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NUTRITION EDUCATION AND SOCIAL NETWORKS. CRITERIA USED BY UPPER-SECONDARY SCHOOL ADOLESCENTS TO SELECT FOOD-RELATED INFORMATION

Educación nutricional y redes sociales. Criterios en adolescentes de nivel medio superior para la selección de información alimentaria

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Abstract

Introduction: This study arose from an interest in analyzing whether the nutrition education adolescents receive during upper-secondary education provides them with criteria for selecting reliable food-related information on social networks; that is, information from nutrition professionals whose content and posts are scientifically and objectively grounded. Social networks are highly popular, and some people take advantage of them to promote products or disseminate false information. It is therefore necessary to raise awareness about the appropriate use of these digital platforms. **Methodology:** A case study was conducted with 35 students from Villanueva High School, located in the municipality of the same name in the state of Zacatecas, Mexico. The students were enrolled in the “Training for Work in Hygiene and Community Health” program,

whose curriculum includes a nutrition education module. Two semi-structured surveys were administered during the 2022-2023 school year. Data was collected on social media use, time spent browsing these platforms, the networks most frequently used, and the type of food-related information viewed through these digital media. **Results:** Respondents were approximately 17 years old; 20 were female, 9 were male, and 6 did not specify their sex. Of the total sample, 5.1% had obesity, 10.2% were overweight, and 64.1% had normal weight. All respondents reported having at least one active social media account and following profiles that discuss nutrition, as they considered information presented through these digital media to be more appealing. **Discussion:** The adolescents surveyed did not have adequate criteria for distinguishing among the nutrition information they viewed on social networks. The most frequently followed accounts included, for example, Leana Deeb, Carlos Belcast, and Andoni, influencers who do not have academic training in nutrition. **Conclusions:** Adolescents reported frequent social media use and considered these platforms important in their lives for communication and obtaining information. However, confusion was found when identifying which individuals have academic training in nutrition.

Keywords:

Social networks, nutrition education, adolescence, adolescent criteria, upper-secondary education, food information, influencers.

1. INTRODUCTION

Nutrition education is particularly important because of the high prevalence of chronic diseases in Mexico. Many of these diseases are preventable, since their natural course can be modified through actions that alter the clinical trajectory of the conditions determining their incidence (Córdova et al., 2008), including an appropriate diet. It is therefore important for the population to be educated on nutrition-related topics so that knowledge can be put into practice and various diseases affecting public health can be prevented.

Every six years, Mexico's National Institute of Public Health and Ministry of Health conduct the National Health and Nutrition Survey (Instituto Nacional de Salud Pública) to identify health problems associated with inadequate food intake across all population groups in the country. A comparison of data from 2012 and 2018 for male and female adolescents aged 12 to 19 shows that the prevalence of overweight and obesity among girls increased from 35.8% in 2012 to 41.1% in 2018. Among boys, prevalence increased from 33.3% in 2012 to 35.8% in 2018. Likewise, these forms of malnutrition were more prevalent among adolescents living in urban areas (39.7%) than among those in rural areas (34.6%), owing to sedentary lifestyles combined with diets high in carbohydrates and fats (Instituto Nacional de Salud Pública, 2018).

To promote the consumption of foods high in saturated fat, sugar, sodium, and excess calories, industries rely on various marketing strategies through digital media, exerting considerable influence on consumers without necessarily taking into account the adverse effects associated with consuming such foods. Accordingly, "the food industry can help the population consume healthier foods by reducing the fat, sugar, and salt content of processed foods (...) as well as by limiting the marketing of foods rich in these components" (Tenorio, 2021, p. 14).

Among the digital media in which products related to nutrition and food are most heavily advertised are social networks. Their importance lies in their widespread use and in the amount of time people spend connected to them. According to Asociación de Internet Mx (2022), 91.1% of users access them daily, while 25.4% remain connected throughout the day. The most popular social networks in Mexico are WhatsApp, Facebook, Instagram, YouTube, and TikTok, with smartphones being the main connection device and allowing users to stay informed at any time.

Moreover, 15.3% of social media users watch tutorials, and cooking recipes are among the most frequently searched topics on TikTok. These are generated primarily by influencers, most of whom do not have professional training. Their dishes may be prepared using foods considered healthy or, conversely, without particular concern for health, focusing instead on making the preparation appealing to users or promoting products that have not been certified by medical bodies.

One of the strategies implemented by the Mexican government is the requirement for front-of-package nutrition labeling, regulated by Mexican Official Standard NOM-051-SCFI/SSA1-2010, which was amended in 2014.

This standard indicates that industrialized products must display a mandatory nutrition declaration on the front of the package. This declaration must state the amount and percentage of caloric contribution from saturated fat, other fats, and total sugars (kcal or cal); the percentage of sodium content (mg); and energy (kcal or cal) per package or serving, as applicable. The front-of-package nutrition labeling system in force in Mexico is based on the Guideline Daily Amount system (Sánchez et al., 2018, p. 1).

