Supplement use and attitudes towards supplementation with vitamins, minerals and protein powder among a Facebook community and university students

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Foreword

Submitted in partial fulfillment of the requirements of the BSc psychology degree, Reykjavik University, this thesis is presented in the style of an article for submission to a peer-reviewed journal.
Abstract
The objective of this survey was to examine individuals who use supplements and those with positive attitudes towards supplementation. Prior research has shown increasing supplement use being correlated with a rise in liver failure and liver injury. A questionnaire was used to determine if gender, age, exercise and body-image were contributing factors. There were 415 participants in this survey, both female and male in the age range of 18-70 years old. Results showed that exercise had a small association with supplement attitudes but body-image, did not add anything to that factor. Those who exercise four times or more weekly had more positive attitudes towards supplementation use than those who exercise less. However, those who exercise fewer times than four times a week were more likely to use supplements than those who exercise more often. Age and gender were both contributing factors to supplement use but not to supplement attitudes. Younger participants and female participants were more likely to use supplements. Results revealed that there was not a significant gender difference in the attitudes towards supplementation with protein powder.

Keywords: Supplement use, attitudes towards supplementation, gender, age, body-image.

Útráttur

Lykilorð: Notkun fæðubótarefna, viðhorf til fæðubótarefna, kyn, aldur, likamsímynd.
Supplement use and attitudes towards supplementation with vitamins, minerals and protein powder among a Facebook community and university students

In recent years, consumption of dietary supplements has been increasing in western communities, along with the number of different supplements the average user consumes. Studies have shown a corollary effect between this increase in supplement use and a rise in cases of liver failure and liver injury (Licata, 2016; Stickel and Shouval, 2015; Stickel, Kessebohm, Weimann and Seitz, 2011). With this in mind it is important to identify the groups of people using supplements and those with a positive attitude towards supplement use in order to better educate people on the usage of supplements and the dangers that can be associated with their consumption. A U.S. research conducted by Radimer et al. (2004) showed that 52% of adult participants under the age of 60 reported taking dietary supplements. There were various reasons given by individuals who choose to supplement with vitamins and minerals. Among these reported were: inadequate nutritional intake, benefits to feelings of well-being, and having had supplements “recommended to them”. The study also showed that individuals who are more concerned with their food intake are more likely to supplement with vitamins and/or minerals (Sebastian, Cleveland, Goldman and Moshfegh, 2007). These results are consistent with the results from a study conducted by Dickinson, MacKay and Wong (2015), which showed that the individuals who were concerned with living a healthy lifestyle were more likely to supplement where, 90% of whom reported supplement use.

According to a study administered by Martin and Govender (2011) on adolescent males aged 15-19 years old, a majority of the participants expressed a desire to be more muscular. Furthermore, it was perceived by almost one third of the participants that more happiness would be obtained by gaining more muscle mass. Almost half the participants were using supplements (such as protein powder) in order to gain more muscularity. A study that
was conducted by Bianco et al. (2011) on individuals who exercised in fitness centers found that supplement use was more common amongst men than their female counterparts. Their results also showed that half of the individuals who participated in the study supplemented with whey protein powder. Younger participants were more likely to supplement with vitamins and minerals but were as likely to supplement with protein powder. These results are consistent with those of a study conducted by Diehl et al. (2012) on supplement use amongst elite athletes. Results indicated that male athletes were more likely to use supplements than female athletes, although both female and male participants used supplements as it was recommended to them in order to be more successful athletes. In addition, male athletes were more likely to use supplements on a daily basis and for muscle building purposes, one of which was protein powder. The most supplement use was found amongst male participants at the age of 18 years old, which was also stated in a study conducted by Caracciolo et al. (2016) where supplement use was found to be more common with younger participants. In that same study, however, it was suggested that supplement use was more common amongst females.

