventive behavior.

In-house training can help to raise the awareness of classroom and Social Studies teachers. As a part of the activities that can be used to promote media literacy, teachers should help their students learn to read between the lines in media messages, inquire into individual bits of information and find alternative ways to become informed while also being entertained.

More time should be spent in the Social Studies teaching program on applied skills that promote prevention and caution before actual problems appear.

School nurses should conduct a screening of height and weight at least once a year, and overweight adolescents and those at risk should be invited to join and be monitored in appropriate programs.

Teachers, pediatricians, nurses working in pediatric/adolescent health would do well to share data and knowledge about ML, critical thinking and decision-making skills on reliable websites, YouTube videos and on other channels of the social media.

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