In education, terminal training tracks that include nutrition education subjects have been incorporated into upper-secondary education within the state high-school subsystem. One example is the “Training for Work in Hygiene and Community Health” program, whose aim is to educate adolescents about the nutrients provided by different foods and to prevent noncommunicable chronic diseases such as diabetes, hypertension, and cardiovascular conditions, as well as other malnutrition-related problems such as underweight, overweight, and obesity. It also seeks to contribute to the adoption of healthy habits, the recognition of regional foods, and their appropriate and hygienic preparation.

These elements frame and delimit this research, which intersects three areas: food education, because the study focuses on upper-secondary students enrolled in a terminal training track that provides instruction on nutrition; adolescence, a period characterized by physical changes and increased concern about body image; and social networks, one of the main channels of information and communication. On the basis of these elements, the objective of the present study was defined around the central premise that nutrition education should provide students with knowledge that helps them develop healthy criteria and critically distinguish among the information distributed through social networks.

2. OBJECTIVE OF THE STUDY

To analyze the use of social networks and the food- and nutrition-related content viewed by upper-secondary school adolescents, and to compare these elements with the nutrition education they receive at school in order to assess whether this education enables them to develop sound criteria for evaluating and distinguishing among the information they consume through these media.

3. SOCIAL NETWORKS IN MEXICO

According to Asociación de Internet Mx (2023), 80.8% of the population aged 6 years or older uses the internet. The main place of connection is the home, followed by the workplace or office, while 21% reported connecting at school. A total of 60.8% of respondents browse the internet for 3 to 9 hours, whereas 27.1% reported doing so for more than 9 hours. The main activity performed by 84.8% of users is accessing social networks.

The main social networks on which users have active accounts are WhatsApp (95.6%), Facebook (84.9%), Instagram (76.2%), YouTube (59.3%), and TikTok (44.2%). The principal uses of social networks were staying informed (77%), communicating with friends and family (76.8%), consuming entertainment content (62.6%), searching for product recommendations or reviews (35.6%), and contacting professional services (22.5%). Regarding advertising, food ranks ninth among topics of interest, with 22.7% of users consulting this type of content. Likewise, 72% of internet users acknowledged being influenced by online posts when deciding whether to make purchases. Social networks were the main source of advertising, and 38.3% reported purchasing pharmacy or health products online (Asociación de Internet Mx, 2023).

Social networks function as new spaces for conversation and user participation that enable the exchange of information and the presentation and discussion of ideas at low cost. Above all, they offer the major benefit of expanding networks of contacts, publicizing products or services, and even attracting new customers easily (Balarezo & Llivichuzca, 2015, p. 15).

Social networks have therefore become increasingly popular because they facilitate interaction among individuals, whether to communicate with people who are nearby or far away or to purchase goods and services. They have also served as platforms for companies to promote their products; for professionals such as physicians and nutritionists to offer services or disseminate information related to their fields; and for influencers or anyone involved in advertising.

4. NUTRITION EDUCATION IN UPPER-SECONDARY EDUCATION

Nutrition education is defined as “learning activities whose purpose is to facilitate the voluntary adoption of eating and other nutrition-related behaviors that promote health and well-being” (American Dietetic Association, 1996, as cited in Grupo de Educación Nutricional y de Sensibilización al Consumidor de la FAO, 2020, p. 6). It encompasses the tools provided to build food and nutrition knowledge among the population. It is also necessary to explain that foods are not inherently “bad”; rather, what contributes to the development of malnutrition-related disease is excess, both in frequency of consumption and in quantities that exceed metabolic energy requirements, particularly foods high in carbohydrates and saturated fats. Any dietary pattern should therefore be accompanied by physical activity to increase energy expenditure and prevent excess energy from being stored in the body.

Within education, students are expected to recognize the difference between food intake and nutrition. The former relates to the consumption of foods according to geographic area, preferences, and local customs, thereby shaping a lifestyle influenced by social factors such as gatherings and celebrations (birthdays, anniversaries, weddings, graduations, etc.). Nutrition, by contrast, is the science that studies the processes followed by macro- and micronutrients in the body after foods

are ingested. Once distributed throughout the body through the bloodstream, these nutrients perform specific functions related to growth, development, and cellular metabolism and help prevent various health problems.

In Mexican upper-secondary education, within the state high-school subsystem, nutrition education is incorporated into the “Training for Work in Hygiene and Community Health” program, whose objective is to provide training and establish a foundation in the health field. Accordingly:

It has an interdisciplinary approach that links knowledge and methodology from preventive medicine in the areas of health promotion and education for disease prevention; it offers the possibility of working as an assistant in activities requiring basic knowledge of the health-disease process derived from epidemiology, public health, nutrition, sexuality, clinical practice, and geriatrics, as well as developing skills in first aid and strategies for promoting health in the community (Dirección General de Bachillerato [DGB], 2018, p. 7).