The purpose of the present survey was to examine if age, gender, exercise and body-image are contributing factors to attitudes towards supplementation with vitamins, minerals and/or protein powder and supplement use. Since supplement use is increasing amongst the general public this additional knowledge will reveal what affects people’s choice to use supplements. As previously mentioned, several studies have shown that increasing supplement use is linked to liver failure and liver injury. It is important to see which groups could be at risk and whether there is a need for educating certain groups about supplements, how they work and whether they, in fact, provide the gains they promise. The following hypotheses were used to identify the groups that were more likely to use supplements and those who’s views are more positive towards supplement use than others.
These hypotheses were established with regard to previous studies to determine if the same user pattern applied to Icelandic participants in comparison to population in prior research.

1a) People who exercise more than four times a week have a more positive attitude towards supplementation than those who exercise less.

1b) People who exercise more than four times a week are more likely to use supplements than those who exercise less.

2a) People younger than 30 years old have a more positive attitude towards supplementation than those who are older.

2b) People younger than 30 years old are more likely to use supplements than those who are older.

3a) Women have a more positive attitude towards supplementation with vitamins and minerals than men.

3b) Women are more likely to use those supplements than men.

4) Men are more likely to supplement with protein powder than women.

5a) Those who exercise more than four times a week have a more positive attitude towards protein powder for muscle building purposes than those who exercise less.

5b) Body-image is a contributing factor, i.e. those who have low body-image have a more positive attitude towards protein powder for muscle building purposes.

Method

Participants

There were 415 participants in this survey, 269 females and 146 males in the age range of 18-70 years old. Participants were recruited from Reykjavík University via email and social media (Facebook). In this experiment volunteer sampling was used as those who received the questionnaire by email as well as those who saw it on Facebook were under no
obligation to answer the survey. Therefore, participation in the survey was not mandatory. Some individuals were not able to respond due to age (under the age of 18 years old).

Participants were given all necessary information prior to answering the questionnaire, which also stated that they were not required to answer and that they could drop out at any time (Appendix B). No material incentives were offered for participation.

**Instruments and measures**

The equipment used in this survey was a questionnaire developed by researcher. Questions were selected by reviewing older literature. Questions 1, 2, 3, 5, 6 and 11 were selected in order to identify whether certain groups of people were more likely to use supplements and had a more positive attitude towards using them. Questions 4a and 4d were based on questions from the questionnaire submitted in research conducted by Dickinson, MacKay and Wong in 2015, which was a survey conducted to examine attitudes towards supplementation among other supplementation related variables. Question 4f and question 7 were based on questions from a questionnaire in a research conducted by Chandra, Miller and Willis (2005). Researcher collaborated with Inga Kristjánsdóttir, a nutritional therapist at Heilsuhúsið in order to form and phrase options b, c and e in question 4. Questions 8, 9, 10, 11 and 13 were based on questions from Rannsóknir & greining. The questionnaire used had an acceptable internal validity where chronbach’s alpha was .75.

**Research design and analysis**

The purpose of this survey was to examine the attitudes of people in Iceland towards supplementation with vitamins, minerals and protein powder and if age, gender, exercise and body-image were contributing factors. This was done to identify the groups of people more likely to use supplements and those who use multiple supplements at a time. Therefore the independent variables were participant’s age, gender and whether he/she supplements with vitamins and/or minerals and the dependent variable was participant’s attitude towards the
supplementation with vitamins and/or minerals. Independent t-test was used to examine whether exercise, age and gender effect supplement use and attitudes towards supplementation and hierarchical multiple regression involving two steps was used to examine attitudes towards supplementation with protein powder and whether exercise and body-image are contributing factors. SPSS statistics program was used to analyze results.

**Procedure**

The questionnaire was submitted via Facebook and email. Researcher put the link to the questionnaire on her personal Facebook page and asked friends to participate and share this with their friends. The questionnaire was also posted on Facebook groups for exercise and fitness, an all girl Facebook group as well as on a page for psychology students in Reykjavik University asking for participation. A personal message was sent to all group administrators asking permission to post on their page (Appendix C). Email was sent to Einar in student registry who sent out the survey to all students at Reykjavik University asking for participation (Appendix D).

