RAIS Journal for Social Sciences | VOL. 4, No. 2, 2020
ISSN 2574-0245 (Print) | ISSN 2574-1179 (Online) DOI: 10.5281/zenodo.4286587

The Impact of Habit Trackers, Healthy Lifestyles and Exercise Motives of University Students in Toronto

Matt VOCINO[1], Laurel WALZAK[2]

[1]Ryerson University, Faculty of Communication and Design, Global Experiential Sport Lab, RTA School of Media, Sport Media, Canada, mvocino@ryerson.ca
[2]Ryerson University, Faculty of Communication and Design, Global Experiential Sport Lab, RTA School of Media, Sport Media, Canada, lwalzak@ryerson.ca

ABSTRACT: Encouraging a healthy and active lifestyle is an important aspect of societal institutions. In spite of these efforts, young adults are still not meeting physical activity guidelines, leading to serious health problems. This study looked to determine the exercise motivations of university students and worked to help academics understand and determine whether a self-reported, healthy-lifestyle habit tracker can improve an individual's health, generate greater awareness of the benefits of being physically active—including academic benefits of living a healthy lifestyle; and change their behaviors. With this in mind, students from a large downtown Toronto-based university were recruited for this study and were required to answer two surveys, six weeks apart after receiving a healthy lifestyle tracking tool. The questionnaires measured individuals' healthy lifestyle behaviors by using a modified Healthy Lifestyle Scale for University Students (HLSUS) and exercise motivations by using the Exercise Motivations Index-2 (EMI-2). Our research suggests that exercise motivations of university-aged students are similar, but that there are significant differences between gender, race, and age group. The study results also indicated that using the physical habit tracker was not correlated with increased healthy lifestyle behaviors but did increase awareness of the academic benefits of living a healthy lifestyle.

KEYWORDS: motivations, behaviors, healthy lifestyle, exercise

Introduction

An important aspect of societal institutions today is encouraging a healthy and active lifestyle. Despite their efforts, adults around the world are still not meeting physical activity guidelines, leading to serious health problems (Paez, Zhao, and Hwang 2009; Ng et al. 2012). Specifically, only 16% of Canadian adults aged 18 to 79 years meet the recommended targets according to the 2019 Canadian Health Measures Survey (CHMS). This group includes individuals who are entering university and have the ability to lead active lifestyles (Skår, Sniehotta, Molloy, Prestwich, and Araújo-Soares 2011; Roberts, Reeves, and Ryrie 2015). Research has linked physical activity to academic success, and weight gained from poor physical activity habits during these formative years can lead to adverse health consequences (Danbert, Pivarnik, and Mudd 2014; Kari, Pehkonen, Hutri-Kähönen, Raitakari, and Tammelin 2017; Egli, Bland, Melton, Czech 2011; Racette, Deusinger, Strube, Highstein, and Deusinger, 2005).

The purpose of this study is to assist university athletic programs in creating physical activity programs that meet the needs of their students by examining the motivations of university students. In addition, this research will also look to better understand and determine whether a self-reported, healthy-lifestyle habit tracker (HLHT) can improve an

individual's health, make respondents more aware of the benefits of being physically active, and change their behaviors.

Literature Review

The Self-Determination Theory (SDT), developed by Deci and Ryan, works to explain why people take certain actions and has been applied to many topics (Deci and Ryan 2000; Ng et al. 2012). SDT has explained people's motivations for living an active lifestyle by dividing motivations into two categories: intrinsic motivation—individuals partake in certain activities for their own personal reasons, and extrinsic motivations (Fortier, Duda, Guerin, and Teixeira 2012).