In “Module II, Public Health and Nutrition,” 48 hours are devoted to the essential concepts of nutrition education, with the objective that students understand “food biochemistry, anthropometric and clinical indicators, appropriate diets for different population groups, and nutritional deficiencies or disorders” (DGB, 2018, p. 7). The contents include macro- and micronutrients; basic concepts of nutrition, calories, food, nutrients, and nutrition; food groups and equivalents; anthropometric indicators such as Body Mass Index (BMI) and waist-to-hip ratio; detection of deficiency- or excess-related diseases (malnutrition); dietary principles and food policies; eating disorders; and hygienic food handling.

The expected learning outcome of this module is that students should “creatively propose meal plans by applying dietary principles that promote a healthy lifestyle through the assessment of individuals’ nutritional status” (DGB, 2018, p. 24). This is based on the “Plate of Good Eating,” a food guide centered on foods commonly consumed in Mexico.

Figure 1. Mexican Plate of Good Eating



Source: DOF, 2013, p. 39.

As shown in Figure 1, the plate is divided into three groups:

Green represents vegetables and fruits, which provide vitamins, minerals, fiber, and carbohydrates. Yellow represents cereals, which provide energy and fiber. Red represents legumes and foods of animal origin; legumes provide fiber, while animal-source foods contain cholesterol and saturated fats, and both groups provide protein (López, 2020, p. 106).

The aim is for students to understand the nutrients provided by each food group and how their appropriate, balanced, varied, safe, sufficient, and complete consumption at each meal (breakfast, lunch, and dinner) can contribute to optimal health, since the groups have different nutritional properties.

This food guide and its guidelines are set out in “Mexican Official Standard NOM-043-SSA2-2012, Basic Health Services. Health Promotion and Education in Food Matters. Criteria for Providing Guidance,” published on January 22, 2013, by the Ministry of the Interior.

Nutrients are divided into macro- and micronutrients according to the amounts required by the body to perform its basic functions. Macronutrients are divided into three groups: 1. Carbohydrates, which are used as the main source of energy and are classified as simple or complex. Simple carbohydrates are found in processed products such as soft drinks, sweet breads, and candies, among others; they are rapidly absorbed into the bloodstream, raising serum glucose. Complex carbohydrates, by contrast, are present in foods such as whole grains and legumes and are absorbed more slowly because of their fiber content, helping prevent excessive increases in blood glucose and thereby reducing health risks. 2. Lipids, or fats, which are necessary for hormone synthesis, body-temperature regulation, and other functions. They are divided into saturated and unsaturated fats. Excess saturated fats are harmful to health because they can contribute to overweight and obesity, leading to noncommunicable chronic diseases, particularly cardiovascular problems. Unsaturated fats, by contrast, are considered healthier and are found in vegetable oils, almonds, peanuts, pistachios, avocado, and other foods. 3. Proteins, obtained from animal-source foods such as meat, dairy products, and eggs, as well as from legumes. Their functions in the body vary because there are different types of proteins: (1) providing structure by forming supporting tissues that give organs elasticity and resistance; (2) acting as biocatalysts that accelerate metabolic chemical reactions; (3) functioning as hormones that regulate processes such as growth and blood-glucose control; (4) protecting the body from foreign agents or infections; (5) transporting molecules, as in the case of hemoglobin; and (6) serving as a source of energy (Luque, 2009).

Micronutrients are classified as vitamins and minerals. These substances are obtained from food in small amounts and perform specific functions that are essential for optimal bodily functioning: “basically, we need vitamins and minerals to grow, produce energy, fight disease, repair damaged tissues, and maintain normal health” (Brown & Challem, 2007, p. 15). Vitamins are divided into water-soluble vitamins, which need to be obtained regularly from food because they are continuously excreted, and fat-soluble vitamins, which can be stored for several weeks in the body’s fat reserves.

5. ADOLESCENCE AND PHYSICAL CHANGES

Another important focus of this research is adolescence, defined as “a stage between childhood and adulthood that chronologically begins with pubertal changes and is characterized by profound biological, psychological, and social transformations, many of which generate crises, conflicts, and contradictions” (Pineda & Aliño, 1999, p. 16). These changes are influenced by sex hormones, whose production increases from puberty onward. The Society for Adolescent Health and Medicine places this stage between 10 and 21 years of age (Hidalgo & Ceñal, 2014, p. 42).

According to Iglesias (2013), some of the hormones involved in sexual maturation during adolescence are secreted by the pituitary gland, including follicle-stimulating hormone (FSH) and luteinizing hormone (LH). In males, these hormones stimulate sperm formation and testosterone production; in females, they stimulate the development of primary ovarian follicles and increase estrogen and progesterone production. In females, the ovaries and adrenal glands also produce estradiol, a hormone that stimulates development of the mammary glands, external genitalia, vagina, and uterus and increases body fat, as well as progesterone, which promotes endometrial growth, supporting embryo implantation during pregnancy or, otherwise, menstruation. In males, the testes produce testosterone, which stimulates growth of the penis, scrotum, prostate, and seminal vesicles, as well as pubic, facial, and axillary hair.

