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# New UBC Kinesiology Building: Promoting and Educating about Energy Use

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# New UBC Kinesiology Building: Promoting and Educating about Energy Use

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**Executive Summary**

The following study consisted of data collection and analysis of the proposed new Kinesiology building by promoting and educating students about energy use. Current literature allowed us to gain a better understanding of energy-conscious developments and strategies successful in other areas thus far, such as shopping malls, appliance advertisements, outside of homes, and implementations in other buildings. Gaps in literature included a lack of research on energy-efficient choices offered in fitness spaces, the use of exercise equipment to generate power for buildings, and an overall lack of information surrounding fitness environments with energy-conscious advertisements and signage. The purpose of this research is to recommend strategies which can be used throughout the new UBC School of Kinesiology building, and to promote methods for sustainable energy use, consumption, and conservation. Thus, we proposed the research question: How can energy consumption and conservation information be promoted in the new UBC Kinesiology building to educate students and faculty, and encourage more energy conscious choices?

2nd year, 3rd year, and 4th year UBC Kinesiology students (n=46) were recruited. The exclusion criteria consisted of non-UBC students, first year students and those who did not provide consent to the survey. Data collection was done through a survey design with qualitative and quantitative questions. Participants were recruited through social media platforms: Facebook and Instagram. The survey included 17 quantitative and 6 qualitative questions to assess knowledge of climate change, consciousness of sustainability, use of physical activity spaces, and how energy-conscious options would affect the choices participants make. Results indicated that students have a strong understanding of the impacts of climate change and are very concerned about it (84%). 87% of students were not aware of the green spaces around the campus, as they did not know how to navigate them. Additionally, 50% of students spent 4-6 hours per day being sedentary and were either using recreational facilities 1-2 days a week (37%) or not at all (36%). This may indicate the need for more convenient physical activity options around the new building, including the student preferences of standing desks (28%), exercise ball chairs (30%), under-desk ellipticals (24%), and desk treadmills (18%). When given the option to choose a Leadership in Energy and Environmental Design (LEED) certified building, most students gravitated towards the UBC building, ‘The Nest’, (63%) or the Student Centre building through York University (27%). Upon analyzing qualitative questions, it was found that a combination of students in 2nd, 3rd, and 4th year are concerned about the environment, global warming, and the impact that these factors will have on their health. 89% of students indicated they would choose more energy-efficient options when presented with informative signage, while 11% indicated that they might choose these energy-efficient options.

Recommendations included renewable energy sources, green building designs, clear labeling, signage surrounding energy efficiency, and active study spaces to encourage physical activity. By following the aforementioned recommendations, and using renewable resources available in development and construction, the proposed UBC Kinesiology building will become a relaxing, uplifting, and energy-conscious space for all who enter.

## Introduction

Many university institutions are beginning to utilize green building strategies to decrease their carbon footprint on the environment. While the buildings themselves are being built greener, the individuals using the buildings are even more crucial to the reduction in energy use. Planning construction of new buildings with users in mind can help promote responsible energy use, while educating those inside about energy expenditure. The proposed University of British Columbia (UBC) Kinesiology building can integrate strategies of information display and delivery into its construction to further encourage its community to make positive energy choices. By allowing responsible energy choices through the availability of resources and education, communities will have the opportunity to make a positive impact on the energy use of the building.

## Literature Review

Current strategies for effective energy use include methods of information exchange, promotion of energy conservation, and networking. These have all shown to impact university campuses throughout the United States and Canada (Kim et al., 2017). Environmental sustainability, or the responsibility to conserve natural resources and protect global ecosystems to support health and wellbeing (McGill University, 2020), is a significant topic discussed within recent research. Additional literature expresses the need to educate consumers with proper label-based systems, sustainable physical activity options, as well as suggested recommendations of green building strategies.

### *Signage Usage*

A simple way to educate consumers on the energy friendliness, or the behaviours which are not harmful to the environment (Global Ecolabelling Network, 2016), is to use a rating

system. The European Union has introduced a label-based system for providing consumers with the knowledge to make energy-efficient choices when purchasing appliances. This system compares the differences between the older rating scales ranging over seven classes, including products unavailable on the market, to a shorter scale comparing only those available for purchase (Waechter et al., 2016). Research has indicated that the shorter scale was more appealing to the consumers and increased their understanding of the differences between the classes within the scale (Waechter et al., 2016). The structure of the scale significantly motivates consumers to make choices on the more efficient end of the scale through a heightened perception of more energy efficient products. With energy efficient products, they ultimately use less energy to perform the same task (Environmental and Energy Study Institute, n.d.).

Reducing the amount of energy or power used, also known as energy consumption, relies heavily on consumers, as the energy efficient label on appliances assists consumers in understanding energy efficiency and helps them implement environmentally-friendly choices. Waechter et. al (2016) explains how "the challenge for policy-makers is to display information in the best format to reach consumers and foster energy-friendly behaviour" (p. 3), while noting the importance of developing a psychological link between labeling and energy friendliness to encourage consumers to make energy-conscious choices without feeling forced. This psychological link helps attract consumers to energy consumption signage with the use of bright colours, and scales (Waechter et al., 2016)

A rating scale system additionally emphasizes the lack of understanding consumers truly have over the labeling system in place, as the consumer does not often grasp the concept of actual energy consumption, and they focus more on energy friendliness. This gives an inaccurate reading of the product's true consumption which can lead to greater energy use through misled

product choices (Waechter et al., 2016). The misunderstanding also correlates to higher energy friendliness with lower overall consumption, which leads to a higher purchase of energy consuming products in a false idea that larger products with good energy friendly ratings are better to buy. This ultimately creates a rise in energy use worldwide.