In 2011, Egli, Bland, Melton, and Czech surveyed a total of 2214 university students from 156 phys ed classes in the US to determine how exercise motivations differ across demographics. The study found that positive health and ill-health avoidance were the two most important motivating factors among the entire group, followed by appearance, strength and conditioning, and weight management. Affiliation, social recognition, and health pressures were the lowest (Egli, Bland, Melton, and Czech 2011, 401). Results showed that men were more likely to be motivated by intrinsic factors and females by extrinsic factors. The study determined that those younger than twenty were motivated by health pressures and avoidance of medical issues in the future, while those older than 20 were more likely to be motivated to exercise because of affiliation (Egli, Bland, Melton, and Czech 2011, 401). The study also concluded that Caucasians were motivated by stress, revitalization, enjoyment, and weight management. African American participants appear to participate in physical activity to stay physically fit (Egli, Bland, Melton, and Czech 2011, 401).

Similarly, a study out of the UK looked at differences in motivations across demographics. This study found that older students were more likely to be motivated to avoid health issues, and appearance motives were less important than previously thought (Roberts, Reeves, and Ryrie, 2015). The study also found differences between the motivations of male and females (Egli, Bland, Melton, and Czech 2011; Roberts, Reeves, and Ryrie, 2015; Wechsler et al. 2002).

Another study looked the impact on students' motivations before and after the mid-semester study week (spring break). It was found that just over a third of students were exercising in order to look good on spring break, and that weight management, performance, psychological motivations, and general health motives were the most common reasons for living an active lifestyle (Kimbrough, Rose, Vallee, and Nelan 2005).

Self-tracking technologies and physical well-being

Many researchers have looked at the impact of activity trackers, self-tracking tools, and fitness apps. Current literature has presented mixed results. Some scholars have completed extensive reviews on the topic and have claimed that while the results are promising, they can't be taken at face value and more research on the topic is needed (Hermsen, Frost, Renes, Kerkhof 2016; Kersten-van Dijk et al. 2017; Piwek, Ellis, Andrews, and Joinson 2016). Other case studies and surveys suggest that tracking technologies do have beneficial effects on consumers' health and well-being (Hermsen, Frost, Renes, Kerkhof 2016; Kersten-van Dijk et al., 2017). While most current literature has focused on digital tracking technologies, past research has looked at more traditional methods. The studies found that overall, interventions aiming to increase physical activity in healthy but not active adults are effective in promotion behaviour change (Howlett, Trivedi, Troop, and Chater 2019).

Leaflet, healthy habits, and self-tracking

Our goal was to look at basic mediums used to influence behaviour change regarding physical activity. In a study by Lally, Chipperfield, and Wardlow (2008), individuals were given a leaflet with tips to help them lose weight and a place to record their progress. The simple educational leaflet improved people's behaviour leading to weight loss (Lally, Chipperfield, and Wardlow 2008).

Healthy lifestyle of university students

To better understand university students' healthy lifestyle, Wang developed the Healthy Lifestyle Scale for University Students (HLSUS) based on Penderd's Health Promotion Model. The survey included 38 questions that are divided into eight divisions covering such topics as exercise, nutrition, and stress management (Wang, Xing, and Wu 2013). Each is ranked out of 1 to 5, with the highest possible score of 190 and the lowest 38. The higher the score means the more the subject actively engages in the behaviors listed. Currently, most applications of this scale are used in studies to differentiate students' behaviors based on demographics (Wang, Xing, and Wu 2013).

Benefits associated with physical Activity

Physical activity has also been shown to improve other areas. There is a correlation between physical activity levels and academic success/education level attained (Donnelly et al. 2016; 2017; Kari, Pehkonen, Hutri-Kähönen, Raitakari, and Tammelin 2017; Singh, Uijtdewilligen, Twisk, van Mechelen, Chin A Paw 2012). In addition, physical activity has been linked to improved creativity and memory; lower stress; and increased energy, mental health, and focus (Oppezzo, and Schwartz, 2014; Ruscheweyh, et al. 2009; 2011; Ahn, and Fedewa, 2011; Budde, Voelcker-Rehage, Pietraßyk- Kendziorra, Ribeiro,and Tidow 2008).

Methods

Participants

We initially surveyed forty-five students enrolled in a large Toronto-based university. Nine respondents were excluded because of missing data. After a second survey, seven participants' responses were excluded from the results as they did not complete the first baseline survey. So overall with these exclusions in mind a total of nineteen individuals completed both surveys.