These physical changes also affect adolescents' perceptions of themselves and may be influenced by social stereotypes. "Body aesthetic standards have been valued differently at different times (...) the existence of a beauty ideal places significant pressure on the population and especially on adolescents who are in the process of integrating their body image" (Salazar, 2008, p. 68). During adolescence, young people may therefore be influenced to adopt ideas or behaviors intended to improve their physical appearance, seeking security and acceptance from those around them.

6. METHODOLOGY

This research is a case study conducted with 35 fifth-semester upper-secondary students who chose to enroll in the "Training for Work in Hygiene and Community Health" program at Villanueva High School, located in the community of the same name in the state of Zacatecas, Mexico. The participants met the criteria established for this research: they were students whose training included the basic knowledge necessary to acquire nutrition education. Respondents were approximately 17 years old; 20 were female, 9 were male, and 6 did not specify their sex. In addition, 5.1% had obesity, 10.2% were overweight, and 64.1% had normal weight.

Fieldwork was conducted during the 2022-2023 school year after authorization was obtained from the educational institution. The adolescents were then informed about the objective of the research and told that all information collected would be anonymous; they were asked to provide consent before answering the surveys. The instruments consisted of two semi-structured questionnaires based on the analysis categories. They were divided into two instruments because a single questionnaire would have been excessively long and could have caused students to lose interest and answer less carefully. The objective of the study and the informed-consent statement were included at the top of both instruments.

The first questionnaire included questions on the following topics: reasons for creating a social media profile, most frequently used social networks, daily time spent on them, following food-related information on social media, nutrition topics learned through social media versus the educational institution, and following nutrition professionals on social media. The second questionnaire included questions about adolescents' physical activity, frequency of exercise and its purpose, perceptions of beauty stereotypes on social media, changes they would like to make to their bodies to fit ideals imposed by society, and their understanding of the concept of diet.

After reviewing the responses to both questionnaires, two additional questions were administered to improve interpretation of the results, particularly to explore in greater depth the food- and nutrition-related profiles followed on social networks and to describe what students understood by essential nutrition-education concepts. The information was then processed according to four categories of analysis: use, consumption, and type of nutrition information; criteria for evaluating

nutrition information; beauty stereotypes and nutrition-related profiles followed on social media; and nutrition education versus information on social networks. The results are presented below.

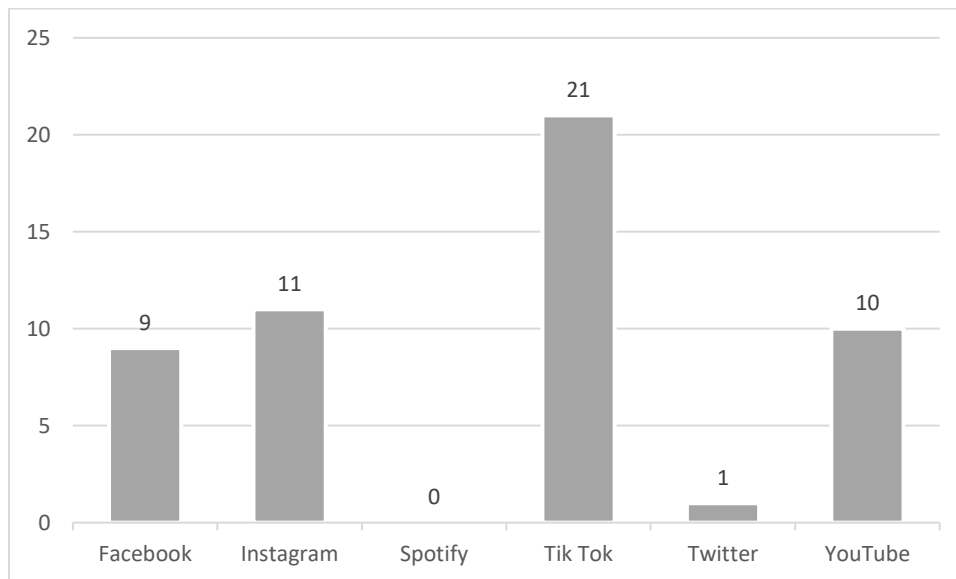
7. RESULTS

7.1. Use, consumption, and type of nutrition information

All respondents reported having at least one active social media profile, and 65.7% stated that these platforms are an important part of their lives. Their main reasons for using them included exchanging or obtaining information and staying connected with friends. Daily browsing time ranged from two to five hours. Some respondents stated that they sometimes feel the need to remain permanently connected and even lose track of time. They also reported that they can rarely go several days without accessing social networks, which are therefore part of their everyday lives both for obtaining information and for communicating and socializing.

Accordingly, “social networks have a major influence on people’s lives and have become sources of information, from a simple search to searching for a recipe or diet, replacing the importance of consulting a professional” (Bueno, 2020, p. 46). The social network most frequently used by adolescents is TikTok. As shown in Figure 2, young people are registered on more than one social network. Finally, 91% reported viewing nutrition-related content through these media.

Figure 2. Social networks most frequently used to view nutrition-related content



Source: Prepared by the authors based on survey data.