*Community Involvement*

Additional research follows a similar approach with the use of energy conservation education throughout communities. While aiming to discover the impact of publicly displaying energy consumption from each household in the community on energy usage, current research explores persuasive techniques of information delivery to support changing energy use habits for the better (Sloot et al., 2018; Bergquist & Nilsson 2016). These techniques include different displays to the community that encourage positive energy consumption choices. Sloot et al. (2018) discovered that pro-environmental motivation and initiative involvement are related to sustainable energy intentions and behaviours. Furthermore, this can be translated to pro-environmental and communal intentions, which can motivate communities to make progressive changes. In order to gather attention and create change, it is clear how projects should work to provide information at key locations where it can nudge or nag (Bergquist & Nilsson 2016). The researchers additionally discuss the effect of social norms and public displays of information on the habits of individuals within a strong community. This showcases how it is essential to focus on the impact that patrons can have in the proposed UBC building.

*Sustainable Physical Activity*

As current global greenhouse gas emissions continue to climb, the need to switch to a mode of active transportation is vital. Bjørnarå et al. (2016) explores the current global issue of decreasing global $CO^2$ emissions while trying to increase the level of physical activity without

increasing energy expenditure. This research suggests possible solutions to promote sustainable physical activity, which includes using forms of active transportation which can be integrated within buildings. Forms of active transportation include walking or riding a bike. An increase in active transportation allows for a decrease in air pollution which in turn benefits public health through the increase of physical activity in commuters, and the general population (Bjørnarå et al., 2016).

*Green Building Strategies*

Green building strategies are being implemented by recreational facilities at post-secondary institutions to increase social and economic impacts within the community, as well as, to reduce the impact on the environment on campus. Leadership in Energy and Environmental Design (LEED) is the most commonly used green building rating system, and provides a framework for healthy, highly efficient, and cost-saving green buildings (Canada Green Building Council, n.d.).While analyzing several LEED certified buildings, Kim et al. (2017) highlighted some strategies including site selection, development density and community connectivity, transportation, bicycle parking, and heat island effect, which are favorable for recreational facilities on campus because they are easily achievable by utilizing existing infrastructure and do not significantly add to construction costs. Additional strategies showcased through several American universities included the use of recycled building materials, waste-management recycling bins, sophisticated lighting control technology, as well as rainwater harvesting strategies to conserve and reuse water more efficiently (Kim et al., 2017). These strategies were found to be effective by reducing and saving the costs of energy use, reducing greenhouse emissions, as well as diverting to less water being taken from rivers and bays (Kim et al., 2017).

Ultimately, these strategies rank within Silver, Gold, and Platinum LEED ranking systems, which further indicates the effectiveness of these strategies in university buildings.

These articles demonstrate a multitude of options for creating spaces that encourage greener choices. By using LEED certified technology and construction practices (Kim et. al, 2017), physical structures can work toward energy efficiency, while the spaces within them can promote methods of transport like cycling that foster physical and environmental health. Numerous articles (Bergquist & Nilsson 2016; Sloot et al., 2018; Waechter et al., 2016) prove the psychology behind energy signage that can encourage consumers to make more energy-friendly choices. This can be applied in green buildings with accessible energy efficient transport options to optimize the possible energy savings individuals using the space can be a part of.

## Gaps in Literature

Although the current literature presents a variety of strategies to promote energy use and energy conservation, there are some gaps that need to be addressed. There are few peer reviewed articles that discuss the use of energy-creating exercise equipment and how this can affect the energy efficiency of a fitness environment. In addition, there is limited peer-reviewed data and information regarding the use of fitness equipment, and interactive energy-efficient options, and how it can generate power and sustainability in buildings.

Moreover, a second gap is the lack of literature regarding the use of energy-conscious signage or educational tactics in recreational or fitness settings specifically. While current research discusses options available in community settings or within product designs, there is little research that explores the education and promotion of energy-friendly choices that can be made within fitness environments.

## Purpose

To determine how spaces within the new UBC building, particularly the BodyWorks gym, fitness centres, and various student spaces, could be used to promote or educate about responsible energy use, energy capture and energy conservation. With the utilization of fitness centers, and student spaces, the purpose of this research is to identify and recommend strategies which can be used throughout the new UBC School of Kinesiology building, and to promote methods for sustainable energy use, consumption, and conservation.

## Research Question

How can energy consumption and conservation information be promoted in the new UBC Kinesiology building to educate students and faculty, and encourage more energy conscious choices?

## Methods

### *Study Population*

The recruited participants included second, third, and fourth year UBC Kinesiology students. Overall, these students have more experience using the current recreational facilities on campus, and they were able to provide stronger recommendations accordingly. In addition, fourth year students were given the opportunity to express certain changes they wanted to see take place on campus before they graduate.

### *Inclusion/Exclusion Criteria*

First year students were excluded from this research, as they may not have known the campus/buildings very well due to the fact that they are new to campus, and are still learning about which buildings they prefer to use. Those who did not agree to provide their consent, or

those who were not current UBC students, were automatically redirected to the end of the page, and were also excluded from the study.

*Research Design*

For this study, we used a UBC survey distribution program, Qualtrics, to conduct data collection. Through the distribution of an online survey, participants were presented with a mix of open-ended questions and choice-based questions, 23 questions in total. The online distribution of the survey was accomplished through social media channels, as we published survey links on UBC Kinesiology student Facebook and Instagram pages, along with reaching out individually to potential respondents that we knew at the university. All recruitment methods were presented through a poster outlining how students could participate (Appendix A). The survey took no longer than approximately 10-15 minutes to complete, and participants were able to access the survey via a specified Qualtrics link (Appendix B).

