



**ERASMUS UNIVERSITY ROTTERDAM**

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**What is the Consumer Behavior of  
Consumers Aged Between 18- and 30-Years  
Old Buying Fitness Supplements?**

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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam

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## Executive Summary

Fitness supplements are designed to provide energy and aid endurance before or throughout a workout, or to enhance muscle repair, recovery, and growth (Harvard Chan School of Public Health, 2023). In recent years, these supplements have become increasingly popular, as the global market for those supplements has witnessed a steady rise in its valuation (PR Newswire, 2017). The fitness supplement industry is expected to continue growing as well, as it was valued at 44.43 billion U.S. dollars in 2021 and is expected to almost double its value by 2030 (*Global sports nutrition & supplement market 2030 | Statista, 2022*).

People aged between 18 and 30 years old, which will sometimes be referred to as young adults for the remainder of this thesis, are the primary target market for companies offering fitness supplements. According to Goston and Correia (2010), majority of fitness supplements are consumed by people aged 30 or under. Young adults have reported to be more likely to make use of supplements as an alternative method of improving their health and appearance (Hoyte et al., 2013; Pasiakos et al., 2015). Thus, the central research question has been prepared as follows:

*“What is the consumer behavior of consumers aged between 18- and 30-years old buying fitness supplements?”*

To answer this question, the following theoretical and empirical sub-questions will be answered.

Theoretical sub-questions:

1. What is the consumer behavior of consumers aged between 18- and 30-years old?
2. What is the consumer behavior of fitness supplement users?
3. What are the opportunities in the fitness supplement industry?
4. What are the threats in the fitness supplement industry?
5. What is the main purchase channel of the fitness supplement industry?

Empirical sub-questions:

1. What influences the consumption of fitness supplements for users aged between 18- and 30-years old?
2. How is the information search process for fitness supplements conducted by consumers aged between 18- and 30-years old?
3. What influences the purchase process for consumers aged between 18- and 30-years old buying fitness supplements?

4. What is the most used purchase channel for consumers aged between 18- and 30-years old buying fitness supplements?

The Literature Review illustrates that young adults' brand loyalty has regressed when compared to older groups. Additionally, this age group has started doing more of their shopping online. Moreover, the most consumed fitness supplements for this age group are reported to be supplements rich in protein. Regarding fitness supplement users, past literature suggests they have unrealistic expectations from these fitness supplements. One of the causes of this are the unprofessional information sources they conduct their information from. Furthermore, from past findings it became evident that convenience, self-image, and social influence are some of the important factors for fitness supplement use.

To gain further insights to answer the central research question, research will be conducted and based around the following hypotheses:

- H1: To what extent do people between 18- and 30-years old use fitness supplements?
- H2: Where do people between 18-and 30-years obtain information from regarding fitness supplements?
- H3: Which factors play a role in choosing certain brands of fitness supplements?
- H4: Where do people between 18- and 30-years old buy their fitness supplements from?

The empirical research was conducted by gathering primary data from 309 respondents through an online survey and analyzing it with the software SPSS. Significant conclusions for each hypothesis have been reached (See Chapter 4 for more details).

Overall, it was proven that during the information search process, consumers commonly conduct the Internet, social media, and close relatives. Regarding the purchase process, price and previous experiences with the brand impact this process. Other factors that may impact the process are reviews, quality, and taste. Moreover, it was concluded that the most frequently used purchase channel for fitness supplements was online. At last, convenience, provision of energy, and the enhancement of muscle recovery or growth are all important factors for someone's consumption of fitness supplements, On the other hand, self-image is an unimportant factor for the consumption of fitness supplement according to the empirical research, which is in contrast with the findings from the Literature Study.

Finally, it can be concluded that the type of fitness supplement consumed influences the weekly supplement intake, as pre-workout and creatine monohydrate users consume significantly more than the other groups.

## **1. Introduction**

### **1.1 Relevance of the Subject**

Fitness supplements have become increasingly popular, as the global market for those supplements has witnessed a steady rise in its valuation (PR Newswire, 2017). The global fitness supplement industry was valued at 44.43 billion U.S. dollars in 2021 and is expected to almost double its value by 2030 (*Global sports nutrition & supplement market 2030 | Statista, 2022*). According to Goston and Correia (2010), majority of fitness supplements are consumed by people aged 30 or under. Young adults have reported to be more likely to make use of supplements as an alternative method of improving their health and appearance (Hoyte et al., 2013; Pasiakos et al., 2015). They form a key segment for supplements not only in terms of the market size, but also in terms of their lifestyle and dietary habits. In this context, to completely understand the popularity of supplement use, young consumers are ideal candidates as they are the biggest demand drivers for health supplements (Evans, Ndetan, Perko, Williams, & Walker, 2012). Therefore, researching this reference group and learning about the factors that influence the decision-making process for this group, is important. The aim of this document is to create a larger insight into those factors and their magnitude.

### **1.2 Central Research Question and Sub-Questions**

This paper will aim to determine the behavior of consumers in the decision-making process for fitness supplements, more specifically those who are either in their late teens or in their twenties. Hence, the central research question is stated as follows:

*“What is the consumer behavior of consumers aged between 18- and 30-years old buying fitness supplements?”*

To answer this research question, the following theoretical and empirical sub-questions are tackled first.

Theoretical sub-questions:

1. What is the consumer behavior of consumers aged between 18- and 30-years old?
2. What is the consumer behavior of fitness supplement users?
3. What are the opportunities in the fitness supplement industry?
4. What are the threats in the fitness supplement industry?
5. What is the main purchase channel of the fitness supplement industry?

Empirical sub-questions:

1. What influences the consumption of fitness supplements for users aged between 18- and 30-years old?
2. How is the information search process for fitness supplements conducted by consumers aged between 18- and 30-years old?
3. What influences the purchase process for consumers aged between 18- and 30-years old buying fitness supplements?
4. What is the most used purchase channel for consumers aged between 18- and 30-years old buying fitness supplements?

### **1.3 Possible Ethical Research Issues**

Even though the survey software Qualtrics and data analyzing software SPSS are proven to be reliable platforms, using a third-party company to process and manage research participant data could possibly be an ethical issue. Furthermore, fitness supplements do not raise any crucial ethical issues as it does not hide any messages and people could access all public knowledge needed about the subject if they wanted to.

### **1.4 Possible Research Limitations**

Firstly, the sample used in this research may not be an ideal representation of the whole young adult consumer population that use fitness supplements as the survey gathered 208 relevant responses for this research, while the relevant consumer population in the author's local country is already approximately 750.000 (CBS Statline, 2023; RIVM, 2022). Secondly, this thesis has been prepared within the timeline of two months, which has caused some time constraint issues for the research.

### **1.5 Structure of the Thesis**

This thesis includes four sections other than Introduction: Literature Study, Research Methodology, Research Outcome, and Conclusions & Recommendations.

Chapter 2, Literature Study, examines past research conducted on topics such as consumer behavior and the fitness supplement industry. The aim of this chapter is to investigate the answers to the theoretical sub-questions mentioned priorly, and to present hypotheses that are tested further during the research. In total, 35 different academic papers have been examined and utilized for this research, which were picked diligently, taking into consideration their publishing dates, number of times they were cited, the journals they were on, and their relevance to the subject.

Chapter 3, Research Methodology, describes the details of the survey preparation process, the distribution methods of the survey to maximize the validity and size of the sample. Furthermore, it explains the techniques used to analyze the collected data, more specifically the software and statistical tests that are used to conduct analysis on the survey results.

Chapter 4, Research Outcome, demonstrates the data gathered through the survey and the outcomes of the statistical tests. The relevant parts of these results are interpreted and translated into a more practical language. Moreover, this chapter aims to provide statistically significant answers to the hypotheses, which are stated at the end of the Literature Review. This section includes relevant tables and figures to support the explanations, whilst the raw data and more detailed analysis results are included in the Appendix.

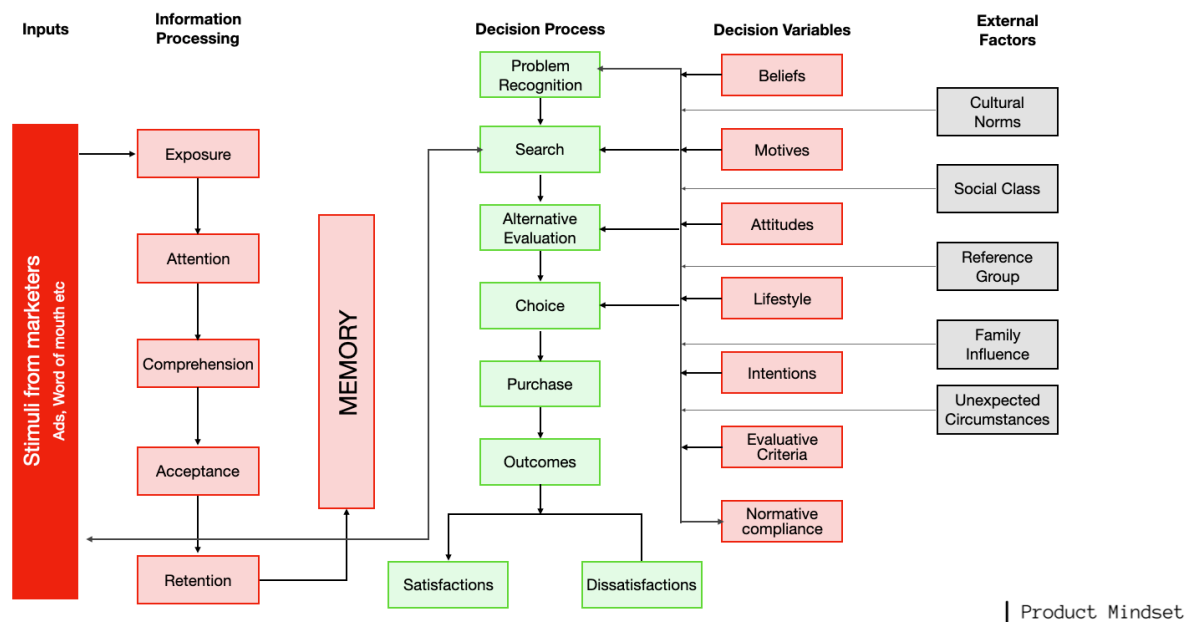
Chapter 5, Conclusions & Recommendations, presents and compares the key findings of the Literature Review and the Research Outcome. In addition, the empirical sub-questions and central research question will be answered in this part. Lastly, the research limitations and recommendations on how these conclusions can be used for marketing in the fitness supplement industry and what sort of further research is needed in the academic world. There is also the personal reflection of the researcher at the end.



## 2. Literature Review

### 2.1 Consumer behavior consumers aged between 18- and 30-years old

One of the key concepts in this subject is consumer behavior, defined as those actions directly involved in obtaining, consuming, and disposing of products and services, including the decision processes that precede and follow these actions (Engel, Blackwell and Miniard, 1995). The decision process can be described as followed: need recognition followed by a search of information both internally and externally, the evaluation of alternatives, purchase, post-purchase reflection, and finally, divestment (Solomon, Russell-Bennett, & Previte, 2012). The Engel Kollat Blackwell Model of Consumer Behavior illustrated in Figure 1 includes the explanation to this decision process.



**Figure 1.** Illustration of the Engel Kollat Blackwell Model of Consumer Behaviour including the different steps: information input, information processing, decision process and variables and factors affecting it (Product Mindset’s Newsletter, 2022).

As the primary target market for fitness supplement users is the segment of 18- to 30-year-olds (Goston and Correia, 2010), it is important to learn more about certain characteristics of this age group regarding consumer behavior. Regarding online shopping, an experiment around college students by Childers et al. (2001) reveals that immersive, hedonic aspects of the new media are important predictors for online shopping attitudes. This is supported by a survey around college students by Cowart and Goldsmith (2007), as they also state that hedonistic shopping is positively correlated with online apparel shopping. Other factors that were positively correlated with online apparel shopping are consciousness, impulsiveness, and brand loyalty. Especially the latter raises questions about whether this is an important factor for online fitness supplement shopping as well.

Regarding brand loyalty, Generation Z, which is known for the generation of people born between 1997 and 2012 (Dimock, 2019), are less brand loyal than previous generations (Vision Critical, 2016). Generation Z is one of the best representations of the researched age span of young adults, as they are currently aged from 10 to 26 years old, and therefore may provide interesting insights that are applicable for the researched age group as well. Generation Z express themselves through their shopping habits and prefer to engage with brands that reflect their current or aspirational self-concept (Ismail et al., 2021).

Continuing about brand loyalty and Generation Z, this generation has developed evolved shopping behavior since the beginning of the COVID-19 pandemic. Just under 60% of Generation Z online shoppers in the United States reported they became less loyal to brands since the beginning of the crisis. Additionally, more than 60% of this group reported that they now have less patience for poorly functioning websites when buying online, leading to many abandoning their purchase or leaving a negative review (Statista, 2023b). The COVID-19 pandemic also effected consumer behavior among young adults in other ways. Results from a widespread survey among young adults post COVID-19 in the Netherlands revealed that a third of respondents would purchase a non-essential item immediately if they came across one with a low price. About a third of respondents also stated they were willing to spend more money on convenience. Lastly, a significant portion of respondents showed their preference for brands that dealt with the COVID-19 crisis in an ethical manner, or for their intention to purchase locally sourced products (Statista, 2022a). A survey conducted in the United Kingdom among young adults supports the revealed preference of this age group for brands that have a high social awareness, as the common stated answer to the question: "What makes a great brand?" was 'ethics and politics'. 'Aesthetics' also proved to be an important factor when it comes to brand perception. However, a brand's affordability and trendiness were much less important to this age group (Statista, 2023a).

Another notable characteristic for adults under 30 years old is their increased use of social media, when compared to older groups (Atske, 2022). Their outstanding use of social media also has consequences for their consumer behavior, as social media app usage increases the amount of online shopping app visits (Yoon et al., 2022). This statement is supported by Zhang et al. (2017), which concludes that consumers exposed to product-related social media content for a longer period will experience a heightened interest in shopping. A global study also revealed that younger adults were more likely to use social media as a way to access news (Statista, 2022b). Furthermore, after an experiment with college students, it was concluded that the number of attributes and attribute level of distribution were prime predictors of information overload on

consumer choice. Online information overload resulted in less satisfied, less confident, and more confused consumers (Lee & Lee, 2004). This is applicable to fitness supplements as those supplements tend to have many different tastes, disclaimers, and brands. Continuing about fitness supplements regarding this age group, the most consumed supplements for this age group are supplements rich in protein and isotonic drinks (Goston & Correia, 2010). The mainly stated goal of this reported supplement intake for this age group was the increase of muscle mass (Goston & Correia, 2010).

Some of the key takeaways regarding this age group is that their preference for sustainability has improved and brand loyalty has regressed when compared to older age groups. Their increased preference for social media use and convenience shopping has also led to this age group doing more online shopping. Therefore, online shopping websites and social media have become more important for determining the consumption patterns of this age group. Additionally, younger adults are more likely to use social media as a way to access news. At last, the most consumed supplements for this age group are supplements rich in protein and isotonic drinks, with the most stated goal of this intake being the increase of muscle mass.