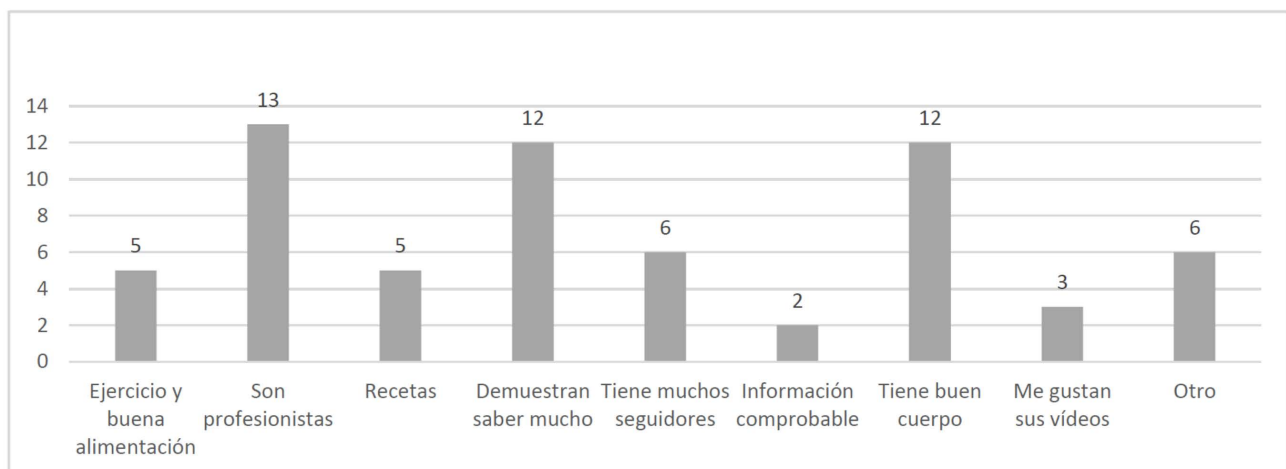
Regarding nutrition information, 48.5% of respondents reported occasionally viewing nutrition-related posts, whereas 34.2% reported checking this type of content daily or several times a day, showing that almost all adolescents had some interest in the topic. Regarding the number of nutrition-related profiles they chose to follow on social networks, 31.4% reported following between 1 and 2, 25.7% between 2 and 5, and 22.8% between 5 and 10. They stated that the information consumed and disseminated on these digital platforms was more interesting than the

nutrition education received at school and considered social networks a tool that can contribute to learning about these topics. In fact, 45% of respondents regarded the information shared by the accounts they follow as a reference for guiding their eating habits.

7.2. Criteria for evaluating nutrition information

To identify the criteria adolescents use to select the information they view on social networks, they were asked to write one or more options reflecting the aspects they consider important when deciding whether to follow a nutrition-related profile. The most common responses were: (1) that the person is a professional, referring to individuals with academic training, ongoing education through courses and workshops, and use of scientific evidence, who provide objective guidance to users who choose to follow them and share their content; (2) that the person appears to know a great deal, referring to people who create informative content and communicate confidently on social networks and who may promote products such as sportswear or supplements and provide nutrition advice without necessarily having academic training; and (3) that the person has a good physique, referring to figures who fit prevailing beauty stereotypes, with stylized bodies achieved through cosmetic surgery, exercise, healthy eating, and/or supplements intended to reduce fat mass and increase muscle mass (Figure 3).

Figure 3. Adolescents' criteria for following a nutrition-related profile



Source: Prepared by the authors based on survey data.

The main reason adolescents decide to follow nutrition professionals or influencers who discuss nutrition on social networks is an interest in caring for their health and body image, as well as the impression that these individuals know a great deal and have an attractive physique. A visual review of the posts from profiles mentioned by the students found recommendations for products that may have negative health effects. In addition, food-related posts can trigger emotional distress among young people and may contribute to a desire to modify eating behavior and body image because of the beauty stereotypes disseminated on social networks. These findings also showed that adolescents were confused about who is and is not a health professional.

Other common criteria for selecting a nutrition-related profile were: having many followers, since a defining feature of an influencer is having thousands or millions of social media followers, which increases popularity among users; exercising and eating well, as a basis for a healthy lifestyle, with

