



Consumption of multivitamins and minerals among youth and adults

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Abstract

Multivitamins are dietary supplements formulated with a combination of vitamins and minerals essential to promote the healthy functioning of the body. While a balanced diet is the preferred approach to obtaining nutrients, multivitamins can play a crucial role in preventing nutritional deficiencies. Widely available without a prescription, they are classified as food and are available in pharmacies and health food stores. Describe how young people and adults have their first contact with multivitamins and understand the main reasons for starting the use, the duration of supplementation and their lifestyle of the participants, which will provide insights related to consumers and nutritional supplements in general. The data used was collected by the Google Forms platform. The link to the form was published on platforms such as Instagram, WhatsApp groups and Facebook, all via sharing. Participants agreed to participate in the research by signing a term of responsibility and authorization. Their privacy has been protected, ensuring the anonymity of every individual involved. The survey revealed that the majority of the public is young, predominantly female and lives in São Paulo. Regarding the consumption of multivitamins, 56% used these supplements in the last six months, highlighting the improvement in immunity and physical performance as the main benefits. The medical indication is the main reason for the use of multivitamins. The regular practice of physical activity is common and the diet of the participants is mostly composed of minimally processed foods. It is imperative to promote not only the adequate consumption of nutrients through diet and supplementation, but also the adoption of a healthy lifestyle that includes the practice of physical exercise as an integral part of maintaining overall health and well-being.

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1. Introduction

The human body is unable to synthesize vitamins in sufficient quantities due to their organic nature, which makes it necessary to acquire them through diet [1.,2.]. In recent years, there has been a global increase in the use of dietary supplements, with consumption patterns varying by sex, age, disease prevention, and nutritional deficiencies [3.]. Recent nationwide surveys have indicated an increase in the prevalence of dietary supplement consumption among adults and children over the past decade [4.].

However, there remains a significant gap in the knowledge about the characteristics of supplement users [4.]. The motivations for consuming these supplements are diverse, including protection against diseases, increasing energy, physical performance, and treatment for specific health problems [3.,5.,6.]. Among the many population groups, multivitamin supplements, alone or in association with minerals, are the most consumed [7.].

With the emergence of the COVID-19 pandemic, there has been a growing recommendation for nutrition and supplementation, widely disseminated through social media, among family, friends, and even some healthcare professionals. This trend was intensified by the absence of specific medical treatments and vaccines available for the coronavirus. As a result, many individuals, especially those with a higher level of education, including medical professionals, adopted the consumption of zinc and vitamin D supplements. This reflected an increased awareness of the importance of disease prevention among these individuals [8.,9.].

This study aims to investigate the reasons for the use of dietary supplements in adults and young people, as well as to extract insights into the profile of consumers. Behavioral analysis aims to understand the reasons that lead these individuals to adopt the habit of consuming dietary supplements.



2. **Methodology**

A cross-sectional study was conducted with a sample of 196 participants, comprising adults and young people, with the objective of investigating the initial contact with the consumption of multivitamins and minerals. This study focused on participants' opinions regarding the influence, knowledge, lifestyle, and use of these supplements.

Data collection was performed through the Google Forms platform. The participants consented through a term of responsibility and authorization to participate in the research, guaranteeing the privacy and anonymity of all those involved. The study was approved by the Ethics Committee of Centro Universitário Faculdade de Medicina do ABC, under Opinion Number: 6.584.006. This study was conducted in accordance with the Helsinki guidelines for human experimentation, ensuring ethical standards were upheld throughout the research process.

The questionnaires were distributed on several digital platforms, including Instagram, WhatsApp and Facebook groups, in order to reach interested and knowledgeable individuals about multivitamins. The collection of responses began on September 20, 2023 and ended on November 27, 2023.

Data collection was performed in duplicate by two teams, each composed of two independent reviewers. Subsequently, all data were transferred to an Excel® spreadsheet and reviewed by two researchers. Discrepancies in the extracted data were resolved by a third reviewer.

The questionnaire covered several aspects, including sex, age, socioeconomic factors such as income and education level, as well as personal opinions on the use and recommendation of supplements, potential health problems, dietary habits and hobbies. The questionnaire consisted of 21 exploratory questions aimed at contextualizing the knowledge of the participants and their level of interaction with the theme, of which 17 were mandatory and 4 optional. The results were presented in the form of graphs and descriptive tables.