## **2.2 Consumer behavior fitness supplement users**

Fitness supplements are a form of dietary supplements. According to the United States Food & Drug Administration (2022), a dietary supplement is a product intended for ingestion that, among other requirements, contains a "dietary ingredient" intended to supplement the diet. The term "dietary ingredient" includes vitamins and minerals; herbs and other botanicals; amino acids; "dietary substances" that are part of the food supply, such as enzymes and live microbials; and concentrates, metabolites, constituents, extracts, or combinations of any dietary ingredient from the preceding categories. Dietary supplements may be found in many different forms, such as pills, tablets, capsules, gummies, softgels, liquids, powders, and bars. To classify this into the fitness supplement category, the supplement is designed to provide energy and aid endurance before or throughout a workout, or to enhance muscle repair, recovery, and growth (Harvard Chan School of Public Health, 2023).

Furthermore, because there is not much scientific information available about all fitness supplements, some of the information stated will only be about protein supplements. Protein supplements are fitness supplements that are rich in protein and this supplement is the most consumed of all fitness supplements (Goston & Correia, 2010). Regarding influencing factors for protein use, the analysis of interview results with Thai fitness enthusiasts that regularly consume

whey protein, which is one of the most common protein supplements (Garrido et al., 2016), reveals the most cited important factor that impacts their decision to consume whey protein is self-image. An additional variable that was discovered was convenience, as some people do not have enough time to prepare food that offers them proper nutritional benefits, and whey protein is a product that can be prepared and consumed quickly. On the other hand, price had no influence on the consumer's thoughts or decisions regarding whey protein consumption (Mahidol University, 2017). Their low interest in price levels correlates to a statement by Baron (2023), which states that a low share of fitness supplement users think that inflation, rising prices, and cost of living are issues that need to be addressed. Next to price, education level had no significant influence on the amount spent on dietary supplements or the decision to use them (Goston & Correia, 2010). Another factor that influences the consumer behavior regarding use of dietary supplements among both amateur and elite sports and across age groups, is social influence (Backhouse et. al., 2011; Goulet, Valois, Buist, & Cote, 2010; Lucidi et al., 2008). Individuals are more likely to make inferences by observing the behaviors of reference groups (such as health professionals and doctors) and significant others (such as family members and friends) and consume fitness supplements due to the expectations of those significant others (Mangleburg et al., 2004). Further, believing in a health and wellbeing modulating effect of protein supplements is a significant characteristic of protein supplement users (Hartmann & Siegrist, 2016).

Additionally, there seem to be some wrong perceptions and beliefs regarding fitness supplements. According to an empirical study around users and non-users of protein supplements, it was concluded that both groups should be better informed about protein supplements to prevent misguided health beliefs and protein overconsumption (Hartmann & Siegrist, 2016). This statement is supported by Maughan et al. (2004), as it states that even when supplement users know that their nutrient status is normal and supplements are unnecessary, they tend to consume them. This sign of ignorance also seems to appear when supplements are proven to be unbeneficial, according to a study by Blendon et al. (2001), which concluded that even if it was scientifically proven that dietary supplements are ineffective, people would continue to consume them. Moreover, recreational sportsmen have been found to consume protein supplements, albeit they were unaware of the implications of consumption. Such users tend to obtain information from the internet or a friend, rather than consulting a professional source of information (Bianco et al., 2011). This corresponds to an investigation around influencing factors for dietary supplement intake by Goston and Correia (2010), where more than half of the participants consumed supplements without seeking any professional guidance. The users reported taking supplements by self-prescription, suggestion from a friend or a clerk in a store, or under the influence of advertisements.

Based on the limited or controversial information available, it seems likely that protein supplement consumers have unrealistic benefit perceptions about the impact of those supplements on physical performance, health, and body weight (Royne, Fox, Deitz, & Gibson, 2014). This aligns with an experiment around high school athletes from Illinois, which concludes that protein supplement users have significantly more misconceptions about protein supplements than non-users do (Duellman et al., 2008).

One of the key takeaways for this part is that many fitness supplement users seem to have a wrong expectation regarding the impact and use of these fitness supplements. Additionally, the sources they gather their information from, are from close relatives or social media, instead of a professional. Lastly, when it comes to reasons for fitness supplement use, self-image and convenience are some of the popular reasons, whilst price and education do not influence the use of fitness supplements. What stands out about the first two factors specifically, is that they were important shopping factors for young adults as well. Another factor that influences consumer behavior of dietary supplement users is social influence.

## **2.3 Fitness supplement industry**

### **2.3.1 Fitness supplement industry opportunities**

The global fitness supplement industry was valued at 44.43 billion U.S. dollars in 2021 and is expected to almost double its value by 2030 (*Global sports nutrition & supplement market 2030* | Statista, 2022). Whey protein, one of the most popular protein supplements, was valued at 10.3 billion U.S. dollars and is forecast to reach 18.12 billion U.S. dollars by 2029 (Statista, 2022c). These statistics show that the fitness supplement and its key components are expected to grow by a large amount in the future.

Not only is the fitness supplement industry expected to grow in the future but it has also witnessed a large growth in the last decennium already. For example, the sports nutrition retail value in the United Kingdom grew from 193 million British pounds in 2010 to 417 million British pounds in 2015 (Statista, 2018b). Sports nutrition is approximately the same as fitness supplements, so this can be seen as applicable for the fitness supplement industry as well. Furthermore, the sports nutrition market value grew from 7.4 billion U.S. dollars in 2016 to 16.8 billion U.S. dollars in 2021 (Grand View Research, 2022; Statista, 2020). Additionally, in a country that lies in another different continent like Japan, the sports nutrition market value witnessed a large growth as well. In 2013, the market was valued at 30 billion Japanese yen, and in 2019 it was estimated to be worth almost 50 billion yen (Statista, 2022d).

Returning to the expected sizeable growth of the industry, it is important to mention some of the opportunities for the industry in the future. As mentioned earlier by Ismail et al., (2021), generation Z consumers prefer to engage with brands that reflect their current or aspirational self-concept. Therefore, the industry can capitalize on this trend by offering customized supplement formulations that target specific fitness goals or dietary requirements. A recent example of this is the pre-workout supplement, which has become much more popular in the last ten years. Pre-workout supplements are designed to provide energy and aid endurance throughout a workout (Harvard Chan School of Public Health, 2023). According to Google Trends, search volume for 'Pre-workout supplement' had almost quadrupled in January 2023, compared to December 2013 (Google Trends). Additionally, in 2022, the pre-workout supplement was responsible for approximately a third of the global market value for sports nutrition (Grand View Research, 2022). Furthermore, with the increased use of social media by people aged under 30, compared to older groups (Atske, 2022), there may be some opportunities in this aspect. For example, social media influencers promoting fitness supplements already exists, but it seems that with the expected growth of the industry, companies can capitalize on this front even further to promote their products among the consumers who belong to the primary target market. To promote their products, companies can put the emphasis on the convenient aspect of fitness supplements, granted that young adults their preference increased for convenience post COVID-19. The only question is however whether this increased preference for convenience is applicable to fitness supplement consumers as well.

In short, the fitness supplement industry has already witnessed a large growth in recent years, and it is expected that this growth will not stop in the coming years. Some of the opportunities in the industry include the offering of customized supplements which target specific fitness goals or requirements, as young consumers prefer to engage with brands that reflect their current or aspirational self-concept. A recent example of this is the pre-workout supplement. Additionally, as result of the increased use of social media by people aged 30 or under, further promotion of fitness supplements on this platform could be a worthwhile idea.

### **2.3.2 Fitness supplement industry threats**

On the other hand, there are also threats in the fitness supplement industry. As mentioned earlier by Yoon et al., 2022, the outstanding use of social media for people aged 30 or under also has consequences for their consumer behavior, as social media app usage increases the amount of online shopping app visits. This means that online fitness supplement stores could become more important as well. Assuming this is true, it is essential that companies design their online fitness supplement stores well, considering a survey around college students concludes that online information overload

resulted in less satisfied, less confident, and more confused consumers (Lee & Lee, 2004). With recent introductions of new fitness supplements and more flavors, it remains important that companies do not make it overcomplicated for consumers that want to buy fitness supplements online.

This also leads to the second mentioned threat, which is the possibility of the fitness supplement market becoming fully saturated within a short time span. After the intense competition with numerous brands vying for market share and the introductions of innovative fitness supplements, it may be impossible for new players within the market to differentiate themselves and compete in the long run. It currently looks like this will be the case, as according to a recent article analyzing the protein supplement industry, the industry is characterized by accreditation of the product, capacity expansion, capital expansion, and substantial investment decisions to increase the market share of manufacturers (Research and Markets, 2019). This statement is supported by another article, which states that over the coming years, the market is likely to gain significantly from the increasing competition that will impel player to introduce new and innovative products (PR Newswire, 2017). Therefore, it will be a hard task to successfully enter this highly competitive market full of innovators as a new player. Lastly, after empirical research proved that both users and non-users should be better informed about protein supplements (Hartmann & Siegrist, 2016), companies need to watch out that this trend does not continue for the future. This misinformation can lead to an incorrect use of the supplements which can undermine trust in the industry. Especially for the emerging fitness supplements that have become more popular in recent years, it is crucial to help the population understand the use.

To summarize, based on the analysis of threats in the fitness supplement industry, online platforms selling fitness supplements should not overload their customers with information, which can be the case in the future with all the recent introductions of new supplements and flavors. Moreover, the fitness supplement industry has become hypercompetitive, and therefore new players in the market with innovative ideas may have a hard task trying to enter this industry. Lastly, the misinformation regarding fitness supplements remains a possible threat, after a recent study has proven that protein supplement users should be better informed about the product.

### **2.3.3 Fitness supplement purchase channels**

When it comes to purchase channels, the distribution differs, and information is limited. According to the Journal of Global Business Review (2019), 38,25% order whey protein online. Furthermore, a statistic reveals that the most used purchase channel for dietary supplements in Sweden was the Internet (Statista, 2021). However, a statistic from a survey in the United Kingdom

reveals that majority of respondents bought their sports nutrition products in-store instead of online (Statista, 2018). Despite these reports contradicting each other, there is little contradiction that the online channel is expected to expand the largest in the future. Hassan (2016), states that the online segment of dietary supplements is expected to grow at the highest compound annual growth rate of 10,1% in the next few years.

In addition, there is some unclarity whether the current preferred purchase channel is online or offline for fitness supplements. However, the online channel is expected to grow further in the coming years.

## **2.4 Conclusion**

To conclude, based on the literature review, there seems to be a wrong misconception among fitness supplement users regarding the influence and use of these fitness supplement products. However, as it has been proven that in recent years the fitness supplement industry has experienced a large growth and a new popular supplement has emerged namely the pre-workout supplement, this may have changed. All sources consulted about the use of fitness supplements are at least five years old, with many being even more than 10 years old. Moreover, a proportional size of the information is only about protein supplements and does not account for pre-workout supplement users for example. Therefore, as the industry has attracted a lot more value and users in recent years, and a new popular product has emerged onto the scene which does not have much information available regarding the use of it, the current knowledge about the use of fitness supplement is limited and researching this further may provide new insights. This leads to hypothesis 1, which is stated as follows:

*H1: To what extent do people between 18- and 30-years old use fitness supplements?*

The answer to this hypothesis should also provide more clarity regarding the consumption of fitness supplements, which is, together with the obtaining and disposing of products and services, an important factor in determining someone's consumer behavior.

Furthermore, the sources fitness supplement users obtain their information from regarding fitness supplements, are mainly from close relatives or social media, instead of a professional source. Nevertheless, the sources that state this are generally more than 10 years old. With the grow of the fitness supplement industry and the additional attention and professional information it has therefore received, this may have changed. An example of this extra professional information is the amount of fitness coaches in Australia. This grew from 23.000 to almost 36.000 in the last decennium



(Statista, 2022c). On the other hand, the social media use for people aged 30 or under has also increased (Atske, 2022). However, it could be argued that the level of information may be higher on social media regarding fitness supplements than before, because of the growth of attention the industry has received in recent years. As a result of these contradicting statements, it is unclear what the information sources of the primary target market are and therefore it is necessary to research this and find evidence whether the information sources for fitness supplement users have changed or not. Therefore, hypothesis 2 is written as follows:

*H2: Where do people between 18-and 30-years obtain information from regarding fitness supplements?*

This hypothesis provides extra insights into a person's consumer behavior, as it provides more information regarding the obtaining part of a product.

Additionally, convenience and self-image are important factors when it comes to consumer behavior for both whey protein supplement users and young adults (Ismail et al., 2021; Mahidol University, 2017; Statista, 2022a). Another consumer behavioral factor that stood out for the latter was that their brand loyalty has regressed (Statista, 2023b). However, there is no evidence yet that all this is true for fitness supplement users as well. The previously stated convenience and self-image factors that was based on qualitative research around twenty interviewees, and only about protein supplements, instead of all fitness supplements. This is also true for the factor price which was deemed to be unimportant to the interviewed protein supplement users. Therefore, questions can be raised whether this is also true for all fitness supplement users. Moreover, researching what the relative importance is of the factors convenience and self-image compared to the main factors for fitness supplement use like the provision of energy or enhancement of muscle recovery and growth (Harvard Chan School of Public Health, 2023) is relevant as well, because this is still unknown. Furthermore, after it was recently proven that sustainability has become a more relevant factor for the relevant age group regarding brand preferences (Statista, 2022a; 2023a), it is worthwhile to find out whether this is applicable for fitness supplement users in this age category as well. In short, it is worth researching whether the convenience and self-image factors are applicable to all fitness supplement users and how they compare in terms of relative importance to the commonly cited reasons of fitness supplement use, like provision of energy or muscle recovery and growth. The same can be said for three influencing factors towards brand preferences: price, sustainability, and brand loyalty. It is still unclear whether these factors are applicable towards fitness supplement users as