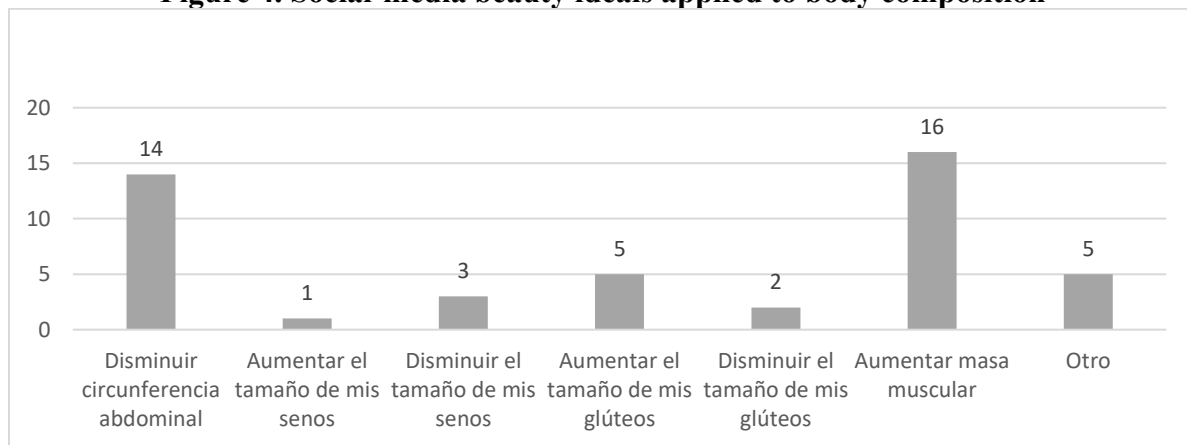
these aspects linked to the body image of the person sharing the information and to prevailing beauty stereotypes; and the recipes they share. This latter variable is related to the menus that make up “diets,” since many nutrition influencers post the type of diet they follow and may thereby serve as a guide for users seeking to adopt the same lifestyle.

7.3. Beauty stereotypes and nutrition-related profiles followed on social media

The physical changes experienced during adolescence can lead to concern about maintaining or achieving an appearance that makes adolescents feel attractive, sometimes altering their perception of body image through what they observe in digital media. Thus, 91% of respondents stated that the posts they view on social networks influence the way they perceive their body image, particularly because these platforms frequently display curvaceous bodies and cosmetic enhancements. Today, many public figures and/or influencers undergo cosmetic procedures to achieve slim yet curvy bodies, increase the size of their buttocks or breasts, and make other changes to different parts of the body.

Beauty stereotypes “constitute a social reality; they are inherited and reproduce prejudice” (García & Hernández, 2022, p. 80). Among the adolescents surveyed, 51.4% reported wanting to change some part of their body to fit the beauty ideals they observe on social networks. The most common response was increasing muscle mass, followed by reducing abdominal circumference (Figure 4).

Figure 4. Social-media beauty ideals applied to body composition



Source: Prepared by the authors based on survey data.

A wide variety of information sources can be found on social networks. Some professionals use their accounts to promote accurate information, reach more people to whom they can offer their services, and gain visibility. By contrast, some influencers have no academic training and share information without scientific support, creating misinformation and confusion among users. They may also compromise users’ health by selling products that do not meet appropriate conditions for use or consumption and by promoting or disseminating meal plans that are not structured according to individuals’ energy and nutritional requirements. The following quotation illustrates how this type of influencer may operate:

Silvia, a fashion influencer, often works for Garnier in many of its campaigns promoting its products. She does not generate the possible “rejection” that may occur when a brand sells a product directly; instead, it is perceived as personal advice from her. As noted above, this is considered more credible. Even so, she is often criticized for failing to state that the content is advertising or even for being “dishonest,” since many users believe that influencers may claim to like products in exchange for money (Bellido, 2018, p. 21).

When the adolescents surveyed were asked which food-related profiles they most frequently followed on social networks, several names appeared repeatedly, including Leana Deeb, Carlos Belcast, and Andoni. Investigation of these figures indicated that they do not have academic training related to nutrition. For example, Leana Deeb posts content such as gym workout routines and has her own digital application through which users can access training plans for a fee; she is also shown cooking and displaying the supplements she consumes. Carlos Belcast is an influencer who creates content displaying his musculature and gym training, and his social media accounts include a link through which followers can access sportswear and the supplements he promotes. Similarly, Andoni displays his musculature in his posts and also has a digital application through which users can access his training routines. He provides nutrition advice despite there being no indication that he is a professional in the field and promotes supplements and products such as pre-workout formulas.

Supplement use remains controversial and is common among people who attend gyms with the aim of increasing muscle mass.

Protein supplements are the most frequently used by high-performance athletes because they are believed to increase muscle mass by preventing protein catabolism during physical activity. However, it has been proposed that their consumption may cause chronic kidney failure by increasing glomerular pressure and promoting hyperfiltration (Pomerantz et al., 2016, p. 42).

Anyone who decides to consume a supplement should do so with appropriate nutrition counseling from a qualified professional. Individuals should also act responsibly and obtain information about correct use and possible adverse effects so that they can make free and informed choices about what they consume.

The foregoing suggests that many of these profiles—which, notably, are among those most frequently followed by adolescents—are primarily intended to sell products or promote brands by presenting supposedly “healthy” lifestyles. They use their image to monetize content and persuade followers about what they should do or consume in order to achieve an appearance similar to that portrayed on social networks.