Participants beginning the survey were prompted with a landing consent page that informed them of any risks, along with all information necessary to fully understand the scope of the data collection and usage (Appendix C). Those who did not provide their consent were automatically redirected to the end of the survey. All responses were anonymous, and participants were not asked to provide their age, gender, or name. The survey consisted of 17 quantitative and 6 qualitative questions that discussed energy friendly resources and physical activity options that the new UBC Kinesiology building could implement within its new design. The quantitative questions additionally contained a mix of scale-based questions that included the Likert and satisfaction scales. These questions determined how students commute to campus, and how they feel about current and future energy-efficient choices on campus, what type of exercise equipment is preferred to use in study spaces, what type of building designs are most

appealing and why. The survey became active on March 19, 2021 and continued to stay open until April 4, 2021. We obtained a total of 46 responses to the survey from 2nd, 3rd, and 4th year UBC Kinesiology students.

*Privacy and Confidentiality*

As per the requirements from the UBC Behavioural Research Ethics Board, a complete copy of all survey responses was provided to Dr. Bundon via a password encrypted Excel spreadsheet. This file is stored for at least 1 year after the completion of the course.

*Data Analysis*

Data collected through the survey questions (Appendix D) revealed quantitative results and raw data through the 'report' feature on Qualtrics. Responses have been measured, grouped, and compared, in order to produce a more accurate representation of the participants responses. Where appropriate, the data is presented through various bar charts. These quantitative data visualizations allow for a more transparent view of trends and patterns amongst the survey responses. In addition, the Likert scale was a specific method used to collect and breakdown quantitative data in the survey, specifically when making decisions for threats to personal safety and climate change. This was then analyzed using a descriptive statistical analysis technique (The Organic Chemistry Tutor, 2019). Descriptive statistical analysis provides us with a clear representation of the trends and tendencies in the survey participants, as they indicated their interactions with the current UBC campus, and their outlooks on environmental change in the near future. Additional data collected on long-answer responses were presented with the use of a descriptive qualitative analysis technique. This thematic analysis technique created a breakdown of each step taken to analyze these responses, including reading the transcripts, labelling relevant

pieces, and determining the most important points and connecting them back to the research (Sandelowski, 2000).

## Results

### *Sample Description*

The survey revealed that with the total respondents (N= 46), 20 were in the 4th year of their studies (43%), 18 were in their 3rd year (39%) and 8 were in their 2nd year (18%). From all 46 responses, 17 Kinesiology students reported using recreational facilities on campus (36%), 13 reported using recreational facilities occasionally (28%), and 16 students reported not using these facilities (34%). When students reported their use of the recreational facilities on campus, 17 responded that they do not use the facilities at all (36%), 17 additional students reported using the facilities 1-2 days a week (36%), 10 reported using facilities 3-4 days a week (21%), and 2 students reported using the facilities 5-6 days a week (4%). In regards to commuting to campus, the survey additionally exhibited how a majority of students, 19, travel to campus via bus (42%), while 10 reported living on campus (22%), 13 drive or take a car (28%) and 3 students travel by bike (6%).

### *Environmental Awareness*

After asking the necessary demographic and introductory questions to obtain general information on the participants' daily lives, we moved on to more specific questions based around climate change and energy-efficient choices. A majority of the students (84%) reported that they worry about climate change, while 5 reported that they sometimes worry about climate change (10%) and 3 indicated that they do not worry about climate change at all (6%). An open-ended question asking about the impact students think climate change can have on the world brought forth similar concerns amongst participants. Through qualitative analysis, the major

themes that were discovered through this question are concerns about global warming, the environment, and how it would eventually lead to detrimental health amongst the human population. Within these themes, students expressed they were greatly concerned about extreme weather changes, poor air quality, and the extinction of animals.

Since our survey was proposed to benefit the future UBC Kinesiology building through energy efficiency, we had to gain a better understanding of any previous knowledge Kinesiology students had about climate change and how that impacted their energy conscious choices. Upon analyzing questions regarding concerns for the environment and how that impacts daily decisions, we discovered that worries about climate change impact most daily decisions for 16 students, and about half of daily decisions for 14 students. Additionally, 1 student reported their concern about the environment impacts every daily decision they make, while 12 reported their concern impacts some decisions, and 3 students and their environmental concern does not impact their daily decisions at all. In response to concerns about their carbon footprint on the environment, the survey data indicated that 28% are somewhat concerned, over 10% are very concerned, 13% are neutral, and 4% are not concerned at all. Given the ongoing concern about climate change, the largest worry was the impact on safety, as 25 students indicated that they believe climate change is a threat to their safety (55%), and 6 reported climate change is a large threat (13%). Out of the 46 respondents, 10 students reported they are neutral about how climate change impacts their safety (20%), 5 reported there is a slight threat to their safety (10%), and 0 students indicated that climate change was not a threat to their safety.

In regards to an open-ended question asking respondents about what motivates them to make climate conscious choices, two main themes emerged. These themes included concerns about future generations to come, and helping the environment wherever possible. The

respondents indicated they are motivated to preserve the environment through elements such as social media, recycling, donating, and reusing everyday items. By accomplishing these tasks, survey responses indicated that students would feel as if their actions are making a difference for future generations.