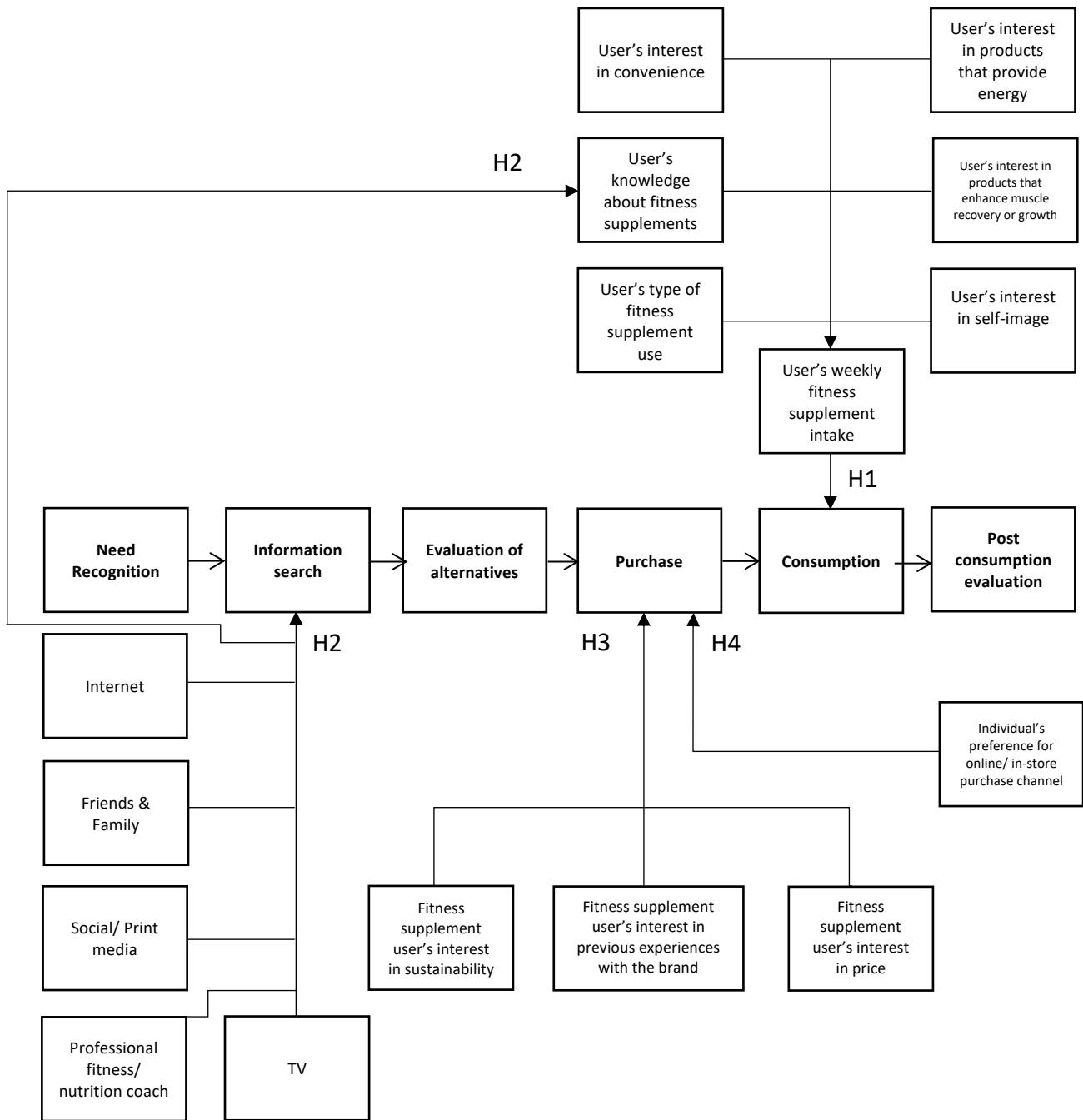
well and how these factors compare to each other in terms of importance. Thus, the following hypothesis can be concluded:

*H3: Which factors play a role in choosing certain brands of fitness supplements?*

Lastly, after an analysis of the fitness supplement industry in the previous sub-chapter it remains unclear whether the most frequently used purchase channel for fitness supplement users is online or in-store. It is worth noting that the increased use of social media for the relevant age group has led to them doing more online shopping (Yoon et al., 2022; Zhang et al., 2017). Furthermore, it is clear that the online purchase channel is growing amongst fitness supplement users as well. Therefore, it is crucial to find the current most used purchase channel and find a better understanding of consumer behavior for this group segment. This leads to the final hypothesis:

*H4: Where do people between 18- and 30-years old buy their fitness supplements from?*

## 2.5 Conceptual Framework



**Figure 2.** Conceptual research model for the hypotheses, visualizing their main concepts and relationships.

### **3. Research Methodology**

#### **3.1 Data Collection**

To find an answer to the main research question and hypotheses, data will be gathered via a quantitative data collection approach. Quantitative research is scientific investigation that includes both experiments and other systematic methods that emphasize control and quantified measures of performance (Capaldi and Proctor, 2008). One of the main advantages of using quantitative research is that the data set collected is large, and therefore can be generalized to and representative of an entire population (Goertzen, 2017). With this in mind, the research approach will be useful because after the conclusion from the literature review it was evident that there are many doubts whether the findings from the literature are still representative of the current fitness supplement consumers or industry.

Moreover H1, H2, and H4 are all hypotheses concerning someone's behavior or attitude. These hypotheses can be answered via quantitative research, as this type of research is useful to quantify behaviors and attitudes and find out how a population feels about a certain issue (Sukamolson, 2007). This means that the answers stated to the hypotheses can also be quantified, which should lead to the possibility to take conclusions about the relative popularity of the stated answers as well. H3 can be seen as both a quantitative and qualitative hypothesis, but due to time limitation and the quantitative approach for the other hypotheses, a quantitative approach will be chosen for this hypothesis as well. Quantitative research can provide some useful information in this case, as it is suitable to explain a phenomenon (Sukamolson, 2007). The phenomenon in this case are the factors that influence the fitness supplement brand choice.

#### **3.2 Research Approach**

The quantitative research approach will be in the form of an online survey conducted using Qualtrics. This ultimately should provide enough information to answer the main research question, as a quantitative approach, especially a survey, can provide many answers about behavior (Sukamolson, 2007). Furthermore, as time was limited and one of the advantages of an online survey are that a large set of data can be gathered in a short time, this data collection method was chosen. A €100,- Amazon gift card was used as an incentive to gain responses. Respondents were offered the option to leave their mail to be entered in a raffle for the Amazon gift card after they answered all relevant questions. This was purely paid through personal funding, with no outside source supplying the funds.

With the target of having a representative sample size, a minimum of 385 answers was required. This sample size was calculated by using a margin of error of 5%, a confidence level of 95%, and a population of approximately 750.000. The population number derives from the total amount of

people aged 18-30 years old in the Netherlands, which is approximately 3.000.000 (CBS Statline, 2023), multiplied by the percentage of people that take workout supplements in the Netherlands, which is 25% (RIVM, 2022).

The survey was mainly sent out to young adults aged from 18 to 30 who currently use or have used fitness supplements. The participants are recruited through connections, social media, and fitness centers. While doing so, convenience sampling was utilized. This type of sampling can be defined as selecting the most conveniently available pool of candidates, while still testing the fitness to the mandatory criteria (Ayyildiz, 2022). Moreover, snowball sampling also took place as participants were requested to forward the survey to other people. In addition, the survey was distributed on the websites Surveyswap.io and Surveycircle.com. These websites offer a service where individuals can fill out surveys to gain responses for their own survey. As a result, a sizeable number of respondents outside of the Netherlands were collected as well.

The survey was sent out on the 21st of June 2023 and was open until the 28th of June 2023. Many respondents were from the Netherlands because of the author's country of origin and the inability to spread the survey through international communities. In the end, 309 responses were collected, of which 208 were applicable to the research and therefore further analyzed.

### **3.3 Survey Overview**

The survey is sent out in English and begins with a short introduction to the topic, followed by three demographic questions (i.e., gender, age, nationality, weekly physical exercise frequency) that are used to check the representativeness of the sample. All the survey questions can be found in Appendix B. Firstly, two questions are asked regarding the use of fitness supplements to provide information needed to answer H1. Next, respondents are asked two questions about the importance of factors when using fitness supplements and when choosing a fitness supplement brand, with the aim of finding the insights needed to H1 and H3. To state the degree of importance for each factor, both questions include a seven-point scale for answers. For both questions, the respondents are also presented the option to indicate whether they think an important factor is missing apart from the presented factors in the survey. If this is the case, a brief description of this factor is asked, and a seven-point scale is included just like for the presented factors. Later, the survey asks a question about the main information sources regarding fitness supplements, where a maximum of 2 options can be chosen. The aim of this question is to gather the required information to answer H2. On the same page, 3 statements are presented next to a seven-point scale where respondents can estimate their own knowledge regarding fitness supplements. The point of this question is to find any possible differences in knowledge, between a supplement user's information sources or perhaps between the specific types of supplements they use for example. The last question asks whether the respondent's

main purchase channel for fitness supplements is online or in-store, so the necessary information required to answer H4 can be gathered. Lastly, to prevent the collected data from possible researcher bias, questions that had limited selections, were as previously mentioned frequently followed by a question whether the respondent thought there was an important factor left out of the previous question. If the respondent selected 'yes', two questions were asked about what this missing factor was and how important this factor was to the respondent.

### **3.4 Data Analysis Techniques**

All collected data is analyzed via the software SPSS. Some of the variables researched are scaled from 1-7 in terms of importance for certain factors, or in terms of agreement with statements that describe someone's knowledge (see Appendix B for more details). Other used variables include categorical variables, like each fitness supplement user sub-group or each type of information source.

The program SPSS was used to carry out significance tests. For most of these tests, the results will be separately analyzed per fitness supplement product, as the theory from the Literature Review regarding consumer behavior for fitness supplement users is frequently about protein supplements and does not account other supplement users. An example of a test where the results are analyzed per sub-group, is the chi-square test. The goal of this test is to draw significant conclusions about the differences between the fitness supplement user sub-groups regarding weekly supplement intake. Additionally, a multiple regressions analysis is done with the dependent variables being each of the four important factors for fitness supplement use (i.e., convenience, self-image, to provide energy, to enhance muscle recovery or growth), and the three variables that indicate how a fitness supplement user estimates his own knowledge about the products, and the independent variables being all fitness supplement user sub-groups. By doing so, it is possible to not only check whether there are any significant differences between these sub-groups regarding all the dependent variables, but also to compare the magnitude of their differences by their coefficients. Moreover, one sample t-tests are performed to test whether the scaled variables significantly differ from the mean, which is 4 in this case, or from each other. Lastly, two-way ANOVA tests have been conducted to test whether any of the information sources significantly influence the knowledge about fitness supplements, or if there are possible any interaction effects between different information sources.

## 4. Research Outcome

### 4.1 Raw Survey Data

In total, 309 responses were collected via the online questionnaire. After the respondents were removed who did not fit the age bracket or never consumed fitness supplements, 208 relevant responses remained. 51.40% (107) of this sample reported being female, and 48.60% (101) reported being male. Furthermore, 74.50% (155) reported being Dutch, 16.80% (35) reported being other European, and 8.70% (18) reported being outside of Europe as their nationality. The frequency of weekly (physical) exercise by respondents and the appropriate percentages are reported in Table 1. Moreover, age is not reported, as the sample was filtered to only include people between the ages 18 and 30. Additionally, it was decided by the researcher that the relevant sample should be using or should have used fitness supplements, as the survey questions were frequently related to prior intake of fitness supplements and corresponding perceptions. Therefore, respondents were also removed from the sample when fitness supplements were never consumed.

**Table 1.** Descriptive statistics of weekly (physical) exercise

	Frequency	Percentage (%)	Cumulative Percentage (%)
<b>Less than once per week</b>	8	3.84	3.84
<b>1-2 times per week</b>	39	18.75	22.59
<b>3-4 times per week</b>	95	45.67	68.26
<b>5-6 times per week</b>	47	22.60	90.86
<b>7 or more times per week</b>	19	9.14	100.0
<b>Observations</b>	208	208	208

### 4.2 Hypothesis 1

The first hypothesis has been prepared as follows: *To what extent do people between 18- and 30-years old use fitness supplements?* The two main results needed to answer this hypothesis, is the frequency of fitness supplement use and the type of fitness supplements consumed. However, as shown in the conceptual framework, there may be other factors impacting these two main results. After the Literature Review suggested that many fitness supplement users misjudged their use of fitness supplements in the past, it may be worthwhile to find out whether the users themselves think this is still the case. Additionally, four majorly stated factors that were important for fitness supplement use (i.e., convenience, self-image, to provide energy, to enhance muscle recovery or growth) will be researched as part of hypothesis as well, to find out how these factors influence the use and type of products consumed of fitness supplements. Possible other factors that were not

presented but stated to be important by the respondents themselves will also be taken into consideration.

**Table 2.** Descriptive statistics of weekly fitness supplement use per fitness supplement product

	Frequency	Relative Percentage (%)
<b>Protein Powder</b>		
Less than once per week	36	24.16
1-2 days per week	21	14.09
3-4 days per week	36	24.16
5 or more days per week	56	37.58
<b>Pre-workout</b>		
Less than once per week	10	11.76
1-2 days per week	7	8.24
3-4 days per week	32	37.65
5 or more days per week	36	42.35
<b>Creatine Monohydrate</b>		
Less than once per week	1	1.43
1-2 days per week	4	5.71
3-4 days per week	9	12.86
5 or more days per week	56	80.00
<b>Vitamin, mineral, or electrolyte rich substance</b>		
Less than once per week	18	21.69
1-2 days per week	15	18.07
3-4 days per week	21	25.30
5 or more days per week	29	34.94
<b>Other supplements</b>		
Less than once per week	3	27.27
1-2 days per week	1	9.09
3-4 days per week	1	9.09
5 or more days per week	6	54.55
<b>Observations</b>	208	208

*Note: the percentages are expressed as the frequency divided by the total amount of observations per fitness supplement product.*

Firstly, returning to the two main results needed to answer the hypothesis, the descriptive statistics of the weekly supplement usage by each fitness supplement sub-group can be seen in Table 2. It can be noticed that protein powder and vitamin, mineral, or electrolyte rich substances are the



two most consumed fitness supplements (149 and 83 times, respectively), with the distribution being reasonably scattered. Pre-workout and creatine monohydrate are both well-consumed supplements as well (85 and 70 times, respectively), but their distribution is more skewed to the left. Creatine monohydrate is a supplement that provides relative substantial creatine intake, which is a naturally occurring compound found in skeletal muscle that is synthesized in the body from amino acids. In the body, it helps produce adenosine triphosphate (ATP), which provides energy for muscles. Creatine is a popular workout supplement marketed to increase athletic performance, especially for weight training (Harvard Chan School of Public Health, 2023). Lastly, the other supplements category is not selected many times, and the category mainly consists of people who consumed protein bars or drinks.

Furthermore, to see whether there are any noticeable differences between these sub-groups defined by their weekly supplement consumption regarding knowledge about the supplements, the means and confidence intervals have been compared with each other. Details of the results can be seen in Appendix C, Table 10. In short, the only conclusion that can be taken when analyzing the means and 95% confidence intervals from this table, is that the group who consumes fitness supplements less than once per week know significantly less than the other groups, and the group who consumes fitness supplements 5 days or more per week know significantly more than other groups. However, there is not enough evidence to state that fitness supplement use has a significant effect on knowledge of the supplements.

Next, to test whether the weekly fitness supplement intake is indifferent for all fitness supplement product user sub-groups, a chi-square test is carried out between these two variables. The results of these tests are presented below in Table 3.