**Results**

There were 415 participants who answered the survey in the age range of 18-70 years old. Most participants were at the ages of 25-30 years old (M=2.09) and standard deviation was 1.04. Participants were both male and female. Female participants took 62% of the total, male participants were 34% and 4% did not specify their gender. Participant’s exercise ranged from never exercising to exercising four to six times a week, where most participants exercised three times a week (M=4.05). The Participants’ body-image was examined by using a body-image scale where participants ranged from having negative body-image to postitive body-image. However, most participants had a fairly positive body-image (M=18.71). Participant supplement use ranged from not using supplement to using supplements as can be seen in Table 1, a majority of participants used supplements (M=1.23).
Attitudes towards supplementation had a large range, although the mean was close to the maximum, which suggests a fairly positive attitude towards supplementation with the survey population (M=31.85). Attitudes towards supplementation with protein powder was isolated from other supplement types, the range for those attitudes was fairly large, although participants had a rather positive attitudes towards protein powder supplementation (M=10.17).

Table 1

*Sample Means, Standard deviation, and Ranges*

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>416</td>
<td>1.64</td>
<td>.48</td>
<td>0-2</td>
</tr>
<tr>
<td>Age</td>
<td>415</td>
<td>2.09</td>
<td>1.04</td>
<td>1-6</td>
</tr>
<tr>
<td>Exercise</td>
<td>415</td>
<td>4.05</td>
<td>1.54</td>
<td>1-6</td>
</tr>
<tr>
<td>Body-image</td>
<td>403</td>
<td>18.71</td>
<td>3.76</td>
<td>6.14-24.57</td>
</tr>
<tr>
<td>Supplement attitudes</td>
<td>412</td>
<td>31.85</td>
<td>6.04</td>
<td>15.33-43.11</td>
</tr>
<tr>
<td>Supplement use</td>
<td>415</td>
<td>1.23</td>
<td>.42</td>
<td>1-2</td>
</tr>
<tr>
<td>Supplementation with protein powder</td>
<td>414</td>
<td>10.17</td>
<td>2.36</td>
<td>3-15</td>
</tr>
</tbody>
</table>

When examining attitudes towards supplementation, three variables were examined. Exercising four times or more weekly and exercising less than four times a week, the age range of 18-30 years old compared to those who were 31-70 years old and female participants were compared to male participants. In regard to frequency of exercise independent t-test revealed that there was a significant difference between those who exercised four times or
more weekly and those who exercised less than four times a week, \(t(410) = -3.62, p<.05\). As can be seen in Table 2, those who exercised four times or more had a more positive attitude towards supplementation than those who exercised fewer times a week, although both groups had a fairly positive attitude towards supplementation. Independent t-test also revealed no significant association for neither age, \(t(409) = .86, p = .38\), nor gender, \(t(408) = -1.51, p = .131\), with attitudes towards supplementation.

Table 2

| Exercise, age and gender associated with attitudes towards supplementation |
|-----------------------------|------|-----|-----|-----|
| Variables                   | N    | Mean| Standard deviation | P value |
| Exercise more than 4 times a week | 216  | 32.86| 6.13             | .00*    |
| Exercise less than 4 times a week | 196  | 30.74| 5.75             | .00*    |
| 18-30 years old             | 373  | 31.96| 6.1              | .38     |
| 31-70 years old             | 38   | 31.1 | 5.49             | .38     |
| Female                      | 266  | 31.52| 5.85             | .13     |
| Male                        | 146  | 31.47| 6.37             | .13     |

*p<.05

In regards to supplement use there were three variables examined. Exercising four times or more weekly and exercising less than four times a week, participants at the age range of 18-30 years old compared to those who were 31-70 years old and female participants were compared to male participants. Exercising four times or more weekly was associated with
supplement use, independent t-test revealed that there was significant difference between those who exercised four times or more weekly and those who exercised fewer times, $t(339.4) = 5.81, p < .05$. Table 3 shows that those who exercised four times or more were less likely to use supplements than those who exercised fewer times. Regarding supplement use and age, independent t-test revealed that there was a difference between those at the age of 18-30 years old and those who were aged 31-70 years old when it came to supplementation use, $t(42.1) = -2.52, p<.05$. Those at the ages of 31-70 years old were more likely to use supplements than those who were aged between 18-30 years old, as can be seen in table 3. There was also an association between gender and supplementation use according to independent t-test analyses, $t(342.9) = -2.39, p < .05$, where women were slightly more likely to use supplements than men.