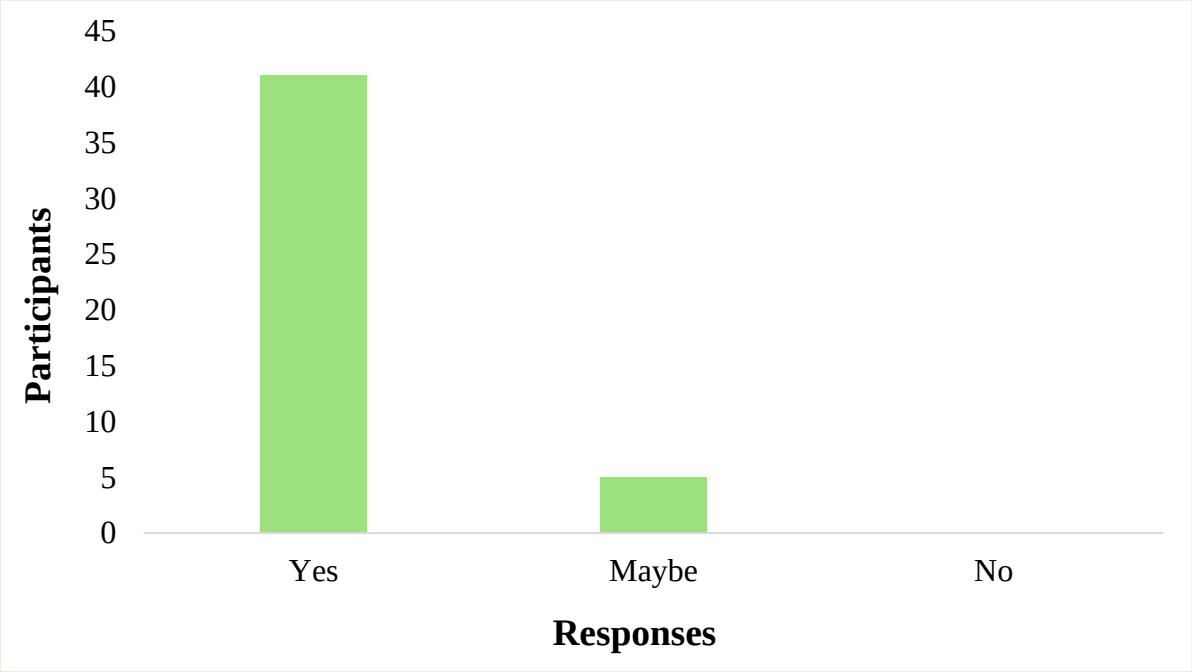
*Energy Efficient Options & Signage Displays*

Given the current environmentally friendly options that are on the UBC campus, we wanted to learn if students use current options such as the community garden. When prompted with a question about whether the students use the community garden, 42 respondents indicated they do not use the garden (87%). For those who responded yes to using the garden, all 6 respondents described that they only use the garden to walk through it, or for fresh air.

In order to determine how students could be more engaged in the learning about energy use and energy efficiency in the new Kinesiology building, we asked whether being presented with signage regarding information about energy consumption around the building would make individuals more inclined to make more energy conscious choices (Figure 1). A majority of students (89%) said that they would choose more energy-efficient options if presented with the information and signage, while 11% of students said they might choose energy-efficient options. This indicates that with the correct signage and displaying techniques around the building, students could be heavily engaged in learning about energy-efficient choices.

**Figure 1**

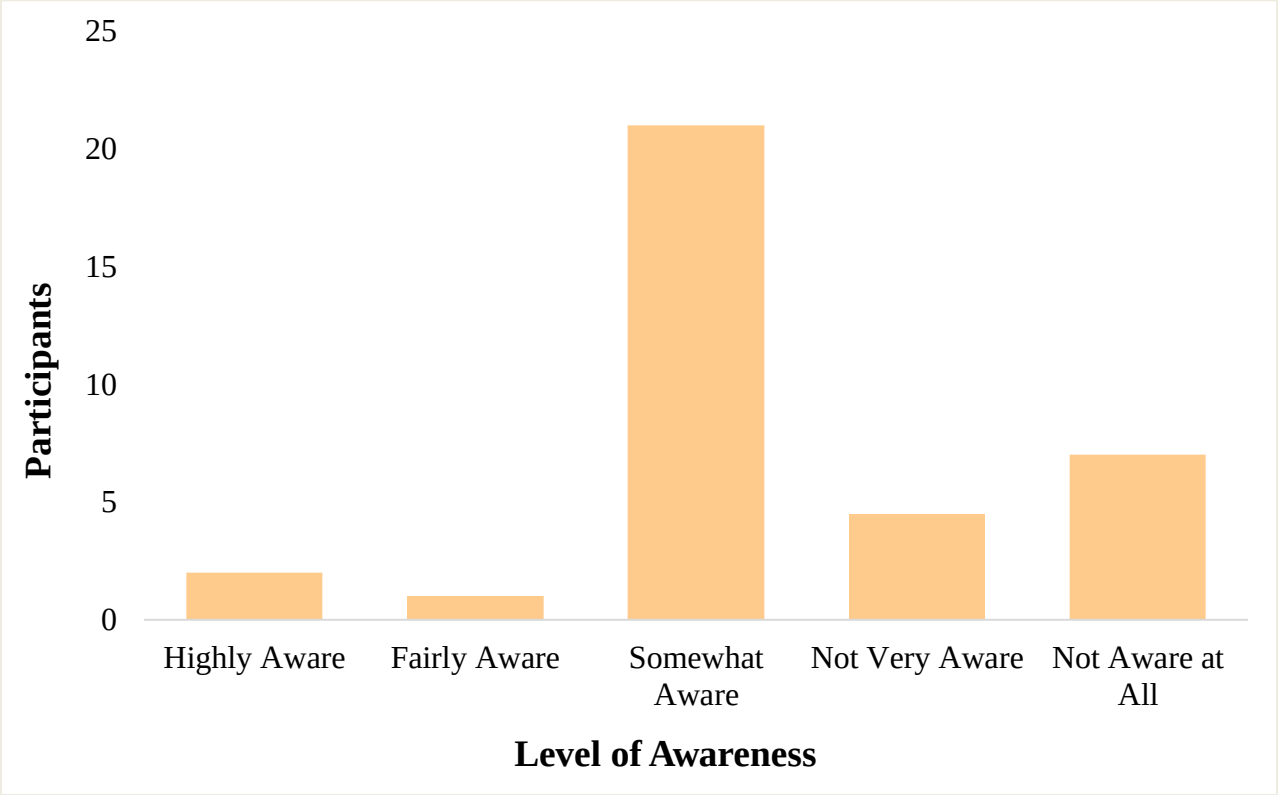
*I worry about climate change*




In addition, we wanted to determine how aware students were of the energy-efficient options that are presented across the UBC campus (Figure 2) to gain a better understanding of how much information should be presented in the new building. Few respondents had knowledge on current energy-efficient options, as 2 students reported they were highly aware (3%), and 1 student responded that they were fairly aware (2%). Though, a majority of students had some knowledge on these options, as 21 responded that they were somewhat aware (46%). However, the survey data still indicated that 15 students were not very aware of these energy-efficient options (32%), and 8 were not aware at all (16%).