7.4. Nutrition education versus information on social networks

Regarding the nutrition information adolescents received at their educational institution, most respondents initially reported being able to identify the characteristics of a healthy diet as well as macro- and micronutrients (carbohydrates, lipids, proteins, vitamins, and minerals), all of which are necessary for proper development and bodily functioning. However, when students were asked to write what they understood by these concepts, it became clear that the definitions were not well understood, as they were written incorrectly or incompletely. It should be noted that each of these concepts had been addressed in classes within the “Training for Work in Hygiene and Community Health” program.

For example, the concept of “diet” refers to the food a person consumes daily, whether healthy or not. In this regard, 62.8% of adolescents did not have a clear understanding of the concept and interpreted “diet” as a special eating plan intended to achieve a specific goal. They also reported learning through social networks about intermittent fasting and gluten-free diets and said they knew family members, friends, or influencers who followed these dietary regimens.

A total of 25.7% of respondents reported following a “diet” they had seen on social networks, and 71.4% stated that they had made some change in their eating behavior to achieve their desired physical appearance, mainly by stopping the consumption of high-fat foods. As part of the curriculum, students had been taught about the characteristics of lipids and their function in the body; 45.7% correctly identified foods containing lipids and understood that they are necessary for hormone synthesis and the absorption of fat-soluble vitamins. Likewise, 82.8% recognized the importance of carbohydrates, and 45.7% correctly identified the concept of proteins and how they contribute to cellular metabolism.

Regarding micronutrient knowledge, 42.8% correctly answered that vitamins contribute to cellular functioning and development, while 54.2% did not know the importance of minerals in the body. In addition, 45.7% did not identify the characteristics of a healthy diet, 40% only partially recognized the Plate of Good Eating, the food groups it contains, and its purpose, and 42.8% did not know the measures required to maintain hygiene in food handling and preservation.

Finally, physical training is necessary as a complement to a dietary regimen when pursuing certain goals. Students were therefore able to select from several options the type of physical activity they performed. A total of 45.7% reported attending a gym between two and five days per week. This finding is related to the content they view from the influencers they follow and to the goals they set for modifying their body image.

8. CONCLUSIONS

Adolescents reported using social networks to stay connected with friends and obtain information of all kinds, emphasizing interaction with other users and communication. Because these media contain many different sources of information, respondents stated that they followed profiles of nutrition professionals because they were interested in caring for their health. However, when they named the accounts they followed, it was found that these accounts did not belong to professionals in the field but rather to fitness trainers or public figures who had gained popularity by sharing gym routines and who now promote sportswear brands and supplements and even provide nutrition advice without having the relevant academic training.

These findings are concerning because adolescents may be influenced by inaccurate information shared through these media. In addition, weight training, as practiced in gyms, should progress gradually and be accompanied by appropriate guidance and supervision so that exercises are performed correctly and musculoskeletal injuries are prevented. Some adolescents reported emotional distress associated with posts displaying beauty stereotypes and expressed a desire to modify their body composition to fit these ideals and feel socially accepted.

It is therefore important for society to pay attention to content published by qualified professionals and, even then, to verify information by consulting scientifically supported sources. Professionals

who create videos and other social media content should also be encouraged to present it in an entertaining and engaging manner for young people, so that objective information can compete effectively for their attention; overly technical terminology may be difficult to understand and may even be perceived as boring.

Regarding the nutrition learning that students were expected to acquire through their vocational training, the findings showed that they did not have sufficient knowledge of basic concepts. When asked about relevant topics covered in class, their answers were only partially correct, suggesting that they had not fully acquired or were not applying the nutrition education provided within the “Training for Work in Hygiene and Community Health” curriculum.

Several aspects should therefore be considered. Teachers can reconsider the teaching-learning strategies used in class in order to achieve meaningful learning that contributes to habit formation. Students, for their part, should pay attention to curriculum content, complete assigned tasks as effectively as possible, and try to relate what they learn at school to daily life in order to improve learning. Society as a whole should also act responsibly regarding what is viewed, published, and shared through social networks, avoiding misinformation and protecting both physical and emotional health.

A relationship was also found between what students view on social networks and their perceptions of body image. Students reported wanting to increase their muscle mass to fit beauty stereotypes disseminated through these digital media and also reported attending the gym regularly, thereby reproducing the patterns they observe and assigning importance to posts by the influencers they follow.

Taken together, the findings show that adolescents enrolled in the “Training for Work in Hygiene and Community Health” program do not have sufficient criteria to select accurate nutrition information from what they view on social networks. This may be because they do not identify the characteristics of a qualified nutrition professional or because they pay greater attention to physical appearance and follower counts, making them more susceptible to influence and to wanting to achieve bodies similar to those of the influencers they follow. These findings may be related to insufficient food and nutrition education.