Table 3

<table>
<thead>
<tr>
<th>Exercise, age and gender associated with supplement use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Exercise more than 4 times a week</td>
</tr>
<tr>
<td>Exercise less than 4 times a week</td>
</tr>
<tr>
<td>18-30 years old</td>
</tr>
<tr>
<td>31-70 years old</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Male</td>
</tr>
</tbody>
</table>
When examining specific supplement use, i.e. supplementation with protein powder, results revealed no difference between males and females regarding their attitudes towards supplementation with protein powder, t(287.2) = -1.34, p =0.18.

Table 4

<table>
<thead>
<tr>
<th>Gender</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>10.38</td>
<td>2.43</td>
<td>0.18</td>
</tr>
<tr>
<td>Male</td>
<td>10.1</td>
<td>2.32</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Hierarchical 2 step multiple regression was used to estimate whether there was a significant relationship between exercising and attitudes towards supplementation with protein powder and to see if body-image added anything to that relationship. Table 5 shows the relationship between exercising, body-image and whether the participant’s attitude towards protein powder was that it could help with building muscle. Step one demonstrates the relationship between how often the individual exercises where exercise alone explained 3.5% of attitude towards supplementation with protein powder for muscle building purposes. An increase in exercise of one unit is associated with an increase in attitude of .119 units. In step 2, body-image was added to the equation. Body-image only added .1% to these attitudes. Furthermore, if the participant would increase their exercise by one unit the attitude would only increase by 0.13 units. Even though the relationship size was fairly small, exercise had a significant effect when it came to attitudes towards protein supplementation for muscle building purposes (β = .186, t = 3.79, p < .05) but body-image did not (β = .044, t = .81, p =.42).
Table 5

Relationship between exercise, body-image and the use of protein for muscle building purposes.

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>( \beta )</td>
<td>Sig.</td>
<td>( t )</td>
<td>B</td>
<td>( \beta )</td>
<td>Sig.</td>
<td>( t )</td>
</tr>
<tr>
<td>Constant</td>
<td>3.42</td>
<td></td>
<td>22.56</td>
<td>3.23</td>
<td>11.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td>.132</td>
<td>.186</td>
<td>.00*</td>
<td>3.79</td>
<td>.119</td>
<td>.168</td>
<td>.002*</td>
<td>3.09</td>
</tr>
<tr>
<td>Body image</td>
<td>.013</td>
<td>.044</td>
<td>.42</td>
<td>.81</td>
<td>.036</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

Discussion

Results show that there is a significant difference in supplement use amongst those who exercised more than four times a week and those who exercised less. Those who exercised less than four times a week were more likely to use supplements. These results are inconsistent with the results from Dickinson, MacKay and Wong (2015) where it is stated that those concerned with a healthier lifestyle are more likely to use supplements. We can assume that those living a healthy lifestyle exercise to some extent.

When looking at age, supplement use was more common amongst those who were older than 30 years old compared to those who were younger. These results are inconsistent with the results from Bianco et al. (2011), Diehl et al. (2012) and Caracciolo et al. (2016) where results from all suggested that supplement use was more common amongst younger people.

In addition, women reported using supplements more than men. This is consistent with the results from research conducted by Caracciolo et al. (2016) where it is stated that supplement use is more common amongst women. However, this is inconsistent with results from Diehl et al. (2012) where supplement use was more common amongst men.
When examining attitudes towards supplementation between those who exercise more than 4 times a week and those who exercise less than four times a week present results showed a significant difference between the two groups. Those who exercise more have a more positive attitude towards supplementation. Prior research indicate that those exercising more are using supplements to a larger extent (Diehl et al., 2012) and those more concerned with living a healthy lifestyle are also using supplements more than those who are not (Dickinson et al., 2015). Present results also revealed that there was no significant difference between gender regarding attitudes towards supplementation. This is inconsistent with both results from Caracciolo et al. (2016) where results indicated supplement use amongst females to be more common and Bianco et al. (2011) where it was stated that supplement use was more frequent amongst men. Age did not have significant effect on supplement attitudes, which is inconsistent with research conducted by Bianco et al. (2011), Diehl et al. (2012) and Caracciolo et al. (2016) which all suggested supplement use to be more common amongst younger people. It had been assumed that individuals using supplements have a more positive attitude towards using supplements (Dickinson et al., 2015) and those who are reportedly using supplements would be consistent in their attitudes towards their use. Present research indicates that is not always the case. Since many of the hypotheses were not confirmed other factors must contribute more to supplement attitudes and since exercise was the only significant factor it can be assumed that it contributes more to attitudes towards supplementation than gender, age and even supplement use.