3. **Development and Discussion**

3.1. Socioeconomic analysis

Of the survey participants, 73% are female, while 27% are male, as illustrated in 1, indicating a predominance of females. It is also observed that the majority of participants (191 out of 196) reside in the state of São Paulo, reflecting the significant representativeness of this region in the sample. Additionally, 4 participants are from Paraná and 1 from Goiânia. Most participants are found to be in the age group of 18 to 24 years (47%), followed by the age group of 25 to 34 years (35%). The age group of 45 to 54 years represents 8%, while those aged 55 to 65 years constitute 3%.

Regarding the presence of medical insurance among the research participants, 82% said they had access to this benefit, while 18% of the participants do not have medical insurance and depend on the Brazilian Unified Health System (SUS).

The distribution of educational level in 1 showed a relative division, with 46% having complete higher education and 42% having incomplete higher education. Only 10% of participants had only completed high school, while < 3% had not completed this educational stage.

The salary income among the participants revealed a significant variety, with 27% of them having an income greater than R\$6,000.00. Secondly, rents between R\$2,000.00 and R\$3,000.00 represented 16% of participants. Following, the income ranges from R\$1,320.00 to R\$2,000.00 and from R\$3,000.00 to R\$4,000.00 registered 15% of participation each. Income below R\$1,320.00 was indicated by 14% of participants, while income between R\$5,000.00 and R\$6,000.00 occupied the last position, with 12% of votes.



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Table 1: Sociodemographic characteristics of participants.

Variable	Absolute Frequency (n)	Relative Frequency (%)
Sex		
Male	53	27
Female	143	73
Age Group		
18 to 24 years	92	47
25 to 34 years	68	35
35 to 44 years	14	7
45 to 54 years	16	8
55 to 64 years	4	2
65 years or older	2	1
Education		
Incomplete high school, complete or incomplete elementary school	5	3
Complete high school	19	10
Incomplete higher education	90	46
Complete higher education	82	42
Income		
< R\$ 1,320.00	27	14
R\$ 1,320.00 to R\$ 2,000.00	30	15
R\$ 2,000.00 to R\$ 3,000.00	31	16
R\$ 3,000.00 to R\$ 4,000.00	30	15
R\$ 5,000.00 to R\$ 6,000.00	24	12
> R\$ 6,000.00	53	27

Source: Data collected through Google form.



3.2. Analysis of multivitamin consumption

All research participants provided information on the duration of consumption. In 2, the most frequent period was 2 to 3 months, corresponding to 24% of the responses. About 15% indicated use for only 1 month, 14% reported consumption for 4 to 6 months, 11% claimed to use for 6 months to 1 year, while 14% claimed to consume multivitamins for more than 1 year. The other responses were concentrated among participants who never consumed multivitamins, totaling 22% of the responses.

The perceived benefits of multivitamin use were reported only by participants who had already used the supplements. The question allowed the selection of more than one answer, considering the variety of benefits offered, covering physical and internal improvements. The most commonly reported response was improvement in immunity, recording 27% of responses. Then, improvement in physical performance was observed, with 27% of responses. Mental disposition improvement received 15% of responses, followed by sleep improvement with 10% of responses, and other benefits such as skin improvement mentioned in 1% of responses. Among the responses, 20% of participants indicated that they did not notice any difference with the use of supplementation.

Table 2: Analysis of multivitamin intake patterns and consumer behavior

Variable	n	%
Duration of multivitamin usage		
1 month	29	15
2 to 3 months	47	24
4 to 6 months	27	14
6 months to 1 year	22	11
More than 1 year	27	14



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Variable	n	%
Never consumed	44	22
Total	196	100

Observed benefits of multivitamin intake^a

Physical performance	60	27
Mental disposition	33	15
Improved sleep	23	10
Improved immunity	61	27
Did not notice any difference	44	20
Others	3	1
Total	224	100

Considerations for buying multivitamins

Physician's recommendation	100	51
Pharmacist's recommendation	19	10
Cost benefit	33	17
Popular brands	12	6
Never bought	25	13
Recommendation from friend/relative	7	3
Total	196	100

Source: Data exported from Google Forms survey

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The inclusion of the question about considerations when purchasing a multivitamin was mandatory in the research. 2 shows that the most favored option was medical advice, obtaining 51% of the answers. Second, the cost-benefit criterion was chosen by 17% of participants. The pharmacist's suggestion received a 10% rate, while popular brands were mentioned by 6% of respondents. Recommendation by friends or family was mentioned by 3% of participants. Of all responses, 13% of respondents admitted to never having purchased a multivitamin.