**Figure 2**

*How aware are you of energy-efficient options that are across campus?*



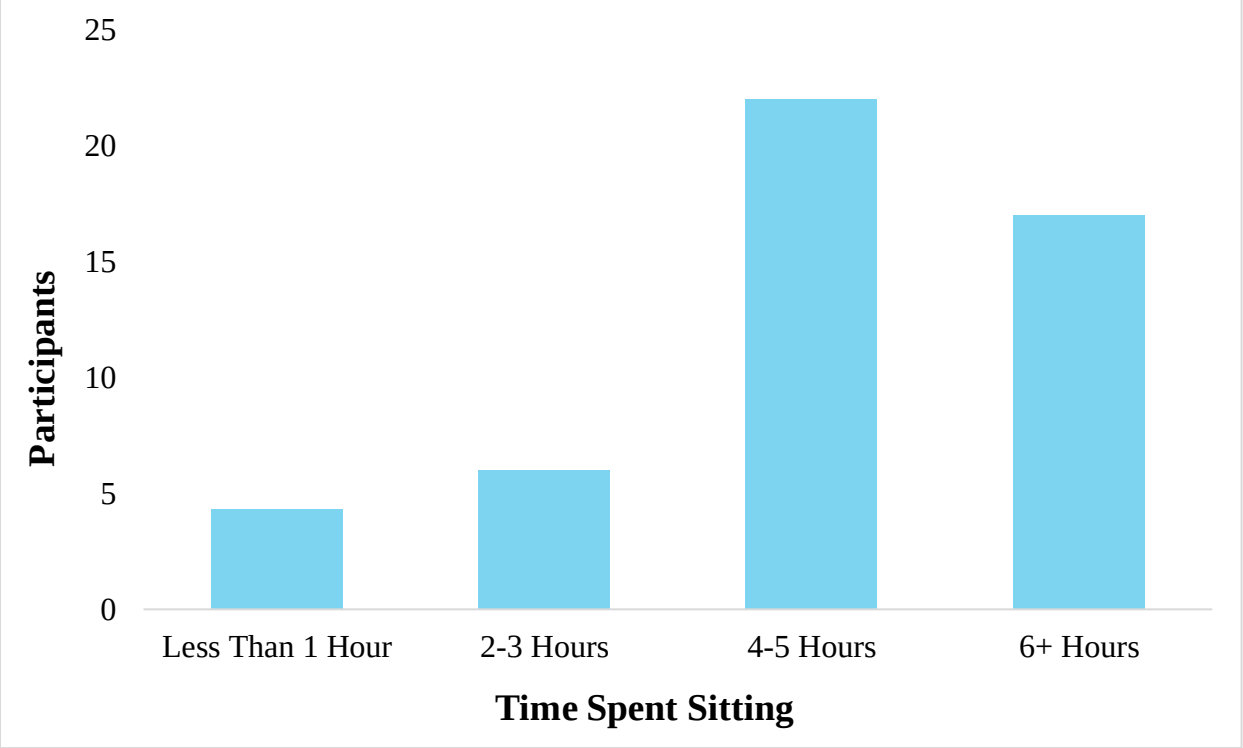

In regards to energy-efficient choices, being presented with options in one building may allow students to continue these choices elsewhere across campus. As a result, we asked whether the promotion of energy efficiency in the building would make students more inclined to choose energy-responsible options elsewhere. A majority of 25 students responded that energy efficiency in the building would probably make them more inclined to do so elsewhere (55%), while 15 indicated that they would definitely make these choices elsewhere (32%). 8 students were additionally indifferent (8%), and 2 responded that the energy efficiency would probably not impact their choices elsewhere (4%).

*Physical Activity Options*

To gain a better understanding of how the new building could adapt physical activity options alongside energy conscious choices, we asked about current activity routines in students, and what exercise options would be most appealing for their use (Figure 3). 50% of respondents indicated that they sit for around 4-6 hours per day, while 37% stated that they sit for 6 or more hours per day, and 13% responded that they sit around 2-3 hours per day.