A random sampling method was used to recruit the students through in-person and social media recruitment strategies. Students were offered a $25 gift card if they completed both surveys. Students were required to sign up for the survey online, and were later emailed an online questionnaire to fill out. Participants were then asked to pick up an HLHT (available for one week) from the university's athletic facility. Participants were to use the habit tracker for six weeks, then to fill out the second and final survey. It should be noted that during this six-week period, the province was put under quarantine, potentially limiting participants' access to things such as workout equipment and healthy food options.

Surveys

The first survey administered began by asking demographic questions and about the participants living arrangements and whether or not the respondent was an international student. The survey also included a modified HLSUS (Wang, Xing, and Wu 2013). The scale was modified to better represent students in North America and shortened from 38 questions to 31. Response items

ranged from 1 to 5, with 1 depicting "never" and 5 as "always." The first questionnaire also included seven questions specifically relating to the academic benefits that have been linked to physical activity (Donnelly et al. 2016; 2017; Kari, Pehkonen, Hutri-Kähönen, Raitakari, and Tammelin 2017; Singh, Uijtdewilligen, Twisk, van Mechelen, Chin A Paw 2012; Oppezzo, and Schwartz, 2014; Ruscheweyh, et al. 2009; 2011; Ahn, and Fedewa, 2011; Budde, Voelcker-Rehage, Pietraßyk-Kendziorra, Ribeiro,and Tidow 2008). For these set of questions respondents used a seven-point Likert-scale with 1 representing "Very Strongly Disagree" and 7 indicating "Very Strongly Agree." The second survey also included a set of twelve questions as per the Self-Reporting Habit Index to determine the strength of participants' habit of using the HLHT (Verplanken and Orbell 2003). The second survey also features the EMI-2, a scale made up of fifty-one questions and fourteen subscales. The fourteen subscales are affiliation, appearance, ill-health avoidance, nimbleness, positive health, revitalization, social recognition, strength and endurance, stress management, and weight management. Study participants must select a number between 0 to 5, where 0 indicates "not at all true for me" and 5 "very true for me" (Egli, Bland, Melton, and Czech 2011).

Healthy lifestyle habit tracker

The HLHT was created by the Toronto-based university's athletic department. The tool included healthy lifestyle tips and a calendar for students to record their behaviors.

Hypotheses

Before administering these surveys, a number of hypotheses were made by the researchers.

Hypothesis 1: We believe the exercise motivations findings will be similar to that of past studies.

Hypothesis 2: Participants who have a strong Self-Reporting Index score (Habit Score) after six weeks will see the greatest improvement in their (HLUS) questionnaire scores, and they will be more actively involved in physical activity.

Hypothesis 3. Participants will be more aware of the academic benefits of being physically active after using the HLHT for six weeks.

Hypothesis 4: Gender, age, ethnicity, living arrangements, and whether or not a participant is an international student will have an impact on one's healthy behaviors and physical activity.

Data analysis

For hypothesis one, mean and standard deviation scores were calculated with gender, age, and ethnicity serving as the independent variable. The dependent variables were the fourteen subscales. Regression analyses, t-tests, and ANOVAs were conducted to determine significance.

Mean scores for the total HLSUS scores were also calculated with age, gender, ethnicity, living arrangements, and international or non-international student status serving as the independent variables. Regression analyses and t-tests were conducted to determine whether the independent demographic variables played a significant role in a person's overall healthy-lifestyle score.

To determine the impact of the HLHT, the difference between two total HLSUS scores was calculated, then the total habit score was calculated by adding the scores of their individual questions together before a scatter plot was generated. A regression analysis was then administered to determine whether there was any significance between habit score

HLSUS. This process was repeated but instead, the difference in how many days a person worked out a week was calculated and used in replacement of the individual's HLSUS score.

To determine whether certain characteristics impacted a participant's understanding of the benefits of living a healthy lifestyle on academics, a scatter plot was created. A participant's total academic score from survey one was graphed with their second score from survey two. An ANOVA and regression test were also conducted to see whether there was any significance.