The reasons why participants opted for the use of multivitamins proved to be quite diverse. The question was not mandatory and allowed the choice of more than one option, so the data is relative. 1 shows, mainly, the medical indication for supplementation, registering 43% of responses. Next, both immunity improvement and dietary supplementation stood out, with 32% of responses each. The desire to promote a healthier life was also an alternative indicated by 26% of participants. Other reasons that gained prominence included belief in the benefits of supplements (20%), improvements in physical performance (18%), disease prevention (17%) and the simple pleasure of taking vitamins (12%). Sleep improvement was mentioned in 12% of responses, while supplementation in conjunction with disease treatments received 8% of responses. Mood improvement was highlighted in 7% of responses. In addition, there were 3% of responses for other reasons, 2% of them related to the absence of sunlight



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exposure, 1% indicating the use of supplements to relieve menopausal symptoms and 1% related to the use of supplements after antibiotic treatment.

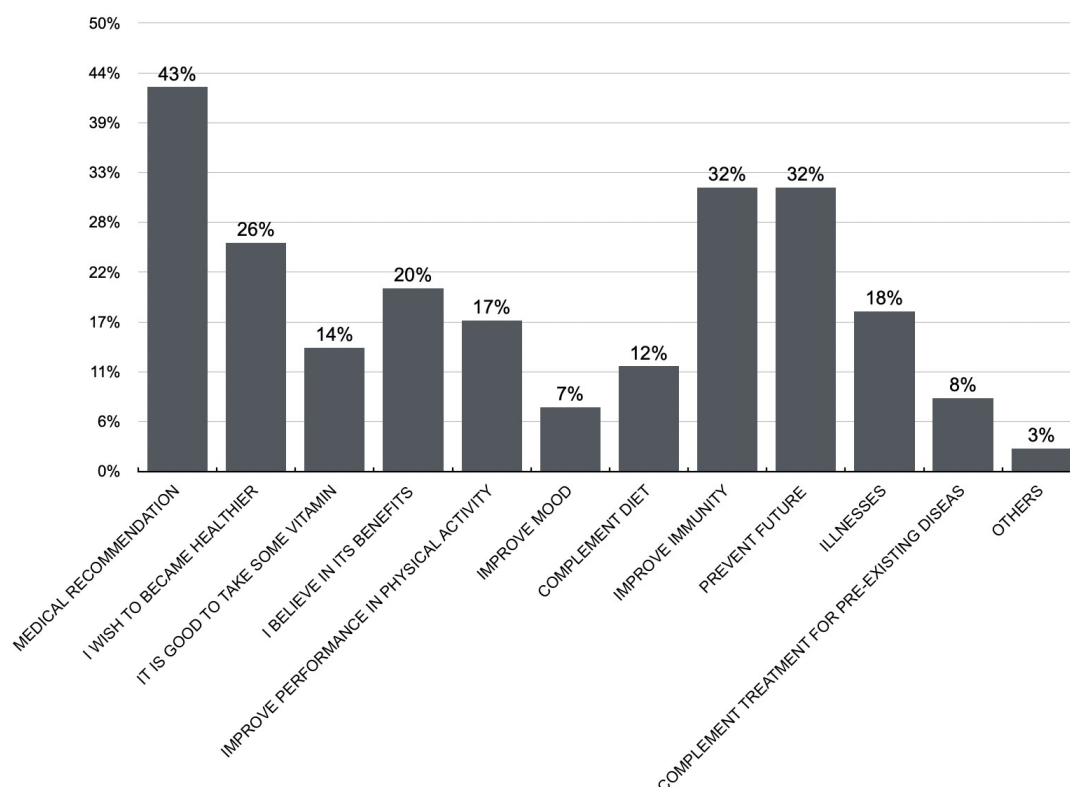


Figure 1: Top reasons participants used multivitamins.

Source: Data exported from Google form.

3.3. Overall health analysis of participants

Of the 196 participants in the research, when asked about the presence of pre-existing diseases, in 2, we observed that 76% of the answers indicated the absence of health problems, while 24% said they had some pre-existing disease. Participants who indicated having health issues were asked an open-ended (non-mandatory) question about which pre-existing diseases they had. The most common response was depression, mentioned by 28% of participants with pre-existing conditions. Second, asthma was cited by 18% of people, followed by hypertension, with 17% of responses.