**Table 3.** Results of chi-square tests between weekly fitness supplement intake and fitness supplement product

	Pearson Chi-Square ( $\chi^2$ )	Cramer's V
<b>Protein Powder</b>	2.87	0.12
<b>Pre-Workout</b>	24.77***	0.35***
<b>Creatine Monohydrate</b>	101.43***	0.70***
<b>Vitamin, mineral, or electrolyte rich substance</b>	1.59	0.09
<b>Other Supplements</b>	2.978	0.12

Note. \*\*\* significant at  $p < 0.01$  \*\* significant at  $p < 0.05$  \* significant at  $p < 0.1$

As can be seen in Table 3, there are varying results regarding the relationship between weekly fitness supplement consumption and fitness supplement products. The conducted tests show that there are no significant relationships for the supplements protein powder,  $X^2(3, 149) = 2.87$ ,  $p = 0.41$ ; vitamin, mineral, or electrolyte rich substance,  $X^2(3, 83) = 1.59$ ,  $p = 0.663$ ; other supplements  $X^2(3, 11) = 2.98$ ,  $p = 0.40$ . However, for the supplements pre-workout,  $X^2(3, 85) = 24.77$ ,  $p < 0.01$ , and creatine,  $X^2(3, 70) = 101.43$ ,  $p < 0.01$ , there are significant relationships with weekly fitness supplement intake. Although chi-square tests do not indicate whether the relationships are positively or negatively related, after looking at the descriptive statistics in Table 2 for the two products it can be safely concluded that pre-workout and creatine monohydrate supplement users consume significantly more of the product than the other supplement users. Furthermore, when looking at Cramer's V for these two supplements, you can see that the relationship between fitness supplement intake and creatine monohydrate is strong, with a significant value of 0.70. When doing the same for pre-workout supplements, it can be concluded that the relationship is average, with a significant value of 0.35.

In addition, to analyze each sub-group of fitness supplement users further, a regression model will be conducted. The dependent variables will be each of the four important factors for fitness supplement use (i.e., convenience, self-image, to provide energy, to enhance muscle recovery or growth), and the three variables that indicate how a fitness supplement user estimates his own knowledge about the products (see Appendix B, Q17 for more details), and the independent variables will be all fitness supplement products. In Table 4, the multiple regression results with the coefficients are presented. Each coefficient is presented with its corresponding standard error in parentheses and significance.

**Table 4.** Multiple regression results

	Convenience	Self-Image	Providing energy	Muscle recovery or growth	Knowledge about exact dosage needed per fitness supplement consumption	Knowledge about benefits and implications fitness supplements	Only consume fitness supplements that are scientifically beneficial
<b>(Intercept)</b>	5.33*** (0.19)	2.769*** (0.25)	4.23*** (0.19)	4.69*** (0.21)	4.36*** (0.26)	4.50*** (0.21)	5.10*** (0.22)

<b>Protein Powder</b>	0.00 (0.18)	0.14 (0.24)	1.49*** (0.18)	-0.73*** (0.20)	-0.25 (0.25)	-0.02 (0.20)	-0.27 (0.21)
<b>Pre-Workout</b>	0.12 (0.16)	0.11 (0.22)	-0.42** (0.17)	1.61*** (0.19)	-0.14 (0.23)	0.13 (0.19)	0.34* (0.20)
<b>Creatine Monohydrate</b>	0.25 (0.17)	0.96*** (0.23)	0.71*** (0.18)	0.22 (0.20)	1.27*** (0.24)	0.84*** (0.20)	1.00*** (0.21)
<b>Vitamin, mineral, or electrolyte rich substance</b>	0.32** (0.16)	0.08 (0.21)	0.28* (0.17)	0.34* (0.18)	0.48** (0.22)	0.59*** (0.18)	0.58*** (0.19)
<b>Other Supplements</b>	0.24 (0.35)	0.34 (0.46)	0.52 (0.36)	0.08 (0.39)	-0.62 (0.49)	-0.36 (0.40)	-0.19 (0.41)
<b>Adjusted R<sup>2</sup></b>	0.01	0.08	0.33	0.34	0.12	0.12	0.16
<b>F(5, 202)</b>	1.58	4.59	21.52	22.65	6.84	6.50	8.73

Note. \*\*\* significant at  $p < 0.01$  \*\* significant at  $p < 0.05$  \* significant at  $p < 0.1$

For protein powder users, the provision of energy is concluded to have a significant importance, whereas enhancement of muscle recovery or growth is concluded to have a significant unimportance. In contrast, for pre-workout supplement users, this is the exact opposite: provision of energy is significantly unimportant and enhancement of muscle recovery or growth significantly important to these users. This is controversial, as protein powder is a supplement known for the enhancement of muscle recovery or growth, whilst pre-workout is a supplement known for providing energy. Furthermore, creatine users are concluded to hold a significant larger interest in self-image and provision of energy compared to other groups, whilst they also have significantly more knowledge about the fitness supplement products they are using. In addition, convenience is significantly important to vitamin, mineral, or electrolyte rich substance users. Moreover, similarly to creatine monohydrate users, they also have significantly more knowledge about the fitness supplement products they use. However, these predictions may be imprecise as the  $R^2$ -values of all regressions are not more than moderate.

Lastly, to analyze whether all the previously used dependent variables significantly differ from the mean, which is 4 in this case, one sample t-tests have been conducted. The results can be seen in Appendix C, Table 12. All values significantly differ from the mean, which means that the factors convenience, provision of energy, enhancement of muscle recovery or growth all are important factors for fitness supplement use. On the other hand, self-image is an unimportant factor when using fitness supplements. Furthermore, when analyzing the 95% confidence intervals, it can be concluded that the factors convenience and provision of energy are both more important than the

enhancement of muscle recovery or growth. With regards to the knowledge about fitness supplements, it can be concluded that the respondents agreed with all three statements that they have enough knowledge about fitness supplements. Moreover, when analyzing the 95% confidence intervals, respondents know the most about whether the fitness supplements they consume are scientifically proven to be beneficial. After the aforementioned comes the knowledge about the benefits and implications of fitness supplements, and at last, respondents know the least about the exact dosage they need per fitness supplement consumption.

Overall, it can be concluded that creatine monohydrate and pre-workout supplement users consume more fitness supplements than the other sub-groups. In addition, creatine monohydrate and vitamin, mineral, or electrolyte rich substance users have significantly more knowledge about fitness supplements compared to others. Furthermore, especially the factors convenience and provision of energy are important factors for fitness supplement use. Enhancement of muscle recovery or growth is also important. On the other hand, self-image is unimportant. Finally, respondents state that they have enough knowledge about fitness supplements.

### 4.3 Hypothesis 2

The second hypothesis asks: *Where do people between 18-and 30-years obtain information from regarding fitness supplements?* In order to answer this hypothesis, the main information sources of the respondents will be analyzed. Furthermore, to learn more about the relative value of each source, a two-way ANOVA test will be carried out. This will be done by setting the three knowledge statement questions as dependent variables and the information sources as the fixed factors. Firstly, the frequencies of main information sources regarding fitness supplements are presented below.

**Table 5.** Reported main sources of information regarding fitness supplements

	Frequency	Percentage (%)
<b>Social Media</b>	102	49.04
<b>Friends and Family</b>	90	43.27
<b>Internet</b>	141	67.79
<b>Professional Fitness or Nutrition Coach</b>	52	25.00
<b>Print Media</b>	16	7.69
<b>TV</b>	7	3.37
<b>Observations</b>	208	208

Note. The percentages are expressed as the frequency divided by the total amount of observations. The total percentages therefore do not add up to 100% as respondents were presented the option to select more than one fitness supplement.

Internet is by far the most conducted information source, followed by social media, and friends and family. On the other hand, print media and TV are unpopular when it comes to information sources for fitness supplements.

**Table 6.** Two-way ANOVA test results between information sources and knowledge about fitness supplements

		Sum of Squares	Degrees of freedom	F
<b>Corrected Model</b>				
	Knowledge about exact dosage needed per fitness supplement consumption	196.46*** a	19	5.16
	Knowledge about benefits and implications fitness supplements	70.42*** <sup>b</sup>	19	2.23
	Only consume fitness supplements that are scientifically beneficial	84.78*** <sup>c</sup>	19	2.42
<b>Intercept</b>				
	Knowledge about exact dosage needed per fitness supplement consumption	734.06***	1	366.40
	Knowledge about benefits and implications fitness supplements	878.81***	1	529.21
	Only consume fitness supplements that are scientifically beneficial	1171.50** *	1	634.51
<b>Social Media</b>				
	Knowledge about exact dosage needed per fitness supplement consumption	3.15	1	1.57
	Knowledge about benefits and implications fitness supplements	0.03	1	0.02
	Only consume fitness supplements that are scientifically beneficial	1.28	1	0.70
<b>Friends and Family</b>				
	Knowledge about exact dosage needed per fitness supplement consumption	0.43	1	0.21
	Knowledge about benefits and implications fitness supplements	1.46	1	0.88

	Only consume fitness supplements that are scientifically beneficial	0.04	1	0.02
<b>Internet</b>				
	Knowledge about exact dosage needed per fitness supplement consumption	4.606	1	2.30
	Knowledge about benefits and implications fitness supplements	4.74*	1	2.58
	Only consume fitness supplements that are scientifically beneficial	9.31**	1	5.04
<b>Professional fitness or nutrition coach</b>				
	Knowledge about exact dosage needed per fitness supplement consumption	42.75***	1	21.34
	Knowledge about benefits and implications fitness supplements	16.26***	1	9.79
	Only consume fitness supplements that are scientifically beneficial	12.98***	1	7.03
<b>Print Media</b>				
	Knowledge about exact dosage needed per fitness supplement consumption	0.95	1	0.47
	Knowledge about benefits and implications fitness supplements	4.11	1	2.48
	Only consume fitness supplements that are scientifically beneficial	5.90*	1	3.20
<b>TV</b>				
	Knowledge about exact dosage needed per fitness supplement consumption	0.14	1	0.07
	Knowledge about benefits and implications fitness supplements	1.40	1	0.84
	Only consume fitness supplements that are scientifically beneficial	9.57**	1	5.18

*a. R<sup>2</sup> = 0.28    b. R<sup>2</sup> = 0.10    c. R<sup>2</sup> = 0.12*

*Note. \*\*\* significant at p < 0.01 \*\* significant at p < 0.05 \* significant at p < 0.1*

Returning to the two-way ANOVA test, the results are described in Table 6. There were also some cases of significant interaction effects, like the interaction effect between Internet and having a professional fitness or nutrition coach ( $F(1,19) = 5.71$ ;  $p = 0.02$ ) for statement 1 ( $F(1,19) = 7.17$ ;  $p =$

0.01) for statement 2, and ( $F(1,19) = 4.74$ ;  $p = 0.02$ ) for statement 3. Regarding statement 1, which is about knowing the exact dosage needed per fitness supplement intake, there is a significant interaction effect between the variables social media and professional fitness or nutrition coach as well ( $F(1,19) = 5.46$ ;  $p = 0.02$ ). This means that in those cases, the impact of one information source on knowledge partly depends on the usage of another information source.

Returning to Table 6, it can be concluded that having a professional fitness or nutrition coach significantly effects your knowledge about fitness supplements. After looking at the mean descriptive statistics regarding knowledge about fitness supplement per information source (see Appendix C, Table 13 for more details), it can also be concluded that this effect is positive. Furthermore, when Internet or TV are one of the main sources, significantly more fitness supplements that are scientifically proven to be beneficial will be consumed. However, these predictions may be imprecise because of the interaction effects and the low  $R^2$ -values.

In short, fitness supplement users mainly conduct their information about fitness supplements from the Internet, friends and family, and social media. Moreover, having a professional fitness or nutrition coach most definitely improves your knowledge about fitness supplements.

#### **4.4 Hypothesis 3**

The third hypothesis reads as follows: *Which factors play a role in choosing certain brands of fitness supplements?* With the aim of answering this hypothesis, the question where respondents were asked about the relative importance of three factors (i.e., sustainability, price, previous experiences with the brand) when choosing fitness supplement brands will be analyzed. Other factors that were not presented but deemed to be important by the respondents will be taken into consideration as well. Moreover, to find possible further findings, these factors will be compared to each type of fitness supplements used.

Firstly, to analyze whether any of the three factors are correlated to a specific sub-group of fitness supplement user, a regression is conducted. The dependent variables are each of the three factors and the independent variables each of the fitness supplement product user sub-groups. Each coefficient is presented with its corresponding standard error in parentheses and significance. The results can be seen in Appendix C, Table 14.

As the  $R^2$ -values are all low (0.01) and the only significant effect is that creatine users find sustainability less important than the other groups, it can be concluded that there are practically no differences between the sub-groups when it comes to choosing a fitness supplement brand.

After the previous conclusion is evident, the sub-groups of fitness supplement users can be generalized and categorized as one entirety. The descriptive mean statistics of the three factors are presented in Table 7.

**Table 7.** Descriptive statistics of influencing factors for fitness supplement brand choice

	Mean	Standard Deviation	Median	Min.	Max.	95% Confidence Interval
<b>Price</b>	5.75	0.92	6	1	7	[5.62; 5.88]
<b>Sustainability</b>	4.00	1.39	4	1	7	[3.81; 4.19]
<b>Previous experiences with the brand</b>	5.49	1.12	6	1	7	[5.34; 5.60]
<b>Other factors</b>	5.95	1.13	6	3	7	[5.40; 6.49]

According to Table 7, the most important presented factor when choosing a fitness supplement brand is the price, with a mean of 5.75. Previous experiences with the brand are also important, with a mean of 5.49. After looking at the confidence intervals, it can be confidently stated that both price and previous experiences with the brand are significant important factors when choosing a fitness supplement brand. On the other hand, the factor sustainability has a mean that is the exact average outcome. This entails sustainability is neither important nor unimportant to customers. Additionally, a total of 19 respondents thought there was an important factor missing apart from the three presented variables. The most cited factors from these 19 cases were reviews, quality, and taste. These factors are also significantly important, but have a smaller sample size, so they may not be representative over a larger population.

Overall, it can be concluded that when it comes to choosing a fitness supplement brand, there are no distinctive sub-groups to be made for each fitness supplement product. Furthermore, price and previous experiences with the brand are factors when choosing fitness supplements. Lastly, factors like reviews, quality, and taste also hold a significant important value, however, these factors are spread over a much smaller sample size.

**4.5 Hypothesis 4**

The fourth and last hypothesis asks the following: *Where do people between 18- and 30-years old buy their fitness supplements from?* To answer this hypothesis, the survey question that asked respondents whether their main purchase channel was online or in-store, will be researched. In addition, the main purchase channel will be segmented per fitness supplement product, to analyze whether there are any notable differences regarding the main purchase channel per product.



**Table 8.** Descriptive statistics of main purchase channel per fitness supplement product

	Frequency	Percentage (%)
<b>Protein Powder</b>		
Online	108	72.48
In-store	41	27.52
<b>Pre-workout</b>		
Online	70	82.35
In-store	15	17.65
<b>Creatine Monohydrate</b>		
Online	62	84.93
In-store	11	15.07
<b>Vitamin, mineral, or electrolyte rich substance</b>		
Online	53	61.63
In-store	33	38.37
<b>Other supplements</b>		
Online	8	72.7
In-store	3	27.3
<b>Observations</b>	208	208

Note. The percentages are expressed as the frequency divided by the total amount of observations per fitness supplement.