When isolating supplementation with protein powder from other supplements, results revealed no difference between men and women, these results are inconsistent with the results from research conducted by Bianco et al. (2011) where it was revealed that supplement use is more common amongst men and that whey protein powder was most common. However, these results did not come as a surprise because in Iceland there has been
a significant rise in the popularity of fitness competitions, especially for women, and perhaps as a result women are also using supplements to a greater extent.

When examining attitude towards supplementation with protein powder and whether body-image and exercise are contributing factors to those attitudes, results revealed that exercise explained 3.5% in those attitudes whereas body-image did not add anything. This is both partly consistent with results from Martin and Govender (2011) where it was stated that participants were supplementing with protein powder to gain muscularity. However, they are partly inconsistent because participants in that particular survey had a negative body-image and were supplementing and exercising in order to get more muscular because they thought it would bring them happiness.

There were nine hypotheses in total and only three of them were confirmed. The hypotheses confirmed were: that those who exercise more had a more positive attitude towards supplementation, that women were more likely supplement users and that those who exercise more have a more positive attitude towards protein powder for muscle building purposes. These findings are consistent with previous research. However, there were six hypotheses that were not confirmed. Younger participants were not more likely supplement users nor did they have a more positive attitude towards supplementation. These results could be due to participant groups being too homogeneous where most participants in present study were at the age of 25-30 years old and only a small number of participants were older, which leads to a non-significant result. The same could be said about exercise. The hypothesis of exercise being a contributing factor to supplement use was not confirmed. The hypothesis of exercise being a significant factor to supplement attitudes regarding both overall supplement use and supplementation with protein powder was not confirmed. This was due to most participants being part of the group that exercised 3 times a week. Clearer results might be at hand with more heterogeneous group. When body image was added to the exercise equation
it was revealed that it did not have any significant effect, hence the hypothesis of body image contributing to supplement attitudes was not confirmed. Participants in this study had a fairly positive body-image, which leads to the same conclusion, as in other non-confirmed hypotheses; that the group examined in this survey was too homogeneous. Gender differences were non significant for either supplement use or protein supplementation. Most participants were women, which confirmed, yet again, that the group examined would have had to be more heterogeneous.

The same issue appears throughout the results of the survey. More heterogeneous groups could have lead to different results. For further research it would be better to compare more heterogeneous groups in order to better identify groups of people using supplements. This research was conducted on Facebook and amongst Reykjavik University students, which could have lead to more homogeneous groups than might be preferred. In a study like this it is a preferable aim to get groups that are as heterogeneous as possible in order to get a clearer results and to be able to generalize onto others.

Participants in present survey were 415, 73,3% of participants use supplements and 66,8% of those using supplements were using three or more supplements at a time. These results do not show a particular pattern of supplement users nor those who have a positive attitude towards supplementation except in their frequency of exercise. Exercise seemed to be the most contributing factor as stated in previous research but the relationship in present study was negative which leads to the conclusion that this needs to be further examined. Elite athletes in the study conducted by Diehl et.al., (2012) were using supplement at the recommendation of their coach or parents in order to gain more success in their respective fields. This implies that the young people in that study did not know much about the supplements they were taking. Furthermore, in a research conducted by Chandra et.al. (2005) on senior adults that were using supplements recommended to them in which they stated not
knowing the exact effect of those supplements. Many individuals are also using pharmaceutical medicine, which could lead to a dangerous adverse drug effect from a combination of the two. With that being said, education about supplement use is crucial, as people often do not know the dangers of using too many supplements at a time.
References