**Figure 3**

*On average, how much time a day do you spend sitting?*



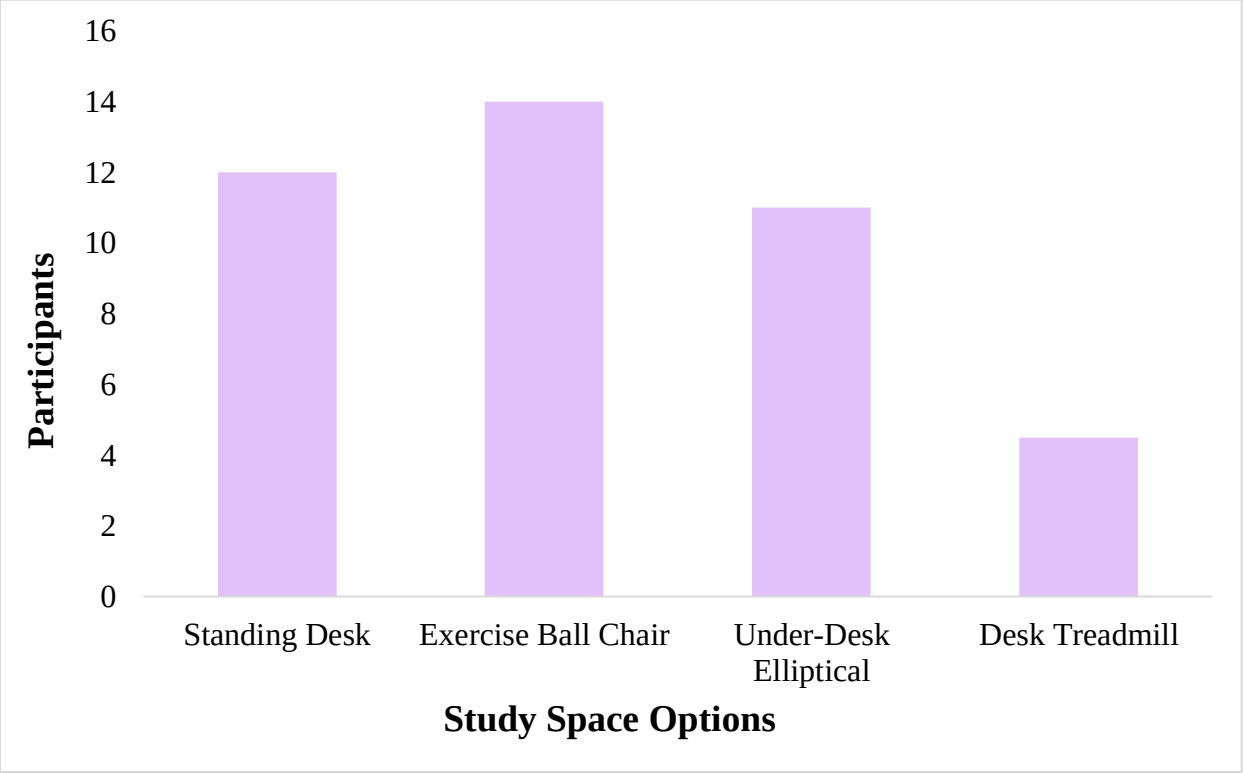

Given the increased sedentary behaviors amongst the respondents, we wanted to further explore current attitudes about exercise equipment and how that could be displayed around the new building. A majority of students indicated that they would definitely use pre-owned or recycled exercise equipment (53%), and 26% said they would possibly use the equipment, given

the right circumstances. In addition, 15% of respondents indicated that they are indifferent, and 6% highlighted that they would not use the equipment.

We further asked respondents what kind of exercise equipment would increase their motivation to use a study space (Figure 4), in which 14 students indicated an exercise ball chair (30%), 12 responded with a standing desk (28%), 11 students said an under-desk elliptical (24%), and 9 chose the desk treadmill option (18%).

**Figure 4**

*Which of the following options would motivate you to use a study space the most?*




Although respondents expressed a variety of choices for exercise equipment, we looked to determine if standing desks would impact motivation to study in the building. By asking students if the presence of standing desks would motivate their studying habits in the building, the survey data indicated that a majority of students (29%) would definitely use study in the

building if standing desks were present and 35% would probably use the building, depending on the type of desk. Additionally, 21% of students said that they are indifferent, 13% said that standing desks would probably not impact their motivation to study in the building, and 2% said that standing desks would definitely not impact their motivation. In continuation of the question prompting about motivation and standing desks, we wanted to discover how energy-efficient options in the building would impact students' use of study spaces. While presenting an open-ended question, respondents indicated that they feel they would be more inclined to use the space, as they would gain more comfort and confidence in the Kinesiology building and the UBC campus as a whole.

*Building Preferences*

As the Kinesiology building is still in its planning stages (University of British Columbia Campus & Community Planning, n.d.), we presented options of different building styles and asked what building the respondents prefer and why they prefer that option. When presented with 4 different pictures of gold and platinum LEED certified university buildings (Appendix E), 63% of the students said that they prefer the current UBC Student Union Building, otherwise known as 'The Nest'. 27% of respondents additionally said they prefer the Student Center building through York University, 6% said they prefer the University of Washington Life Science building, and 4% chose the University of Utah College of Law building. These responses allowed us to determine what kind of LEED standards can be incorporated into the new building.

With an open-ended question asking students why they chose one of the buildings, four main themes became evident. One theme discussed the Nest and how the building presented with big windows, solar panels, and an accessible rooftop with a large amount of green space. The

second theme directed towards the University of Utah College of Law building, in which respondents expressed they felt there were numerous bike lanes and large sidewalks. A third theme related to the University of Washington building, as students reflected upon the environment and structure of the building, specifically referring it to a prison. The last theme connected to the University of York building, which was pointed out to have numerous large windows to allow natural lighting to boost emotions and moods.

To conclude the survey, we prompted respondents with an open-ended question to list any additional ideas they have that would make the new building more environmentally friendly. Based on the survey responses, three main themes were presented including the discussion of efficient building design, renewable energy sources, and clear labelling around the building.

## Discussion

### *Environmental Concern & Energy Awareness*

Through the survey results, it is evident that 2nd, 3rd, and 4th year Kinesiology students have an overall strong understanding of the impacts of climate change and they are very concerned about it (84%). The higher awareness of climate change within this population in general gives us insight on how the new UBC Kinesiology building can further work to engage and involve the students. When presented with options to use environmentally friendly sources around the campus, it is clear that there is an intimidation factor amongst a large number of students (87%), and students did not know how to get involved within the green spaces around the UBC campus, or were not comfortable doing so. Waechter et al. (2016) identified the importance of creating a psychological link between energy-conscious choices and labeling, which can be extended to signage and labels on different structures and equipment in the building. This draws the importance of presenting signage and interactive information about

energy use and energy conscious choices around the new building, especially to ensure students have the opportunity to engage and get involved in energy conscious choices.