Firstly, the frequencies of the main purchase channel for each fitness supplement product are shown in Table 8. It is convenient that for every fitness supplement product, the online purchase channel has been conducted more. Especially for creatine monohydrate users, the online purchase channel is much more preferred. Considering that even the lowest percentage of all fitness supplement user sub-groups, 61.18% (52) of them to be exact, still reported to mainly use the online purchase channel when buying fitness supplements, it can be concluded that the online purchase channel is the most used purchase channel when it comes to buying fitness supplements for every single product.

#### 4.6 Summary of Key Findings Empirical Research

Overall, each hypothesis can be answered with some significant answers. For H1, chi-square tests were conducted to test whether there were any significant differences regarding the fitness supplement use between all sub-groups. By doing so, it became evident that pre-workout and especially creatine monohydrate users consume more fitness supplements than the other groups.

Moreover, multiple regressions were created where the dependent variables were each of the four important factors for fitness supplement use and the three variables that indicate how a fitness supplement user estimates his own knowledge about the products, and the independent variables were all fitness supplement user sub-groups. Regarding the four important factors, convenience is proven to be an important factor for vitamin, mineral or electrolyte rich substance users, self-image is an important factor to creatine monohydrate users, the provision of energy are important for protein powder and creatine monohydrate consumers, and the enhancement of muscle recovery or growth is an important factor to pre-workout users. Additionally, the provision of energy is deemed to be less important to pre-workout supplement users when compared to the other sub-groups. The same can be stated for protein powder consumers regarding the enhancement of muscle recovery or growth. Returning to the variables about knowledge, it was also concluded that creatine monohydrate and vitamin mineral, or electrolyte rich substance users have significantly more knowledge about fitness supplements compared to the other sub-groups. At last, when analyzing one sample t-test results comparing the factors for fitness supplement use and statements about knowledge to the mean, it was concluded that the factors convenience and provision of energy are important factors for fitness supplement use. Enhancement of muscle recovery or growth is also important, whilst self-image is unimportant. Finally, respondents state that they have enough knowledge about fitness supplements.

Secondly, when analyzing H2, a descriptive statistic table was carried out that presents the frequencies of each conducted information source. From this it could be concluded that most fitness supplement users obtain their information regarding fitness supplements from the Internet, friends and family, and social media. Additionally, to learn more about the relative value of each source, two-way ANOVA tests were carried out. The three knowledge statement questions were set as dependent variables and the information sources as the fixed factors. The results of these tests proved that having a professional fitness or nutrition coach provides more knowledge about fitness supplements.

Thirdly, when analyzing H3, multiple regressions were once again created, this time the dependent variables were the three factors which were deemed to be important when choosing a fitness supplement brand and the independent variables were once again each of the fitness supplement product user sub-groups. These regressions proved that there are no distinctive differences between the sub-groups regarding the importance of price, sustainability, and previous experiences with the brand when buying fitness supplement products. Furthermore, after analyzing the means and 95% confidence intervals of the factors price and previous experiences, it was

concluded that both these factors were important when users choose their fitness supplement brands.

Lastly, for empirical H4, respondents were asked whether their main purchase channel for fitness supplements was online or in-store. After it became evident that for each user sub-group the online purchase channel was far more used, the conclusion was drawn that the online purchase channel is the most used purchase channel when it comes to buying fitness supplements for every single product.

## **5. Conclusions and Recommendations**

Firstly, this chapter sums up the key findings of the literature study and empirical research, and thereafter compares these to see that the similarities and differences are. Afterwards, the central research question is answered with the help of all conclusions. Then, limitations that might have influenced the research are discussed. Lastly, the chapter is finished with recommendations for both the market and future researchers, and the personal reflections of the researcher.

### **5.1 Review**

#### **5.1.1 Literature Study Conclusions**

Regarding the researched age group of 18–30-year old's, this group's brand loyalty has regressed when compared to older age groups (Statista, 2023b; Vision Critical, 2016). On the other hand, their preference for sustainability has improved (Statista, 2022a). Moreover, their increased preference for social media use and convenience shopping has also led to this age group doing more online shopping (Yoon et al., 2022; Zhang et al. 2017). Therefore, online shopping websites and social media have become more important for determining the consumption patterns of this age group. Additionally, younger adults are more likely to use social media as a way to access news (Statista, 2022b). At last, the most consumed supplements for this age group are supplements rich in protein and isotonic drinks, with the most stated goal of this intake being the increase of muscle mass (Goston & Correia, 2010).

Continuing to the consumer behavior of fitness supplement users, it seems likely that protein supplement consumers have unrealistic benefit perceptions about the impact of those supplements on physical performance, health, and body weight (Royne, Fox, Deitz, & Gibson, 2014). Furthermore, the sources they gather their information from, are from close relatives or social media, instead of a professional (Bianco et al., 2011). Moreover, self-image and convenience are important factors for the use of fitness supplements, whilst education and price are unimportant (Goston & Correia, 2010; Mahidol University, 2017). What stands out about the first two factors is that they are important factors for young adults as well when buying products (Ismail et al., 2021; Statista, 2022a). At last, social influence also influences the consumer behavior of dietary supplement users (Backhouse et. al., 2011; Goulet, Valois, Buist, & Cote, 2010; Lucidi et al., 2008).

Finally, the fitness supplement industry has grown a lot in value in recent years (Grand View Research, 2022; Statista, 2020). In addition, the industry is forecasted to double their market value within 10 years (*Global sports nutrition & supplement market 2030 | Statista, 2022*). Currently, the protein supplement industry can be characterized as a hypercompetitive market where high

investments are being made in a battle for every percentile of market share (Research and Markets, 2019). Lastly, regarding purchase channels, there are contradictions. The most used purchase channel for dietary supplements in Sweden was the Internet (Statista, 2021). On the other hand, respondents in the United Kingdom reported to buy most of their sports nutrition products in-store instead of online (Statista, 2018). However, there was little contradiction that the online purchase channel is expected to grow the most in the future (Hassan, 2016).

### **5.1.2 Empirical Research Conclusions**

The empirical part of this research consists of four hypotheses, prepared as a result of the literature study, that were researched through a sample of 208 young adult fitness supplement users. Firstly, chi-square tests were conducted to test whether there were any significant differences regarding the fitness supplement use between all sub-groups. By doing so, it became evident that pre-workout and especially creatine monohydrate users consume more fitness supplements than the other groups. Moreover, multiple regressions were created where the dependent variables were each of the four important factors for fitness supplement use (i.e., convenience, self-image, to provide energy, to enhance muscle recovery or growth) and the three variables that indicate how a fitness supplement user estimates his own knowledge about the products, whilst the independent variables were all fitness supplement user sub-groups. Regarding the four important factors, convenience is proven to be an important factor for vitamin, mineral or electrolyte rich substance users, self-image is an important factor to creatine monohydrate users, the provision of energy are important for protein powder and creatine monohydrate consumers, and the enhancement of muscle recovery or growth is an important factor to pre-workout users. Additionally, the provision of energy is deemed be less important to pre-workout supplement users when compared to the other sub-groups. The same can be stated for protein powder consumers regarding the enhancement of muscle recovery or growth. Returning to the variables about knowledge, it was also concluded that creatine monohydrate and vitamin mineral, or electrolyte rich substance users have significantly more knowledge about fitness supplements compared to the other sub-groups. At last, when analyzing one sample t-test results comparing the factors for fitness supplement use and statements about knowledge to the mean, it was concluded that the factors convenience and provision of energy are the most important factors for fitness supplement use. Enhancement of muscle recovery or growth is another important factor. On the other hand, self-image is unimportant. Finally, respondents state that they have enough knowledge about fitness supplements.

Secondly, when analyzing H2, a descriptive statistic table was carried out that presents the frequencies of each conducted information source. From this it could be concluded that most fitness

supplement users obtain their information regarding fitness supplements from the Internet, friends and family, and social media. Finally, to learn more about the relative value of each source, two-way ANOVA tests were carried out. The three knowledge statement questions were set as dependent variables and the information sources as the fixed factors. The results of these tests proved that having a professional fitness or nutrition coach provides to more knowledge about fitness supplements.

Thirdly, when analyzing H3, multiple regressions were once again created, this time the dependent variables were the three factors which were deemed to be important when choosing a fitness supplement brand and the independent variables were once again each of the fitness supplement product user sub-groups. These regressions proved that there are no distinctive differences between the sub-groups regarding the importance of price, sustainability, and previous experiences with the brand when buying fitness supplement products. Furthermore, after analyzing the means and 95% confidence intervals of the factors price and previous experiences with the brand, it was concluded that both these factors and especially the factor price were important when users choose their fitness supplement brands.

Lastly, for empirical H4, respondents were asked whether their main purchase channel for fitness supplements was online or in-store. After it became evident that for each user sub-group the online purchase channel was far more used, the conclusion was drawn that the online purchase channel is the most frequently used purchase channel when it comes to buying fitness supplements for every single product.

### **5.1.3 Comparison Key Outcomes Literature and Empirical Research**

Firstly, with regards to H1, past research established that protein supplement consumers have unrealistic perceptions about the impact of those supplements (Royne, Fox, Deitz, & Gibson, 2014). In contrast, this research states that every fitness supplement user sub-group (i.e., users of protein powder, pre-workout, creatine monohydrate, and vitamin, mineral or electrolyte rich substances) estimates their knowledge is high enough, especially the pre-workout and vitamin, mineral or electrolyte rich substance users (see Table 11 for more details regarding the knowledge for every sub-group). There is also a contradiction regarding the claims made by Blendon et al. (2001) and Maughan et al. (2004), who respectively state supplement users tend to consume supplements that are scientifically proven to be unbeneficial and unnecessary, as this research proves users themselves think this is not the case.

The empirical research conducted also proved that convenience is one of the most important factors when using fitness supplements, which is in line the claims that convenience is important for both

fitness supplement users and young adults (Chanwatitanont, 2017; Statista, 2022a). On the other hand, empirical research has proven self-image is an unimportant factor for fitness supplement users, which is in contrast with the statements from the literature study that claims fitness supplement users or young adults prefer to engage with brands that promote their self-image or self-concept (Chanwatitanont, 2017; Ismail et al., 2021). Furthermore, this empirical research and research conducted by Goston & Correia (2010) both conclude supplements rich in protein are the most popular supplements for a young adults.

Secondly, after researching H2, the statement by Bianco et al. (2011), which states that protein supplement users prefer to gather their information about the product from close relatives or social media instead of a professional, can be supported and is applicable to every fitness supplement user sub-group. Therefore, the claim made that younger adults are more likely to use social media as a way to access news (Statista, 2022b), can also be supported.

Thirdly, when researching analyzing H3, it became evident that price and previous experiences are important when choosing fitness supplement brands, whilst sustainability neither important nor unimportant. This is in contrast with the claims made by Baron (2023) and Goston & Correia (2010), who state that price is unimportant to fitness supplement users. Additionally, the claims made about young adults preferring brands that prioritize sustainability (Statista, 2022a; 2023a), are therefore also countered by the empirical research. At last, past research has proposed that young adults have become less loyal to brands (Statista, 2023b; Vision Critical, 2016), which is again not in line with the conducted empirical research.

Lastly, the research behind empirical H4 reported that the online purchase channel is the most used by the respondents. This is in line about statements from the Literature Review about young adults using more online shopping and Sweden's most used purchase channel for dietary supplements being the Internet (Statista, 2021; Yoon et al., 2022), but also contradicts a statement conducted from past research about United Kingdom respondents reporting to have frequently bought their sports nutrition products in-store instead of online (Statista, 2018).

#### **5.1.4 Central Research Question**

The central question of this research, as stated in Chapter 1, is as follows:

*“What is the consumer behavior of consumers aged between 18- and 30-years old buying fitness supplements?”*

To answer this question, it was first explained what consumer behavior and a fitness supplement is. To present a clear answer, the consumer decision process will be split into multiple segments, just like in the conceptual framework. As a result of the literature and empirical study behind H2, it was proven that during the information search process, consumers ideally conduct the Internet, social media, and close relatives. Additionally, the previously named sources somewhat limit their knowledge, after it is evident that conducting information from a professional significantly improves knowledge about fitness supplements. Regarding the purchase process, empirical research behind H3 reveals price and previous experiences with the brand impact this process, which contradicts the findings of the Literature Study. Other factors that may impact the process are reviews, quality, and taste. Moreover, after the empirical research for H4 it was clear that the most used purchase channel for fitness supplements was online, which is largely in accordance with the Literature Study. At last, regarding the consumption process and H1, convenience, provision of energy, and the enhancement of muscle recovery or growth are all important factors for someone's consumption of fitness supplements, according to both empirical research and literature research. On the other hand, self-image is an unimportant factor for the consumption of fitness supplement according to the empirical research, which is in contrast with the findings from the Literature Study. Furthermore, there were no findings to be found to state that someone's knowledge about fitness supplements significantly impacts their weekly intake of the supplements. Finally, after the empirical research it can be concluded that the type of fitness supplement consumed influences the weekly supplement intake, as pre-workout and creatine monohydrate users consume significantly more than the other groups.

## **5.2 Recommendations**

### **5.2.1 Recommendations to Companies**

The findings provided by this research can be utilized by marketing teams of fitness supplement brands. Firstly, the importance of convenience, provision of energy, and enhancement of muscle recovery or growth should be emphasized by companies offering fitness supplements that want to increase their market share, since it has been proven with significant statistical results that these factors are important to fitness supplement users in general. Secondly, after it was clear that the online purchase channel is more preferred by the respondents, companies that mainly want to attract the primary target market of fitness supplement users should put major effort in offering a well-designed online platform, especially after the literature study proved that this primary target market has become more critical about the functioning of online stores.



At last, another one of these companies' priorities should be the provision of quality and reasonably priced fitness supplements, as the empirical research proved that both these factors are important to fitness supplement users aged in the primary target market age group.

### **5.2.2 Recommendations to Future Researchers**

Considering this research depended on a strict age range representative of the primary target market and most respondents are Dutch (74.50%), future researchers can explore other broader age ranges or countries. This conceptual research model can easily be applied or expanded according to another target audience in the age category. Additionally, as this research used within-subject study design, some biases might have negatively impacted the results, an example of this is the occurrence of exhaustion under respondents. Lastly, this research only utilized specific factors categorized by the findings of the Literature Review, thus exploring other papers and sources regarding different factors that influence the fitness supplement use and brand choice can enrich the findings on this topic.