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Other conditions, such as anxiety, anemia, diabetes, chronic back pain, arthritis, hypercholesterolemia, kidney disease, varicose veins, thrombosis, atopic dermatitis, and cardiovascular disease, ranged from 1 to 3 responses among participants with pre-existing diseases.

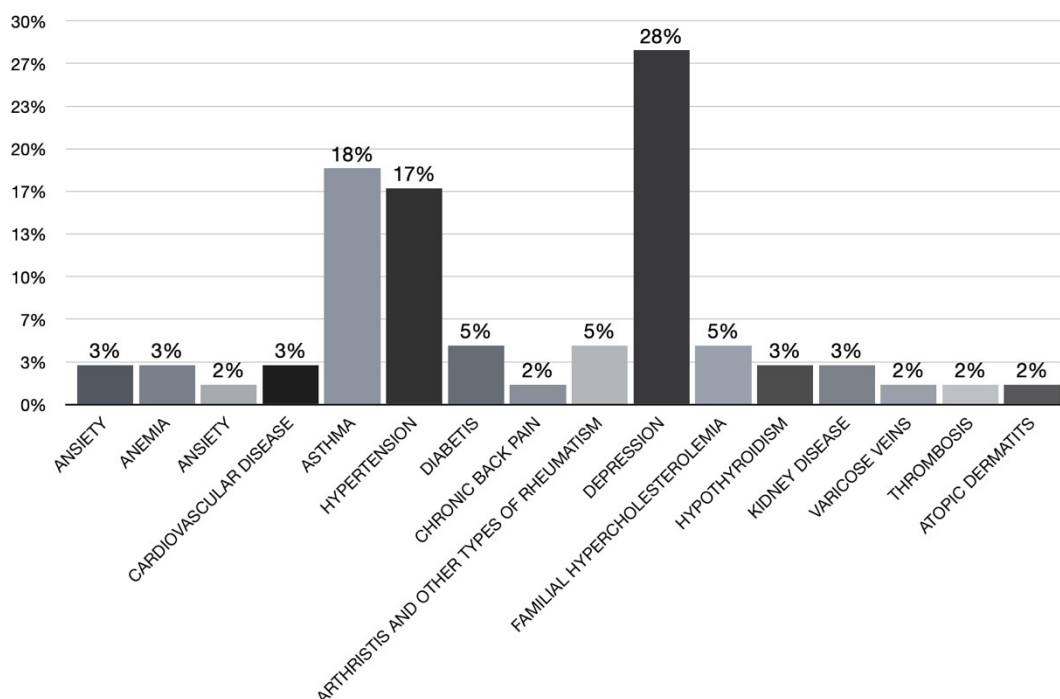


Figure 2: The main pre-existing diseases of the participants.

Source: Data exported from Google form.

When discussing whether multivitamins can prevent disease, approximately 74% tend to claim that supplementation is essential to prevent health problems. Meanwhile, about 26% of responses support the view that multivitamins lack the ability to prevent disease.

3.4. General analysis of the practice of physical activity



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The practice of activity is quite widespread among survey participants, with approximately 68% reporting that they exercise regularly. Meanwhile, about 32% of participants stated that they do not practice physical activity on a regular basis.

Participants were asked what physical activities they practiced, but it was not a mandatory question, resulting in a variety of answers. Bodybuilding was the most mentioned activity, representing 35% of the responses, and then walking, with 22%. Third, running was mentioned by 12% of participants, while swimming and cycling received 4% and 3% of responses, respectively. Soccer, volleyball and pilates practices were less mentioned, with only 2%, 1% and 1%, respectively. Other sports modalities comprised 8% of the responses, while 11% of the participants reported not practicing any type of physical activity.

Table 3: General analysis of the practice of physical activity and diet.

Variable	n	%
Main practiced physical activities		
Walking	43	22
Bodybuilding	68	35
Running	23	12
Swimming	8	4
Cycling	6	3
Soccer	4	2
Volleyball	2	1
Pilates	2	1
Others	15	8
None	21	11



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Variable	n	%
Frequency of practice of physical activity		
Every day	12	6
2 to 3 times per week	70	36
4 to 5 times per week	41	21
Once a week	15	8
Once every 15 days	8	4
Do not practice physical activity	49	25
Foods more often consumed		
Natural foods	27	14
Minimally processed foods	104	53
Processed foods	60	31
Ultra-processed foods	6	3

Source: Data collected through Google form.