The open-ended survey questions demonstrated that most respondents were concerned about climate change and their own health. By using informative labeling and signage throughout the building in an aesthetically appealing way with the structure of the interior, the patrons of the space will be able to make environmental and health-conscious choices more easily and understand their impact immediately.

*Utilizing Physical Activity*

Our results revealed that students (50%) are typically spending 4-6 hours per day sitting or being sedentary. With 45% of UBC undergraduate students not meeting the recommended 150 minutes of MVPA per week (University of British Columbia Wellbeing, n.d.), it is even more critical that physical activity options be implemented within the new building to reduce students' reliance on sedentary behaviours. As per the survey results, physical activity levels amongst the students are further decreasing through the indication of decreased use of recreational facilities around campus, as students are either using recreational facilities 1-2 days a week (37%), or not at all (36%). This may indicate the need for more convenient physical activity options around the new building, including the student preferences of standing desks (28%), exercise ball chairs (30%), under-desk ellipticals (24%), and desk treadmills (18%). The new Kinesiology building should provide equipment that encourages physical activity, especially during otherwise sedentary times such as studying, to convert sedentary time into a healthier experience. It should also provide more options for active transportation, such as cycling, using the stairs or ramps, and make these options more appealing for use with decorative or informational stair wraps and ramp designs.

*Building Approach & Design*

When given the option to choose a LEED certified building, most students gravitated towards the Nest (63%) or the York University Student Centre Building (27%). Given the large windows, extra outdoor green space, and solar panels, students were more drawn to these buildings and their energy conscious design. Therefore, the new UBC Kinesiology building should strive to provide structures that support the use and inclusion of outdoor space. Providing large windows will reduce the need for lit areas, particularly in the summer, and can allow reduced use of air conditioning through opening the large panels for air circulation (Park & Lee, 2020). Solar panels provide a clean, renewable energy source for powering areas of the building, and signage can describe what areas are being powered by these solar panels, giving patrons a positive understanding that their chargers or light switches are being powered cleanly. Creating functional, appealing green spaces surrounding the building will encourage students and faculty to use these spaces recreationally with leisure activities, increasing their physical activity levels.

When considering responses to the qualitative questions of the survey, it was found that a combination of students in 2nd, 3rd, and 4th year are concerned about the environment, global warming, and the impact that these two factors will have on their health. Research done by Bjørnarå et al. (2016) outlines the benefits of active transportation on physical health, as well as providing a mode of decreasing CO2 emissions, furthering benefits into health. Creating opportunities for active transportation within the structures of the new Kinesiology building will help support maintenance of health for students and faculty. Furthering these concerns are additional worries regarding the future generations living on the planet, and their potential struggles with the consequences of the actions from past generations. The respondents also mention the strategies the current generation is implementing to try and save the planet, by

making energy conscious and sustainable choices. By using LEED certified technology and construction practices (Kim et. al, 2017), students and faculty can continue to make effective energy conscious choices supported by the physical structures promoting and achieving energy efficiency. The decisions made to support energy efficiency and conscious consumption must be supported through options available in the new Kinesiology building in order for patrons to make these choices. Through conscious development, the building itself will encourage energy friendly usage which can continue into other areas of life, as 55% respondents indicated their likelihood of choosing energy-efficient options in other areas of life following informative labeling throughout the building.

The problem presented by the partner includes how we can utilize fitness centres and student spaces to identify and recommend strategies which can be used throughout the new UBC School of Kinesiology building, and to promote methods for sustainable energy use, consumption, and conservation. Through this research, varying options for effective energy-conscious information delivery, active transportation opportunities, and uses of technology within the building have been revealed and supported by survey results. Students identified their preference for buildings with more outward technology supporting energy conservation or clean energy sources, such as solar power, as well as their desire for more outdoor spaces allotted to leisure activities, such as green space for studying and bicycle storage.

Identified gaps in literature such as the use of energy-creating exercise equipment, interactive energy-efficient options, and the generation of power in buildings were addressed through questions in the survey. Questions regarding building design revealed the desire students have for solar panels and large windows for natural lighting. 53% of students responded positively to using pre-owned exercise equipment, which reduces the environmental impact of

these machines immediately. A majority of respondents (89%) indicated they would choose more energy-efficient options when presented with informative signage, while 11% indicated that they might choose these energy-efficient options. This indicates a preference toward options favouring energy efficiency and energy-creating equipment, providing more sustainability and powering areas of the building. This also addresses the lack of literature surrounding the use of energy-conscious signage and information delivery in recreational and fitness settings; the strong indication students gave toward making energy-efficient choices when presented with labels describing energy efficiency reveals the efficacy of labels and informative strategies in fitness settings as in the literature available for community spaces and appliances. Energy consumption and conservation can ultimately be promoted through energy efficient building designs, clear labelling around the building, renewable energy sources and active study spaces.

## Limitations

Within our data collection process, we encountered some challenges and faced certain limitations that had to be corrected to prevent participant confusion. Prior to opening up our survey to the public, we encountered issues with our original survey questions. Within our first survey, we struggled to ask strong and creative questions that would garner the responses needed to help facilitate our research. To combat this issue, we received feedback on the necessary changes we had to make, then had a group brainstorm session which allowed us to create an effective survey that would help guide us in answering our research question.

Another challenge that we encountered with our survey was a technical error which altered our font and ultimately made the survey difficult to read. This error was presented only through mobile phones, as we did a trial run of the survey after it was activated. To correct this

issue, we quickly adjusted the format through the settings on the Qualtrics platform to regain our desired font and keep the survey operating efficiently.

The smaller sample size (N=46) provides a limitation; the small sample size resulted from time constraints and limited response to outreach, and our research would be improved with the inclusion of larger sample sizes. Although the population chosen for this study provides a relatively well distributed representation across the students and their years of study, this sample presents as an additional limitation. The research would be further strengthened by input from other faculties, despite the building being a part of the Kinesiology faculty. The survey also did not take into consideration the input of faculty members, which have a potentially stronger knowledge of the buildings and campus, and will be active patrons of the new building.