9. REFERENCES

- Asociación de Internet Mx. (2022). 18° Estudio sobre hábitos de personas usuarias de Internet en México 2022. <https://acortar.link/SiW8QM>
- Asociación de Internet Mx. (2023). 19° Estudio sobre los hábitos de usuarios de internet en México 2023. <https://www.asociaciondeinternet.mx/estudios/habitos-de-internet>
- Balarezo, M. & Llivichuzca, D. (2015). Las redes sociales como nueva opción de promoción de las microempresas en la ciudad de Cuenca [Tesis de Licenciatura]. Universidad de Cuenca. <http://dspace.ucuenca.edu.ec/bitstream/123456789/23958/1/REDES%20SOCIALES.pdf>
- Bellido, S. (2018). El marketing de influencers [Trabajo final de grado]. España: Universidad de Gerona. <https://acortar.link/pmU11D>
- Bermejo, E. (2021). Impacto de la red social Tik Tok: influencia como medio de comunicación desde el confinamiento por COVID-19 [Trabajo de fin de grado]. Universidad de Sevilla. <https://hdl.handle.net/11441/126185>

- Brown, L. & Challem, J. (2007). Vitaminas y minerales esenciales para la salud. Ediciones Nowtilus, S.L. <https://www.nowtilus.com/descargas/fragmentovitaminasyminerales.pdf>
- Bueno, M. (2020). Imaginarios sociales y hábitos de alimentación influenciados por redes sociales en adolescentes en edades entre 14 y 16 años [Tesis de grado]. Cartago Valle: Universidad Antonio Nariño. <https://acortar.link/sySwL2>
- Córdova, J., Barriguete, J., Lara, A., Barquera, S., Rosas, M., Hernández, M., León, M. & Aguilar, C. (2008). Enfermedades crónicas no transmisibles en México: sinopsis epidemiológicas y prevención integral. Salud Pública de México, 50(5), 419-427. <https://acortar.link/27yOPX>
- Diario Oficial de la Federación [DOF]. (2013). Norma Oficial Mexicana NOM-043-SSA2-2012, Servicios básicos de salud. Promoción y educación para la salud en materia alimentaria. Secretaría de Salud. <https://acortar.link/mz7dpr>
- Dirección General de Bachillerato [DGB]. (2018). Higiene y Salud Comunitaria Programa de estudios tercero, cuarto, quinto y sexto semestres. Subsecretaría de Educación Media Superior. <https://acortar.link/s3Iyeq>
- García Villanueva, J. & Hernández Ramírez, C.I. (2022). Estereotipos de belleza: un análisis desde la perspectiva de género. GénEros. Revista de Investigación y Divulgación sobre los Estudios de Género, 29(32), 65-87. <https://revistasacademicas.ucol.mx/index.php/generos/article/view/474>
- Grupo de Educación Nutricional y de Sensibilización del Consumidor de la FAO. (2020). La importancia de la Educación Nutricional. <https://acortar.link/NwK4ma>
- Hidalgo, M. & Ceñal, M. (2014). Hablemos de... Adolescencia. Aspectos físicos, psicológicos y sociales. Anales de Pediatría Continuada, 12(1), 42-46. <https://lc.cx/p3vsXr>
- Iglesias, J. (2013). Desarrollo del adolescente: aspectos físicos, psicológicos y sociales. Pediatría Integral, XVII(2), 88-93. <https://acortar.link/Rpdmnt>
- Instituto Nacional de Salud Pública. (2018). Encuesta Nacional de Salud y Nutrición (ENSANUT). Secretaría de Salud e Instituto Nacional de Estadística y Geografía (INEGI) de México. <https://acortar.link/pz23F>
- López, M. (2020). Analizando “El plato del bien comer”. Revista de Nutrición clínica y Metabolismo, 4(1), 103-109. <https://acortar.link/YRoPqA>
- Luque, M. (2009). Estructura y propiedades de las proteínas. https://www.uv.es/tunon/pdf_doc/proteinas_09.pdf
- Morán, I., Cruz, V. & Iñárritu, M. (2007). El índice de masa corporal y la imagen corporal percibida como indicadores del estado nutricional en universitarios. Revista Facultad de Medicina de la UNAM, 50(2), 77-79. <https://acortar.link/hvdeeP>

- Pineda, S. & Aliño, M. (1999). El concepto de adolescencia. En Ministerio de Salud Pública, Manual de prácticas clínicas para la atención integral a la salud de la adolescencia. MINSAP. <https://ccp.ucr.ac.cr/bvp/pdf/adolescencia/Capitulo%20I.pdf>
- Pomerantz, A., Blachman, R., Vital, S., Berebichez, R., Aguilar, J. & Lara, D. (2016). Consumo de suplemento proteico y su posible asociación con daño renal en atletas mexicanos de alto rendimiento. *Revista Médica del Instituto Mexicano del Seguro Social*, 54(1), 42-47. <https://acortar.link/V5cRZV>
- Salazar, Z. (2008). Adolescencia e imagen corporal en la época de la delgadez. *Reflexiones*, 87(2), 67-80. <https://www.redalyc.org/pdf/729/72912555004.pdf>
- Sánchez, K., Balderas, N., Munguía, A. & Barquera, S. (2018). El etiquetado de alimentos y bebidas: la experiencia en México. <https://acortar.link/U0B1kA>
- Tenorio, K. (2021). Sobrepeso y obesidad en México: afectaciones a la salud. *En contexto*, 171. <https://acortar.link/WrBgLr>

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