The frequency of physical activity was investigated as a mandatory question for all survey participants, 8% of participants reported performing daily physical activities. The most common response was physical activity 2 to 3 times a week, chosen by 36% of participants. Then, 21% indicated practicing activities 4 to 5 times a week. The weekly practice of physical activity once was mentioned by 8% of respondents, while the practice in every 15 days received 4% of responses. Regarding the lack of physical activity, 25% of respondents reported not exercising.

The association between physical activity and the use of multivitamins was also investigated. Approximately 74% of participants reported not using multivitamins in



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conjunction with physical activity. Only 26% of participants reported taking supplementation associated with multivitamins.

3.5. General analysis of the diet of the participants of the survey

When we asked about the most frequent type of food among all participants, we found that minimally processed foods were mentioned more frequently, as shown in 3, totaling 53% of the responses. Second, with 31%, are processed foods. Consumption of natural foods accounted for 14% of responses, while only 3% of participants reported consuming ultra-processed foods.

The presence of dietary supplementation was questioned among participants who consume ultra-processed foods daily, only 24% of the participants take supplementation to complement their diet and 76% of them do not use multivitamins to complement their diet.

3.6. Discussion

Studies of dietary supplement consumption in the population have consistently revealed a high utilization rate of these products, evidenced by the sales figures driving a multibillion-dollar global industry [10.,11.,12.]. The analysis of the socioeconomic profile of the participants revealed a predominance of females, a common trend in research related to health and well-being, attributed to the greater willingness of women to participate in these studies. This gender pattern aligns with Brazilian national health surveys, which consistently show higher healthcare-seeking behavior among women, potentially influenced by cultural factors such as traditional caregiving roles and greater health awareness promoted through maternal health programs [24.,25.]. In addition, the age distribution of participants, with a significant concentration in the youth group, can influence lifestyle choices and consumption habits, particularly in the post-COVID-19 era where health consciousness has increased significantly among younger populations [25.]. The diversity in terms of education and salary income reflects the representativeness of the sample, offering insights into different socioeconomic strata,



though it's important to note that supplement accessibility remains limited by economic factors in developing countries like Brazil [27.].

Studies indicate that the practice of self-medication is more prevalent among women and tends to increase with age, being influenced by maternal education, parental factors, family history and socioeconomic status [13.]. This pattern may be particularly pronounced in Brazil, where over-the-counter supplement availability and aggressive marketing campaigns target female consumers, often promoting unrealistic health benefits without adequate scientific support [28.,29.].

Regarding the intake of multivitamins, the research revealed a division among the participants, with a considerable portion using these supplements in the last six months. This result may indicate a growing concern with health and well-being, as well as a search for solutions to improve the quality of life, though it's crucial to examine whether this trend represents evidence-based health decisions or marketing-driven consumption. The most commonly perceived benefits, such as improved immunity and physical performance, corroborate the belief in the effectiveness of multivitamins as a complement to a healthy diet. However, systematic reviews have shown mixed evidence for these perceived benefits in healthy populations, suggesting that many users may be influenced by marketing claims rather than scientific evidence [30.,32.].

Research indicates that dietary supplements are used to ensure adequate nutrient intake, stimulate growth and weight gain, increase the supply of vitamins and minerals, protect against flu and infections, compensate for insufficient fruit and vegetable intake, and are generally more affordable than conventional foods [14.]. This economic rationale may be particularly relevant in the Brazilian context, where fresh produce costs have increased significantly, making supplements appear as cost-effective alternatives despite questionable nutritional equivalence [32.].

Numerous evidences suggest that food selection or availability does not always ensure adequate intake of necessary vitamins and minerals. In these situations, supplementation may be essential to achieve adequate intake. This is one of the most common reasons for the use multivitamins. However, this reasoning requires critical



examination, as Brazilian dietary guidelines emphasize that a varied diet typically provides adequate nutrients for healthy individuals, and indiscriminate supplementation may lead to nutrient imbalances or mask underlying dietary inadequacies [33.,34.]. In addition, increased sense of well-being, reduced mental and physical fatigue, and improvements in psychological and cognitive functions are often reported as motivations for supplement consumption [15.,16.,17.]. These subjective benefits, while important to users, may be influenced by placebo effects and require careful interpretation in clinical contexts [35.].