### **5.3 Limitations**

Firstly, this sample only consists of 208 representative respondents, while the population of young adults consuming fitness supplements in the Netherlands alone is 750.000 (CBS Statline, 2023; RIVM, 2022). Performing this research with a much larger sample can increase the reliability and validity of the results. Furthermore, the sample was mainly selected from the educational institution, work environments, and close relatives that are relevant to the researcher, due to convenience sampling being used. This caused the sample to be unrandomized. Moreover, the results according to the empirical research conducted regarding someone's knowledge about fitness supplements, are estimated by respondents themselves, and therefore may provide an inaccurate representation of their knowledge. In addition, several factors selected for the empirical research that impact the use and brand choice of fitness supplements were the result of specific findings in the Literature Study, thus if other sources or findings was taken inspiration of instead, other factors could have been presented and the conclusions might have been different.

### **5.4 Reflection**

During the process of writing this bachelor thesis, the collection of information for the Literature Review and the data needed for the research went according to plan. On the other hand, finding the relevant tests needed to test the hypotheses took more time than expected. This was mainly because the author's knowledge regarding these tests had somewhat faded. Additionally, writing a correct thesis proposal was more difficult than expected, as many corrections from the supervisor were needed for the proposal to be deemed acceptable. Moreover, writing a Literature

Review was something the author had no major experience in and therefore needed many corrections as well.

Overall, the author learned how to research academic sources for the Literature Review and filter the best ones. Furthermore, writing a thesis from scratch is a process that was unique to the author and therefore educational as well, especially the parts of the thesis the author had no prior major experience in, like the Literature Review. Lastly, despite the process of writing a thesis going according to plan in the long run, sometimes planning with more time margin for certain parts of the thesis could help in the future, as sometimes the author felt in a hurry in order to finish the thesis in time.

## Appendix

### Appendix A. Reference List

Atske, S. (2022) *Social Media Use in 2021* | Pew Research Center. Available at:

<https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/>.

Ayyildiz, M. (2022) *Colors in Marketing: The Impact of Colors in Fashion Social Media Advertisements on Consumer Decision-Making Processes*. Business Economics.

Backhouse, S.H., Whitaker, L. and Petróczi, A. (2013) "Gateway to doping? Supplement use in the context of preferred competitive situations, doping attitude, beliefs, and norms,"

*Scandinavian Journal of Medicine & Science in Sports*, 23(2), pp. 244–252. Available at:

<https://doi.org/10.1111/j.1600-0838.2011.01374.x>.

Baron, C. (2023) *Target group: Protein supplement users in the Netherlands* | Statista. Available at:

<https://www.statista.com/study/123003/target-group-protein-supplement-users-in-the-netherlands/>.

Bianco, A. *et al.* (2011) "Protein supplementation in strength and conditioning adepts: knowledge, dietary behavior and practice in Palermo, Italy," *Journal of the International Society of Sports Nutrition*, 8(1). Available at: <https://doi.org/10.1186/1550-2783-8-25>.

Blendon, R.J. *et al.* (2001) "Americans' Views on the Use and Regulation of Dietary Supplements," *Archives of Internal Medicine*, 161(6), p. 805. Available at:

<https://doi.org/10.1001/archinte.161.6.805>.

Capaldi, E.J. and Proctor, R.W. (2008) "Are Theories to Be Evaluated in Isolation or Relative to Alternatives? An Abductive View," *American Journal of Psychology*, 121(4), pp. 617–641.

Available at: <https://doi.org/10.2307/20445489>.

CBS Statline (2023) *Bevolking op 1 januari en gemiddeld; geslacht, leeftijd en regio*. Available at:

<https://opendata.cbs.nl/statline/#/CBS/nl/dataset/03759ned/table?ts=1687380347390>.

Chanwatitanont, N. (2017) *FACTORS DRIVING ATTITUDES TOWARDS THE CONSUMPTION OF WHEY PROTEIN AMONG PEOPLE WHO EXERCISE*. Thematic Paper. Mahidol University.

- Childers *et al.* (2001) "Hedonic and utilitarian motivations for online retail shopping behavior," *Journal of Retailing*, 77, pp. 421–423.
- Cowart and Goldsmith (2007) "The influence of consumer decision-making styles on online apparel consumption by college students," *International Journal of Consumer Studies*, 31, pp. 639–647.
- Darley, W., Blankson, C. and Luethge, D. (2010) "Toward an Integrated Framework for Online Consumer Behavior and Decision Making Process: A Review," *Psychology & Marketing*, 27, pp. 94–116. Available at: <https://doi.org/10.1002/mar.20322>.
- Dimock, M. (2019) *Where Millennials end and Generation Z begins* | Pew Research Center. Available at: <https://www.pewresearch.org/short-reads/2019/01/17/where-millennials-end-and-generation-z-begins/>.
- Duellman, M.C. *et al.* (2008) "Protein Supplement Users Among High School Athletes Have Misconceptions About Effectiveness," *Journal of Strength and Conditioning Research*, 22(4), pp. 1124–1129. Available at: <https://doi.org/10.1519/jsc.0b013e31817394b9>.
- Engel, Blackwell and Miniard (1995) "Consumer Behavior," *Dryden Press* [Preprint]. 6th edn.
- Erasmus, A., Boshoff, E. and Rousseau (2001) "Consumer decision-making models within the discipline of consumer science: a critical approach," *Journal of Family Ecology and Consumer Sciences*, 29, pp. 82–90.
- Evans Jr., M.W. *et al.* (2012) "Dietary Supplement Use by Children and Adolescents in the United States to Enhance Sport Performance: Results of the National Health Interview Survey," *Springer* [Preprint]. Available at: <https://doi.org/10.1007/s10935-012-0261-4>.
- Garrido, B.C. *et al.* (2016) "Proteomics in quality control: Whey protein-based supplements," *Journal of Proteomics*, pp. 48–55. Available at: <https://doi.org/10.1016/j.jprot.2016.03.044>.
- Global online shopping trends by generation 2021* | Statista (2023). Available at: <https://www.statista.com/statistics/1288182/shopping-methods-by-age/>.

*Global sports nutrition & supplement market 2030* | Statista (2022). Available at:

<https://www.statista.com/statistics/450168/global-sports-nutrition-market/>.

Goertzen (2017) "Introduction to Quantitative Research and Data," in *Library Technology Reports*, pp. 12–18.

Google Trends (no date) *Pre-workout supplement*. Available at:

<https://trends.google.nl/trends/explore?cat=71&date=all&q=%2Fg%2F11hd9kjby6&hl=nl>

(Accessed: June 18, 2023).

Goston, J.L. and Correia, M.I.T.D. (2010) "Intake of nutritional supplements among people exercising in gyms and influencing factors," *Nutrition*, 26(6), pp. 604–611. Available at:

<https://doi.org/10.1016/j.nut.2009.06.021>.

Goulet, C. *et al.* (2010) "Predictors of the Use of Performance-Enhancing Substances by Young Athletes," *Clinical Journal of Sport Medicine*, 20(4), pp. 243–248. Available at:

<https://doi.org/10.1097/jsm.0b013e3181e0b935>.

Grand View Research (2022) *Sports Nutrition Market Size, Share & Trends Analysis Report By Product Type (Sports Supplements, Sports Drinks), By Application, By Formulation, By Consumer Group, By End-user, By Sales Channel, By Region, And Segment Forecasts, 2023 - 2030*.

Available at: <https://www.grandviewresearch.com/industry-analysis/sports-nutrition-market>.

Hartmann, C. and Siegrist, M. (2016) "Benefit beliefs about protein supplements: A comparative study of users and non-users," *Appetite*, 103, pp. 229–235. Available at:

<https://doi.org/10.1016/j.appet.2016.04.020>.

Harvard Chan School of Public Health (2023) *Workout Supplements*. Available at:

<https://www.hsph.harvard.edu/nutritionsource/workout-supplements/>.

Hassan, H. (2016) *TRENDS IN THE DIETARY SUPPLEMENTS GLOBAL MARKET*. Available at:

<https://dspace.nuph.edu.ua/bitstream/123456789/10364/1/315.pdf>.

Hoy and Adams (2016) *Quantitative research in education: A primer*. 2nd edn. Sage Publications.

- Hoyte, C., Albert, D. and Heard, K. (2013) "The Use of Energy Drinks, Dietary Supplements, and Prescription Medications by United States College Students to Enhance Athletic Performance," *Springer* [Preprint]. Available at: <https://doi.org/10.1007/s10900-013-9653-5>.
- Ismail *et al.* (2021) "Brand engagement in self-concept (BESC), value consciousness and brand loyalty: a study of generation Z consumers in Malaysia," *Young Consumers*, 22, pp. 112–130.
- IvyPanda (2023) *Engel-Blackwell-Miniard Model and Nicosia Model | Research Paper Example*. Available at: <https://ivypanda.com/essays/engel-blackwell-miniard-model-and-nicosia-model/>.
- Lee and Lee (2004) "The effect of information overload on consumer choice quality in an online environment," *Psychology of Marketing*, 21, pp. 159–183.
- Lucidi, F. *et al.* (2008) "The social-cognitive mechanisms regulating adolescents' use of doping substances," *Journal of Sports Sciences*, 26(5), pp. 447–456. Available at: <https://doi.org/10.1080/02640410701579370>.
- Mangleburg, T.F., Doney, P.M. and Bristol, T. (2004) "Shopping with friends and teens' susceptibility to peer influence," *Journal of Retailing*, 80(2), pp. 101–116. Available at: <https://doi.org/10.1016/j.jretai.2004.04.005>.
- Markwell, L. (2018) *Supplement Filter The learner's guide to supplements during an epidemic of over-information*. Available at: <https://static1.squarespace.com/static/61c4caafe917ce25c6b05459/t/61e34259e1de307553e0bfc/1642283612166/Supplement+Filter.pdf>.
- Maughan, R.J., King, D. and Lea, T.J. (2004) "Dietary supplements," *Journal of Sports Sciences*, 22(1), pp. 95–113. Available at: <https://doi.org/10.1080/0264041031000140581>.
- Nagar, K. (2020) "An Examination of Gym Supplement Choice: Using the Modified Theory of Planned Behaviour," *Journal of Food Products Marketing* [Preprint]. Available at: <https://doi.org/10.1080/10454446.2020.1817827>.

- Pasiakos, S., McLellan, T. and Lieberman, H. (2015) "The Effects of Protein Supplements on Muscle Mass, Strength, and Aerobic and Anaerobic Power in Healthy Adults: A Systematic Review," *Springer* [Preprint]. Available at: <https://doi.org/10.1007/s40279-014-0242-2>.
- PR Newswire (2017) "Protein Supplements Market - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast 2017 - 2022," *PR Newswire US*.
- Product Mindset's Newsletter* (2022) "EKB Model of Consumer Behaviour," 30 October. Available at: <https://productmindset.substack.com/p/ekb-model-of-consumer-behaviour>.
- Research and Markets (2019) "Protein Supplements: Global Market Size, Share & Trends Analysis, 2019 to 2025 - ResearchAndMarkets.com Authors:," *Business Wire (English)* [Preprint].
- RIVM (2022) *Het gebruik van workout-supplementen door sporters in Nederland*. Available at: <https://www.rivm.nl/publicaties/gebruik-van-workout-supplementen-door-sporters-in-nederland>.
- Rodkaew, P. and Wiroonrath, S. (2019) "BUSINESS COMPETITIVENESS FOR THAI WHEY PROTEIN SUPPLEMENT PRODUCTS OF THE WHEY PROTEIN BUSINESS IN CHONBURI," *Journal of Global Business Review*, 21(2), pp. 6–22.
- Royne, M. *et al.* (2014) "The Effects of Health Consciousness and Familiarity with DTCA on Perceptions of Dietary Supplements," *Journal of Consumer Affairs*, 48(3), pp. 515–534. Available at: <https://doi.org/10.1111/joca.2014.48.issue-3>.
- Solomon, M., Russell-Bennett, R. and Previte, J. (2012) *Consumer Behaviour*. 3rd edn. Pearson Higher Education AU.
- Statista (2018a) *Purchase channels for sports nutrition products in the United Kingdom (UK) 2015*. Available at: <https://www.statista.com/statistics/717621/channels-for-sports-nutrition-products-united-kingdom-uk/>.
- Statista (2018b) *Retail value of sports nutrition United Kingdom (UK) 2010-2015*. Available at: <https://www.statista.com/statistics/717848/sports-nutrition-retail-value-united-kingdom-uk/>.

- Statista (2020) *Global sports nutrition product market value 2016, by region*. Available at:  
<https://www.statista.com/statistics/326665/global-sports-nutrition-protein-product-sales-by-category/>.
- Statista (2021) *Distribution of sales channels for dietary supplements and vitamins in Sweden 2020*. Available at: <https://www.statista.com/statistics/789311/distribution-of-sales-channels-for-food-supplements-and-vitamins-in-sweden/>.
- Statista (2022a) *Emerging consumer types in the Netherlands due to the coronavirus 2020*. Available at: <https://www.statista.com/statistics/1122821/netherlands-emerging-consumers-coronavirus/>.
- Statista (2022b) *Gen Z and Millennials: main news sources worldwide 2021*. Available at:  
<https://www.statista.com/statistics/281915/main-news-sources-millennials/>.
- Statista (2022c) *Number of fitness instructors Australia 2004-2019*. Available at:  
<https://www.statista.com/statistics/686040/australia-number-of-fitness-instructors/>.
- Statista (2022d) *Size of the whey protein market worldwide 2021-2029*. Available at:  
<https://www.statista.com/statistics/728005/global-whey-protein-market-size/>.
- Statista (2022e) *Sports nutrition supplement market size in Japan FY 2013-2019*. Available at:  
<https://www.statista.com/statistics/910570/japan-sports-nutrition-supplement-market-size/>.
- Statista (2023a) *Change in loyalty towards brands among U.S. Gen Z shoppers since COVID-19 2021*. Available at: <https://www.statista.com/statistics/1031546/change-in-online-loyalty-behavior-among-us-gen-z-shoppers/>.
- Statista (2023b) *What makes a great brand according to Generation Z in the UK 2020*. Available at:  
<https://www.statista.com/statistics/1119926/what-makes-a-great-gen-z-brand-uk/>.
- Sukamolson (2007) "Fundamentals of Quantitative Research," *Language Institute Chulalongkorn University*, 1(3), pp. 1–20.



U.S. Food and Drug Administration (2022) *Questions and Answers on Dietary Supplements*. Available at: <https://www.fda.gov/food/information-consumers-using-dietary-supplements/questions-and-answers-dietary-supplements#:~:text=Congress%20defined%20the%20term%20%22dietary,intended%20to%20supplement%20the%20diet.>

Vision Critical (2016) *The Everything Guide to Generation Z*. Available at: <https://cdn2.hubspot.net/hubfs/4976390/E-books/English%20e-books/The%20everything%20guide%20to%20gen%20z/the-everything-guide-to-gen-z.pdf>.

Yoon, J.S. *et al.* (2022) "The effect of social media apps on shopping apps," *Journal of Business Research*, 148, pp. 23–32. Available at: <https://doi.org/10.1016/j.jbusres.2022.04.021>.