Means scores and standard deviations were calculated, and regression analysis was used to determine the impact of an individual's gender, age, ethnicity, student status, and living status on the number of days they work out a week and their overall HLSUS score. This analysis was conducted separately for participants who completed survey one and survey two. Survey one had 36 total respondents, 75% of which were female, 41% were 20 years old and younger, and 88% were not international students; 19.4% of respondents were Caucasian, 44% were Asian, 25% were South Asian, African Canadians/Blacks were 6%, and the rest were Arabs and Filipino Canadians. Survey two consisted of 26 respondents, 69% of whom were female, 65% were 20 years old or younger, and 96% were non-international students; 11.5% of respondents were Caucasian, 7% were Black, 3.8% were Hispanic or Latino, 46% Asian, 27% South Asian and 3.8% Eastern European.

Results

Given the small number of respondents and a sample that doesn't accurately represent the entire student population of the university, it is difficult to confidently state that the results of the survey are significant and accurate.

Hypothesis 1

The findings are somewhat similar to the study by Egli, Bland, Melton, and Czech (2011). In the current study, Positive Health ranked as the top motivation with Endurance and Ill-Health Avoidance in second and third place. The next three motivations were Nimbleness, Enjoyment, and Appearance. The bottom three motivations of our study population were Competition, Social Recognition, and Health Pressures. For means and standard deviations on these results, see Table 1.

Table 1. Descriptive Statistics Reported by Means and Standard Deviations for Exercise Motivation Subscales (EMI-2)

	Scales	Mean	SD
1	Positive Health	4.551	0.853
2	Strength and Endurance	4.452	0.927
3	Ill-Health Avoidance	4.026	1.006
4	Nimbleness	3.872	1.163
5	Enjoyment	3.788	1.166
6	Appearance	3.788	0.997
7	Revitalization	3.769	0.983

8	Weight Management	3.750	1.897
9	Stress Management	3.740	1.201
10	Challenge	3.577	1.255
11	Affiliation	2.654	1.461
12	Competition	2.577	1.374
13	Social Recognition	2.356	0.965
14	Health Pressures	1.897	0.951

Table 2. Ranking of Exercise Motivation Subscales Reported by College Subjects Given by Frequency and Percentile

Subscale	Female	Male	</= 20	>20	White/ Caucasian	Hispanic Latino	Black/ African Canadian	Asian	South Asian	Eastern European
Affiliation	11	12	12	11	12	4	11	11	12	10.0
Appearance	5	10	5	7	6	2	5	9	4	6.0
Challenge	10	6	9	10	9	1	3	8	10	5.0
Competition	13	8	11	13	11	6	11	12	11	9.0
Enjoyment	9	3	3	9	4	2	6	5	9	7.0
Health Pressures	14	14	14	14	13	6	10	14	14	9.0
Ill-Health Avoidance	3	4	4	2	3	3	4	6	3	1.0
Nimbleness	4	7	7	4	5	1	6	7	5	1.0
Positive Health	1	2	1	1	1	1	2	1	1	1.0
Revitalization	8	5	6	8	7	3	7	4	8	3.0
Social Recognition	12	13	13	12	14	5	9	13	13	8.0
Strength and Endurance	2	1	2	3	2	1	1	2	2	1.0
Stress Management	7	9	8	6	10	1	8	3	7	4.0
Weight Management	6	11	10	5	8	1	3	10	6	2.0

Table 2 shows the top motivators by age, sex, and race. Each subscale is given a number from one through fourteen, where the lower numbers represent a more important motivation. Both sexes are motivated to exercise for Positive Health and Strength and Endurance. However, women are also motivated by extrinsic factors such as appearance and weight management. Men appear to be more likely motivated by intrinsic factors such as strength, positive health, and enjoyment. These findings are consistent with past research (Egli, Bland, Melton, and Czech

2011). Table 2 also indicates a difference in motivations for those under (enjoyment) and over 20 years old (weight management).