Studies on supplementation with multiple vitamins and minerals can be complex to interpret due to the interaction between nutrients and the individual variables of the participants. However, these studies are clinically significant and offer important insights into health and well-being. Isolating the effect of a single nutrient is challenging, as many interact with each other and can have synergistic or antagonistic effects on the human body [15.]. This complexity is further compounded in the Brazilian population due to genetic diversity and varying baseline nutritional status across different regions [36.]. Macro and micronutrient deficiencies are linked to the development of several diseases, although it is difficult to directly relate the pathological consequences of these deficiencies to their bodily functions [18.,19.,20.].

Vitamin D and calcium supplementation is largely supported by evidence to improve bone health and prevent fractures [20.,Erro: Origem da referência não encontrada]. Healthcare professionals recommend daily doses of calcium (1,200 mg) and vitamin D (1,000 IU) through dietary sources and/or supplements [Erro: Origem da referência não encontrada]. This recommendation is particularly relevant in Brazil, where vitamin D deficiency is prevalent despite abundant sunlight, often due to urban lifestyle factors and skin protection practices [37.]. Vitamin B12 is crucial for cognition, nervous system health, vascular health, and red blood cell production, with deficiency increasing with age, especially among the elderly [Erro: Origem da referência não encontrada]. Difficulty in digesting the natural form of vitamin B12 present in animal proteins is the main cause of its deficiency [Erro: Origem da referência não encontrada].



In the Brazilian context, B12 deficiency may also be influenced by the growing vegetarian and vegan population, particularly among younger demographics represented in this study [38.].

Vitamin C, a significant antioxidant, is essential for maintaining health and acts as a therapeutic supplement in various clinical conditions. There is a decline in the plasma concentration of vitamin C after surgery, with demand increasing in the postoperative period [23.]. The medical indication was the main reason for the use of multivitamins, highlighting the importance of professional guidance. However, our findings suggest that many participants also use supplements without medical supervision, raising concerns about potential interactions and inappropriate dosing [39.]. In addition, the low association between physical activity and multivitamin intake suggests that participants do not consider supplementation part of their exercise routine, which contrasts with international trends where athletic populations show higher supplement use [9.,40.].

Studies indicate that pharmacists, parents and friends are the main sources of information for self-medication, used to treat headaches, colds and menstrual problems [12.]. This pattern of informal health advice is particularly concerning in Brazil, where pharmaceutical regulation of supplements is less stringent than in developed countries, potentially exposing consumers to products of variable quality and efficacy [41.]. Most participants reported having no pre-existing diseases, indicating a relatively healthy sample. Those with specific health conditions are more likely to seek ways to improve their health, including the use of multivitamins. This finding raises questions about the appropriateness of supplement use in healthy populations and whether resources might be better directed toward improving dietary quality [42.].

The association between the kind of diet and the use of supplements reveals that participants who consume ultra-processed foods do not usually take supplementation, suggesting a lack of awareness about their importance in an unbalanced diet. This paradoxical finding indicates that those who might benefit most from supplementation



(due to poor dietary quality) are least likely to use it, while those with better diets are more likely to supplement, potentially creating a "worried well" phenomenon [43.].

4. **Final Considerations**

Although the use of multivitamins is understood to be important to prevent diseases, assist in the diet and improve performance in physical activity for most participants, it is observed that the use of supplements is maintained for at least 2 months, which indicates that use ends up being "acute" for most of the research participants.

In this way, the use of multivitamins is integrated into the participants' routine, adapting to their lifestyle and specific needs, which may or may not be related to health. This practice can result in benefits such as improved immunity, increased physical performance and sleep quality, among others.

It is concluded that the medical recommendation was one of the main reasons for the purchase of supplements and the duration of use suggests that the majority of participants resorted to multivitamins to meet specific health needs.

Based on the results obtained through the research, the importance of a balanced diet in the prevention of nutritional deficiencies is evident, especially among young people and adults. Lifestyle plays a crucial role in the adoption of these supplementation habits, with physical activity being a significant indicator in this context.

This study contributes to the growing body of literature on dietary supplement consumption in Brazil, highlighting the need for evidence-based approaches to supplementation that prioritize dietary quality while recognizing the potential role of targeted supplementation in specific populations. The findings support the development of more nuanced public health recommendations that consider individual lifestyle factors, health status, and socioeconomic circumstances in guiding supplementation decisions.

The research emphasizes that while multivitamins may serve important roles in addressing specific nutritional needs, they should complement, not replace, a balanced



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and varied diet. Healthcare professionals and policymakers should work collaboratively to ensure that supplementation practices are grounded in scientific evidence and tailored to individual health requirements, ultimately promoting optimal nutritional status and public health outcomes.

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