# Fitness Supplement Survey

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## Start of Block: Begin of Survey

Introduction Welcome! This survey is part of a bachelor thesis that aims to research the consumer behavior of fitness supplement users. Your honest answers are crucial for the success of this research, so please provide your responses to the best of your ability.

The survey will take approximately 5 minutes to complete.

If you would like to participate in the giveaway of an Amazon or Bol.com gift card with a value of €100,-, you can enter your e-mail in the last question and your participation for the giveaway will be noted. The winner will be selected at random and contacted before the 15th of July.\*

Thank you in advance!

Note: Data collected (personal or otherwise) will be used solely for the purposes of this bachelor thesis or to contact the winner of the gift card. If you have any questions or concerns regarding the study, please contact me at [586022ts@student.eur.nl](mailto:586022ts@student.eur.nl).

P.S.: This survey contains credits to get free survey responses at [SurveySwap.io](https://SurveySwap.io)

\*If you have never consumed fitness supplements before, your rate of participation to the survey will be limited. Therefore, your participation to the giveaway will be withdrawn. The reason for this is that not all relevant questions can be answered if this is the case, and finishing the survey will be impossible.

## End of Block: Begin of Survey

---

## Start of Block: Default Question Block

Q1 What is your gender?

- Male
  - Female
  - Non-binary
  - Prefer not to say
-

Q2 What is your age (in years)?

- 0 - 17 years old
  - 18 - 30 years old
  - 31 - 50 years old
  - 51+ years old
- 

Q3 What is your nationality?

- Dutch
  - Other European
  - Outside of Europe
- 

Page Break

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Q4 How many times do you (physically) exercise per week?

- Less than once per week
  - 1-2 times per week
  - 3-4 times per week
  - 5-6 times per week
  - 7 or more times per week
- 

Q5 How often do you consume fitness supplements? *Fitness supplements are a form of dietary supplements. A dietary supplement is a product intended for ingestion that, among other requirements, contains a "dietary ingredient" intended to supplement the diet. The term "dietary ingredient" includes vitamins and minerals; herbs and other botanicals; amino acids; "dietary substances" that are part of the food supply, such as enzymes and live microbials; and concentrates, metabolites, constituents, extracts, or combinations of any dietary ingredient from the preceding categories. Dietary supplements may be found in many different forms, such as pills, tablets, capsules, gummies, softgels, liquids, powders, and bars. To classify this into the fitness supplement category, the supplement is designed to provide energy and aid endurance before or throughout a workout, or to enhance muscle repair, recovery, and growth.*

- I have never consumed fitness supplements
- Less than once per week
- 1-2 times per week
- 3-4 days per week
- 5 or more days per week

*Skip To: End of Survey If Q5 = I have never consumed fitness supplements*

---

Q6 Which fitness supplements do you consume? (Multiple options possible) **Protein Powder:** *Protein powders are nutritional supplements that may help build muscle, repair tissue, and make enzymes and hormones. Using protein powder may also aid weight loss and help people tone their muscles.*

**Pre-workout:** *Pre-workout supplements are designed to provide energy and aid endurance*

throughout a workout. They are typically taken 15-30 minutes before a workout, but can also be consumed during exercise. Common ingredients included into pre-workout supplements are beta-alanine, caffeine, and creatine.

**Creatine Monohydrate:** Creatine monohydrate is a popular workout supplement intended to increase athletic performance, especially for weight training. This supplement mainly comes in the form of powder or pills.

- Protein powder
- Pre-workout
- Creatine Monohydrate
- Any type of a vitamin, mineral, or electrolyte rich supplement (that is SPECIFICALLY part of your physical exercise routine, and you would not consume otherwise)
- Any other type of supplement that you consider as fitness supplement

---

*Display This Question:*

*If Q6 = Any other type of supplement that you consider as fitness supplement*

Q7 Could you please briefly define the fitness supplement you meant when you selected 'Any other type of supplement that you consider as fitness supplement' in the previous question?

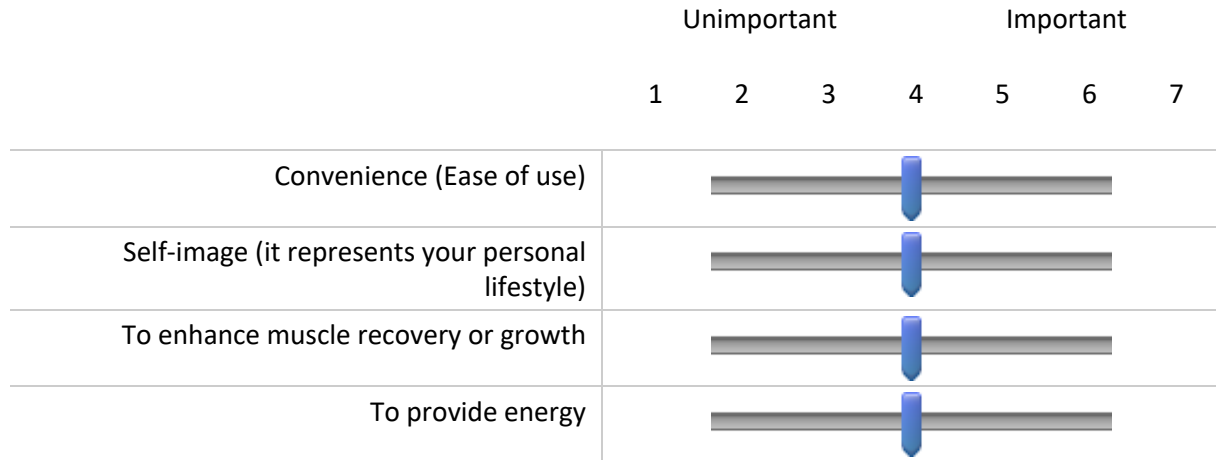
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Page Break



Q8 To what extent are these factors important to you, for your use of fitness supplements?



Q9 Do you feel there is an important factor missing in the previous question that should be included?

- Yes
- No

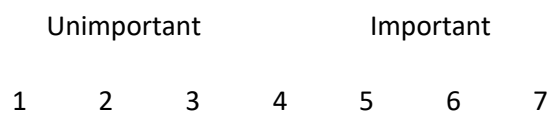
*Display This Question:*  
If Q9 = Yes

Q10 Could you briefly explain what that factor is?

\_\_\_\_\_

*Display This Question:*  
If Q9 = Yes

Q11 To what extent is the factor described in the previous question important to you, for your use of fitness supplements?



Rating of previously described factor	
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Page Break



Q12 To what extent are these factors important to you, when choosing a certain brand of fitness supplements?

	Unimporant			Important			
	1	2	3	4	5	6	7
Price							
Sustainability							
My previous experiences with the brand							

Q13 Do you feel there is an important factor missing in the previous question that should be included?

- Yes
- No

*Display This Question:*

*If Q13 = Yes*

Q14 Could you briefly explain what that factor is?

\_\_\_\_\_

*Display This Question:*

*If Q13 = Yes*

Q15 To what extent is the factor described in the previous question important to you, when choosing a brand of fitness supplements?

	1	2	3	4	5	6	7
Rating of previously described factor							



Page Break

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Q16 What are your main sources of information when it comes to fitness supplements?  
(Maximum of 2 options allowed)

- Social Media
- Friends and Family
- The Internet
- A professional fitness or nutrition coach
- Print Media (e.g. Newspapers, Magazines, Books)
- TV

Q17 How strongly do you agree/ disagree with the below statements?

	Disagree				Agree		
	1	2	3	4	5	6	7
"I know the exact dosage of fitness supplements I need per consumption."							
"I have enough knowledge about the benefits and implications of the fitness supplements I use."							
"I only consume fitness supplements that are scientifically proven to be beneficial."							

Page Break

Q18 What is your main purchase channel for fitness supplements?

Online

In-store

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Page Break 

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Q19 If you would like to participate in the gift card giveaway, please enter your e-mail below (if not, you can skip this question)

---

End of Block: Default Question Block

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## Appendix C. Tables

**Table 9.** Descriptive statistics of weekly supplement use

	Frequency	Percentage (%)	Cumulative Percentage (%)
Less than once per week	52	25.00	25.00
1-2 days per week	31	14.90	39.40
3-4 days per week	54	25.96	65.87
5-6 days per week	71	34.13	100.00
<b>Observations</b>	208	208	208

**Table 10.** Descriptive statistics of knowledge about supplement use for each sub-group of consumption per week

	Mean	Standard Deviation	Median	Min.	Max.	95% Confidence Interval
<b>Knowledge about exact dosage needed per fitness supplement consumption</b>						
Less than once per week	3.56	1.61	4	1	7	[3.11; 4.01]
1-2 days per week	4.94	1.39	5	1	7	[4.43; 5.44]
3-4 days per week	4.70	1.40	5	1	7	[4.32; 5.08]
5 or more days per week	5.45	1.56	6	1	7	[5.08; 5.82]
<b>Knowledge about benefits and implications fitness supplements</b>						
Less than once per week	4.08	1.56	4	1	7	[3.64; 4.51]
1-2 days per week	4.77	1.38	5	1	7	[4.27; 5.28]
3-4 days per week	5.22	1.02	5	1	7	[4.94; 5.50]
5 or more days per week	5.73	0.93	6	1	7	[5.51; 5.95]
<b>Only consume fitness supplements that are scientifically beneficial</b>						

Less than once per week	4.62	1.77	5	1	7	[4.12; 5.11]
1-2 days per week	5.39	1.31	6	1	7	[4.91; 5.87]
3-4 days per week	5.81	1.18	6	1	7	[5.49; 6.14]
5 or more days per week	6.25	0.94	7	1	7	[6.03; 6.48]

**Table 11.** Descriptive statistics of main factors and knowledge about supplement use for each fitness supplement product

	Mean	Standard Deviation	Median	Min.	Max.	95% Confidence Interval
<b>Protein</b>						
<b>Powder</b>						
Convenience	5.60	1.24	6	1	7	[5.40; 5.80]
Self-Image	3.37	1.60	3	1	7	[3.11; 3.63]
To Provide Energy	5.97	1.07	6	2	7	[5.79; 6.14]
Muscle Recovery/ Growth	4.78	1.58	5	1	7	[4.52; 5.03]
Knowledge about exact dosage needed per fitness supplement consumption	4.68	1.74	5	1	7	[4.40; 4.96]
Knowledge about benefits and implications fitness supplements	5.05	1.38	5	1	7	[4.82; 5.27]
Only consume fitness supplements that are scientifically beneficial	5.54	1.50	6	1	7	[5.29; 5.78]
<b>Pre-workout</b>						
Convenience	5.70	1.02	6	2	7	[5.49; 5.93]
Self-Image	3.48	1.48	3	1	7	[3.16; 3.80]
To Provide Energy	5.29	1.49	6	2	7	[4.97; 5.62]
Muscle Recovery/ Growth	6.05	0.82	6	4	7	[5.87; 6.22]
Knowledge about exact dosage needed per fitness supplement consumption	4.81	1.62	5	1	7	[4.46; 5.16]

	Knowledge about benefits and implications fitness supplements	5.24	1.05	5	2	7	[5.00; 5.46]
	Only consume fitness supplements that are scientifically beneficial	5.95	1.02	6	3	7	[5.73; 6.27]
<b>Creatine Monohydrate</b>							
	Convenience	5.79	1.10	6	2	7	[5.52; 6.05]
	Self-Image	3.96	1.53	4	1	7	[3.59; 4.32]
	To Provide Energy	6.07	1.01	6	3	7	[5.83; 6.31]
	Muscle Recovery/ Growth	5.37	1.28	5	1	7	[5.07; 5.68]
	Knowledge about exact dosage needed per fitness supplement consumption	5.47	1.47	6	1	7	[5.12; 5.82]
	Knowledge about benefits and implications fitness supplements	5.60	0.95	6	3	7	[5.37; 5.83]
	Only consume fitness supplements that are scientifically beneficial	6.27	0.90	7	4	7	[6.06; 6.49]
<b>Vitamin, mineral, or electrolyte rich supplements</b>							
	Convenience	5.78	0.96	6	2	7	[5.57; 5.99]
	Self-Image	3.29	1.57	3	1	6	[2.95; 3.63]
	To Provide Energy	5.52	1.46	6	1	7	[5.20; 5.84]
	Muscle Recovery/ Growth	5.28	1.34	5	1	7	[4.99; 5.57]
	Knowledge about exact dosage needed per fitness supplement consumption	5.00	1.54	5	1	7	[4.66; 5.34]
	Knowledge about benefits and implications fitness supplements	5.39	1.19	6	1	7	[5.13; 5.64]

Only consume fitness supplements that are scientifically beneficial	5.95	1.10	6	1	7	[5.71; 6.19]
<b>Other supplements</b>						
Convenience	5.82	0.98	6	4	7	[5.16; 6.48]
Self-Image	3.73	1.56	4	1	6	[2.68; 4.77]
To Provide Energy	6.18	0.98	6	4	7	[5.52; 6.84]
Muscle Recovery/ Growth	5.09	1.30	5	3	7	[4.22; 5.96]
Knowledge about exact dosage needed per fitness supplement consumption	4.18	1.66	5	2	6	[3.07; 5.30]
Knowledge about benefits and implications fitness supplements	4.73	1.49	5	2	7	[3.73; 5.73]
Only consume fitness supplements that are scientifically beneficial	5.45	1.44	6	2	7	[4.49; 6.42]

**Table 12.** One sample t-tests results when compared to the mean

	t	Mean Difference	95% Confidence Interval of the Difference
Convenience	20.61***	1.60	[1.45; 1.76]
Self-Image	-6.69***	-0.71	[-0.72; -0.93]
To Provide Energy	15.42***	1.50	[1.31; 1.70]
Muscle Recovery/ Growth	9.62***	1.03	[0.82; 1.25]
Knowledge about exact dosage needed per fitness supplement consumption	6.13***	0.71	[0.48; 0.93]
Knowledge about benefits and implications fitness supplements	11.07***	1.04	[0.86; 1.23]
Only consume fitness supplements that are scientifically beneficial	15.99***	1.60	[1.40; 1.80]

Note. \*\*\* significant at  $p < 0.01$  \*\* significant at  $p < 0.05$  \* significant at  $p < 0.1$

**Table 13.** Descriptive statistics of knowledge about supplement use for each information source

	Mean	Standard Deviation	Median	Min.	Max.	95% Confidence Interval
<b>Social Media</b>						