Table 3. Report of Significant Differences by Demographic Variables (Age and Sex) and Exercise Motivation as Determined by Independent t-Tests with Mean Scores Reported

Source of Variation			M	SD	T value	P value
Sex	Competition	Female	2.07	1.37	-3.3745	0.00251
		Male	3.72	1.42		

Table 3 highlights the differences in motivation by age and sex. There was only one significant difference between the two sex categories for Competition: males were significantly more motivated to exercise for competition than women.

Table 4. Report of Significant Differences by Race and Exercise Motivation as Determined by ANOVAs with Mean Scores Reported

	Mean Scores							
Subscale	White/ Caucasian	Hispanic/ Latin American	Black/ African Canadian	Asian	South Asian	Eastern Europe	F Value	Significance
Social Recognition	1.33	3.00	2.13	2.50	2.75	3.25	4.905702935	0.004320268

Like table 3, table 4 highlights differences of exercise by race. However, there is one of the differences is significant: social recognition. Asians were significantly more motivated by Social Recognition than Caucasians and Hispanics/Latin Americans.

Hypothesis 2

The difference in HLSUS score represents the difference between a study participant's score from when they first completed the scale to when they did it after using a HLHT for six weeks. If our hypothesis was accurate, the scatter plot would have shown a positive trend with the difference in HLSUS score becoming greater as the habit score increased. However, this is not the case, indicating that use of the HLHT had little impact on a healthy lifestyle. In order to confirm this, a regression analysis was conducted, which resulted in a significant F value of 0.374 and a P value of 0.374.

Results indicated that there is no relationship between habit strength and frequency of being physically active (Significant F = 0.505, P = value 0.505). Clearly then, our second hypothesis was incorrect as participants who have a strong Self-Reporting Index score (Habit Score) after six weeks did not see greatest improvement in their HLSUS scores, and they were not more actively involved in physical activity.

Hypothesis 3

This hypothesis was correct as participants were more likely to agree with the academic benefits of working out after using the HLHT. There was a moderate positive relationship (Pearson r =

0.661462576); however, the correlation is not significant as the P value is 0.926607. This is probably due in part to our limited sample size.

Hypothesis 4

The differences were not significant in the mean and standard deviation of the HLSUS score for those who completed the first survey. However, our analysis suggested that individuals who worked out four or more times were more likely to have a higher HLSUS score than those who didn't.

Although a number of differences can be seen, they were not significant. Once again, however, it suggests that individuals who worked out four or more times were more likely to have a higher HLSUS score than those who didn't.

Table 5. Survey One Mean and Standard Deviation for Number of Days Being Physically Active

		Mean	Standard Deviation	P - Value
Gender	Female	1.78	1.4799	0.046962
	Male	3.00		

Due to our limited sample size, the only significant result found was that males were physically active more days a week than females. While our results did indicate that gender, age, ethnicity, living location, and whether or not the responded was an intentional student impacted one's physical activity, the differences were not significant.

Limitations

There are two major limitations that need to be addressed when examining and analyzing the results. The first is the small sample size. In addition, the age, gender and ethnicity of the study participants did not accurately reflect the entire student body. Ultimately, it was challenging to find significant results and thus suggests that one should be cautious when trying to generalize and apply the study's findings to the general population.

Another limitation is that this study took place during the Covid-19 quarantine. It is possible that individuals were unable to be physically active during the mandatory lockdown.

Conclusion

There were differences in exercise motivations between genders, ethnicities, and ages. Some evidence suggests that using the HLHT would make students more aware of the academic benefits of leading a healthy lifestyle. The study did highlight that gender, age, race, living location, and students' status does impact one's healthy lifestyle score, as calculated by the HLSUS and, and how often an individual is physically active a week. There was no evidence to suggest that the strength of the habit of using the HLHT had an impact on an individual healthy lifestyle score or days spent being physically active. Future researchers should try to replicate this study with a larger sample size.

Acknowledgements

This study was funded by Ryerson University, Department of Athletics and Recreation.

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