	Knowledge about exact dosage needed per fitness supplement consumption	4.38	1.60	5	1	7	[4.07; 4.70]
	Knowledge about benefits and implications fitness supplements	4.82	1.34	5	1	7	[4.56; 5.09]
	Only consume fitness supplements that are scientifically beneficial	5.58	1.28	6	1	7	[5.33; 5.83]
<b>Friends and Family</b>							
	Knowledge about exact dosage needed per fitness supplement consumption	4.32	1.73	5	1	7	[3.96; 4.69]
	Knowledge about benefits and implications fitness supplements	4.86	1.42	5	1	7	[4.56; 5.15]
	Only consume fitness supplements that are scientifically beneficial	5.28	1.60	6	1	7	[4.94; 5.61]
<b>Internet</b>							
	Knowledge about exact dosage needed per fitness supplement consumption	4.80	1.55	5	1	7	[4.54; 5.06]
	Knowledge about benefits and implications fitness supplements	5.16	1.26	5	1	7	[4.95; 5.37]
	Only consume fitness supplements that are scientifically beneficial	5.71	1.38	6	1	7	[5.48; 5.94]
<b>Professional fitness or nutrition coach</b>							
	Knowledge about exact dosage needed per fitness supplement consumption	5.92	1.23	6	2	7	[5.58; 6.27]
	Knowledge about benefits and implications fitness supplements	5.46	1.16	6	2	7	[5.14; 5.79]

	Only consume fitness supplements that are scientifically beneficial	5.92	1.40	6	1	7	[5.53; 6.31]
<b>Print Media</b>							
	Knowledge about exact dosage needed per fitness supplement consumption	5.00	1.21	5	3	6	[4.35; 5.65]
	Knowledge about benefits and implications fitness supplements	5.56	0.96	6	3	7	[5.05; 6.08]
	Only consume fitness supplements that are scientifically beneficial	6.06	1.39	6	2	7	[5.32; 6.80]
<b>TV</b>							
	Knowledge about exact dosage needed per fitness supplement consumption	4.00	0.82	4	3	5	[3.24; 4.76]
	Knowledge about benefits and implications fitness supplements	4.86	0.90	5	3	6	[4.03; 5.69]
	Only consume fitness supplements that are scientifically beneficial	6.14	0.38	6	6	7	[5.79; 6.49]
<b>Observations</b>		208	208	208	208	208	208

**Table 14.** Multiple regressions between reasons for brand choice and fitness supplement products

	<b>Price</b>	<b>Sustainability</b>	<b>Previous experiences with brand</b>
<b>(Intercept)</b>	5.70*** (0.19)	4.08*** (0.23)	5.25*** (0.19)
<b>Protein Powder</b>	0.11 (0.15)	-0.05 (0.22)	-0.00 (0.18)
<b>Pre-Workout</b>	0.03 (0.14)	0.17 (0.20)	0.31* (0.17)
<b>Creatine Monohydrate</b>	-0.20 (0.14)	-0.47** (0.22)	0.06*** (0.17)
<b>Vitamin, mineral, or electrolyte rich substance</b>	0.08 (0.13)	0.08 (0.20)	0.20 (0.17)

<b>Other Supplements</b>	-0.10 (0.29)	0.26 (0.43)	0.25 (0.35)
<b>Adjusted R<sup>2</sup></b>	0.01	0.01	0.01
<b>F(5, 202)</b>	0.544	1.17	1.29

Note. \*\*\* significant at  $p < 0.01$  \*\* significant at  $p < 0.05$  \* significant at  $p < 0.1$

**Table 15.** Descriptive statistics regarding three main influencing factors for fitness supplement brand choice

	Mean	Standard Deviation	Median	Min.	Max.	95% Confidence Interval
<b>Protein Powder</b>						
Price	5.77	0.99	6	1	7	[5.61; 5.93]
Sustainability	3.95	1.43	4	1	7	[3.72; 4.18]
Previous experiences with the brand	5.48	1.19	6	1	7	[5.28; 5.67]
<b>Pre-workout</b>						
Price	5.73	0.84	6	3	7	[5.55; 5.91]
Sustainability	4.04	1.25	4	2	7	[3.77; 4.30]
Previous experiences with the brand	5.68	0.79	6	3	7	[5.51; 5.85]
<b>Creatine Monohydrate</b>						
Price	5.63	0.92	6	3	7	[5.41; 5.85]
Sustainability	3.71	1.24	3	1	6	[3.42; 4.01]
Previous experiences with the brand	5.59	1.25	6	1	7	[5.29; 5.88]
<b>Vitamin, mineral, or electrolyte rich substance</b>						
Price	5.80	0.87	6	1	7	[5.61; 5.98]
Sustainability	4.06	1.27	4	1	6	[3.78; 4.34]
Previous experiences with the brand	5.60	1.09	6	1	7	[5.36; 5.84]
<b>Other supplements</b>						

Price	5.63	1.50	6	2	7	[4.63; 6.65]
Sustainability	4.18	1.54	4	2	7	[3.15; 5.21]
Previous experiences with the brand	5.73	1.19	6	3	7	[4.93; 6.53]
<b>Observations</b>	208	208	208	208	208	208

## Appendix D. Raw Data

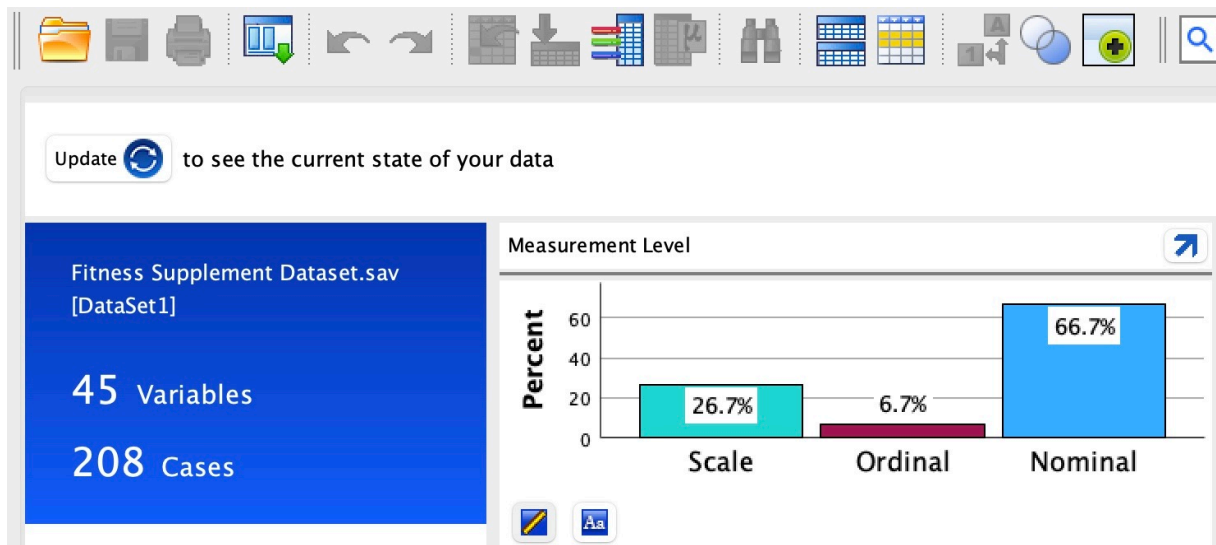


Figure 3. Overview of the Fitness Supplement Raw Dataset

208 : fiber\_5  
Visible: 45 of 45 Variables

Gen der	Age	Nat ional	Ever cise	Su p p le men t	Protein	Pre- vious at h le	Cre dit	Vis it or	Off er	Other_suppl ement_name	Con vent	ef f ic a cy	Eser gy	Mu sc le reco	Q9	Q10	Q11	Pric e	Su p p le men t	Protein	Q13	Q14
184	2	2	1	2	2	1	0	0	0	0	6.00	1.00	5.00	2.00	2		-	7.00	3.00	7.00	2	
185	2	2	1	3	2	1	0	0	0	0	6.00	1.00	5.00	2.00	2		-	7.00	6.00	4.00	2	
186	2	2	1	2	2	1	0	0	0	0	6.00	5.00	3.00	5.00	2		-	7.00	1.00	5.00	2	
187	2	2	1	3	5	1	0	0	0	0	6.00	2.00	5.00	4.00	2	1 Protein Shakes	-	6.00	5.00	5.00	2	
188	2	2	1	3	4	1	0	0	1	0	6.00	2.00	6.00	5.00	2		-	5.00	4.00	6.00	2	
189	2	2	1	3	3	1	0	0	1	0	6.00	4.00	6.00	5.00	2		-	6.00	5.00	6.00	2	
190	2	2	1	2	3	1	0	0	1	0	5.00	2.00	6.00	5.00	2		-	6.00	5.00	6.00	2	
191	2	2	1	3	4	1	0	0	0	0	5.00	3.00	6.00	6.00	2		-	6.00	3.00	7.00	2	
192	2	2	1	3	4	1	0	1	0	0	7.00	2.00	6.00	6.00	2		-	6.00	5.00	6.00	2	
193	2	2	1	3	4	1	1	1	0	1	6.00	3.00	6.00	6.00	2		-	6.00	3.00	5.00	2	
194	2	2	1	3	4	1	1	1	0	0	5.00	4.00	5.00	6.00	2		-	3.00	5.00	5.00	2	
195	2	2	3	3	2	1	0	0	0	0	3.00	3.00	4.00	6.00	2		-	5.00	6.00	6.00	2	
196	2	2	1	2	2	1	0	0	0	0	5.00	3.00	5.00	5.00	2		-	5.00	3.00	3.00	2	
197	2	2	1	2	2	1	0	0	0	0	6.00	2.00	4.00	4.00	2		-	6.00	6.00	4.00	2	
198	2	2	1	1	2	1	0	0	0	0	4.00	2.00	5.00	3.00	2		-	7.00	5.00	5.00	2	
199	2	2	1	3	4	1	0	0	1	0	6.00	3.00	6.00	4.00	2		-	6.00	3.00	5.00	2	
200	2	2	1	3	4	1	1	1	0	1	7.00	3.00	7.00	6.00	2		-	6.00	3.00	6.00	2	
201	2	2	1	5	5	1	1	1	0	0	2.00	3.00	6.00	6.00	2		-	3.00	3.00	6.00	2	
202	2	2	3	2	1	0	0	0	0	0	1.00	1.00	5.00	3.00	2		-	6.00	3.00	1.00	2	
203	2	2	2	3	2	1	0	0	0	0	7.00	1.00	4.00	1.00	2		-	7.00	1.00	4.00	2	
204	2	2	3	2	2	1	0	0	0	0	7.00	1.00	4.00	6.00	2		-	7.00	6.00	6.00	2	
205	2	2	1	2	2	1	0	0	0	0	4.00	2.00	5.00	6.00	2		-	5.00	5.00	6.00	2	
206	2	2	3	5	1	0	0	0	0	0	7.00	3.00	5.00	7.00	2		-	6.00	6.00	7.00	2	Effectiveness of
207	2	2	2	2	2	1	0	0	0	0	5.00	5.00	5.00	3.00	2		-	7.00	4.00	6.00	2	
208	2	2	2	2	2	1	0	0	0	0	5.00	3.00	3.00	2.00	2		-	6.00	2.00	5.00	2	

212 : Q13  
IBM SPSS Statistics Processor is ready  
Unicode:ON Classic  
Visible: 45 of 45 Variables

Q13	Q14	Q15	Soc ial med ia	Frie nd s	Inter net	Protein	Pre- vious at h le	TV	Exa ct	Ben efit	Sci en ce	Pur has e	fiber_5	Online_Protein	Online_Pre	Online_Creatine	Online_vitamin
184	2		1	0	1	0	0	0	3.00	5.00	5.00	1	1	1.00			
185	2		0	0	1	0	0	1	3.00	3.00	6.00	2	1				
186	2		1	0	0	0	0	0	3.00	2.00	4.00	1	1	1.00			
187	2		1	1	0	0	0	0	3.00	5.00	5.00	2	1				
188	2		1	0	1	0	0	0	3.00	5.00	6.00	2	1	1.00			1.00
189	2		1	0	1	0	0	0	3.00	5.00	6.00	2	1				
190	2		1	0	1	0	0	0	3.00	3.00	6.00	2	1				
191	2		0	1	1	0	0	0	3.00	6.00	6.00	1	1	1.00	1.00		
192	2		1	1	0	0	0	0	3.00	5.00	7.00	1	1	1.00	1.00		1.00
193	2		1	0	1	0	0	0	3.00	6.00	6.00	1	1	1.00	1.00		1.00
194	2		1	0	1	0	0	0	3.00	5.00	5.00	1	1	1.00			1.00
195	2		0	1	1	0	0	0	2.00	5.00	1.00	2	1				
196	2		1	1	1	0	0	0	2.00	3.00	3.00	1	1	1.00			
197	2		0	0	1	0	0	0	2.00	3.00	5.00	1	1	1.00			
198	2		1	0	1	0	0	0	2.00	4.00	5.00	2	1				
199	2		1	1	0	0	0	0	2.00	3.00	6.00	2	1				
200	2		1	1	0	0	0	0	2.00	5.00	6.00	1	1	1.00	1.00		1.00
201	2		1	0	0	1	0	0	2.00	5.00	4.00	1	1	1.00	1.00		1.00
202	2		1	1	0	0	0	0	1.00	1.00	1.00	2	1				
203	2		0	1	1	0	0	0	1.00	1.00	1.00	2	1				
204	2		0	0	1	0	0	0	1.00	1.00	3.00	2	1				
205	2		1	1	1	1	1	0	2.00	3.00	3.00	1	1	1.00	1.00		
206	2	Effectiveness of the...	7.00	0	1	1	0	0	7.00	5.00	4.00	2	1	1.00			
207	2		1	1	0	0	0	0	4.00	4.00	4.00	2	1	1.00			
208	2		1	0	1	1	0	0	4.00	5.00	6.00	1	1	1.00			

212 :  
IBM SPSS Statistics Processor is ready  
Unicode:ON Classic  
Visible: 45 of 45 Variables

Pre	Online_Creatine	Online_vitamin	Online_Other	Instore_Protein	Instore_Pre	Instore_Creatine	Instore_vitamin	Instore_other	var	var	var
184	-	-	-	-	-	-	-	-			
185	-	-	-	-	2.00	-	-	-			
186	-	-	-	-	-	-	-	-			
187	-	-	-	-	2.00	-	-	2.00		2.00	
188	-	1.00	-	-	-	-	-	-			
189	-	-	-	-	2.00	-	-	2.00			
190	-	-	-	-	2.00	-	-	2.00			
191	1.00	-	-	-	-	-	-	-			
192	1.00	-	1.00	-	-	-	-	-			
193	1.00	-	1.00	-	-	-	-	-			
194	1.00	1.00	-	-	-	-	-	-			
195	-	-	-	-	2.00	-	-	-			
196	-	-	-	-	-	-	-	-			
197	-	-	-	-	-	-	-	-			
198	-	-	-	-	2.00	-	-	-			
199	-	-	-	-	2.00	-	-	2.00			
200	1.00	-	1.00	-	-	-	-	-			
201	1.00	1.00	-	-	-	-	-	-			
202	-	-	-	-	2.00	-	-	-			
203	-	-	-	-	2.00	-	-	-			
204	-	-	-	-	2.00	-	-	-			
205	1.00	-	-	-	-	-	-	-			
206	-	-	-	-	-	-	-	-			
207	-	-	-	-	-	-	-	-			
208	-	-	-	-	-	-	-	-			

Figure 4. Raw Data Sample