A final limitation within the research relates back to the qualitative short-answer responses of the survey. There was a large variation in the length and detail for each response; certain respondents provided multiple opinions or knowledge points, while others provided one or two.

## Recommendations

As the plans for the new kinesiology building are currently being created and compiled, we now have an opportunity to hear from UBC kinesiology students and take their needs and wants into consideration. The following are three of our specific recommendations, backed up by our survey response data. The addition of these recommendations would satisfy the needs of the students and will also make a positive impact on the environment. This in turn will set a standard for green initiative within the UBC community and help pave the way for other UBC buildings to do the same.

1. **Energy Efficient Building Design**

As per the survey results, most students gravitated towards the building design of the UBC Nest building (63%), or the Student Centre building through York University (27%). Both of these buildings shared the same design characteristics, as respondents chose them based on their large windows and overall appealing look. In terms of technical designs, we recommend the new UBC Kinesiology building utilize some of the designs that were provided by respondents including: sustainable building materials, LED motion censored lighting, indoor bike storages, accessible green rooftops, and recycled building materials. There are also indoor designs that we recommend the building include, such as automatic sinks and paper towel dispensers, and low flow plumbing toilets and fixtures. A current example of a building that has been operating with an energy conscious building design is the UBC Centre for Interactive Research on Sustainability (CIRS). This platinum LEED certified building utilizes additional options including rainwater harvesting from its rooftop, solar energy harvesting with solar panels, as well as utilizing wood structures as materials to reduce the building's greenhouse gas emissions from construction (University of British Columbia, n.d.). We recommend these options presented above for the new Kinesiology building to further implement environmental and energy conscious features.

2. **Clear Labelling**

When reviewing our results, we learned that 89% of students would use energy efficient choices if they were presented and aware of the option however, it was also noted that a combined 48% of students were not aware of energy efficient options around campus at all. Through this information it is evident that there needs to be a change in the way we present energy efficient options around campus and help students become more aware of the options that

are currently available. By providing information in a clear, eye-catching way, energy-conscious choices can be identified around campus and help students become more aware. The recommendations that would be best suited to address this issue is by providing bold interactive signage on floors and walls that would guide students into making easy green choices such as recycling and composting. Furthermore, interactive options within the space can provide information on different parts of the building, such as solar panels or water reclamation, that would otherwise be inaccessible for students and faculty. This will allow them to understand the energy efficiency of the building beyond what can be immediately seen, and provide a sense of satisfaction in studying and using the space and its technologies.

3. **Renewable Energy Sources**

The vast majority of students who participated in our survey are concerned about the environment (84%) and a large portion of these students believe climate change is a large threat to their safety (55%). Therefore, priorities should be placed on making the new Kinesiology building environmentally friendly and an obvious emphasis that the building has implemented green technology or sources of renewable energy. In order to accomplish this goal, we recommend that the building implement solar panels, large windows for more airflow which uses less air conditioning in the summer season.

In addition, we also recommend conducting research on the usability of exercise equipment that is capable of generating energy which can be syphoned to other areas of the building for use. If deemed feasible we recommend implementing these types of exercise machines within the new recreation center within the new Kinesiology building.

4. **Active study space options**

Within our research, we discovered that a large majority of students were sitting 4-6 hours a day (50%) and some over 6+ hours a day (37%). This result shows that there has been a substantial increase in sedentary behaviour amongst kinesiology students. To help students get moving, we asked them if the presence of active office equipment such as a standing desk would motivate them to use study spaces and 29% definitely agreed that it was a motivating factor and would use the space while 35% probably would use the space. The two pieces of active office equipment that students would prefer to have in the new Kinesiology building are exercise ball chairs (30%) and standing desks (28%). Therefore, we recommend implementing these pieces of equipment in the building, to allow students the opportunity to get active and reduce sedentary times while focusing on their studies.

**Appendix A**

**Recruitment Poster**


If you're a UBC Kinesiology student in 2nd - 4th year, we'd love to speak with you! :)

As part of a course-based research project (KIN 464), we are conducting a study on using gyms and fitness centers to promote and educate about energy use, specifically in the development of the new Kinesiology building on UBC Vancouver campus. If you are a Kinesiology student in 2nd, 3rd, or 4th year, we would love for you to complete a survey. For more information, visit https://ubc.ca1.qualtrics.com/jfe/form/SV_8J8llt1IZV3vjZs or email natasha.sukorokoff@gmail.com.

*Please note that this post is public and anyone who likes, comments or shares the link will, by doing so, be associated with the study. The Principal Investigator on this project is Dr. Andrea Bundon (andrea.bundon@ubc.ca).*

## Appendix B

## Survey Link

The survey was activated as of March 19, 2021, and closed April 4, 2021. The survey was accessed via this link: https://ubc.ca1.qualtrics.com/jfe/form/SV_8J8llt1lZV3vjZs

## Appendix C

## Consent Form

**CLASS PROJECT:** Health Promotion and Physical Activity (KIN 464)

Participant Consent Form

Considering Energy Promotion and Education in New UBC Kinesiology Building

Group 22

**Principal Investigator:**

Dr. Andrea Bundon (Assistant Professor, School of Kinesiology, Faculty of Education)

**The purpose of the class project:**

To gather knowledge and expertise from community members on the topic of using gyms and fitness centres to promote and educate about energy use, specifically the development of the new School of Kinesiology building on UBC Vancouver campus in 2025. Our project considers how different methods of energy efficiency-related education and available resources within the building can encourage energy-conscious decisions from those using the space.

**Study Procedures:**

With your permission, we are asking you to participate in a survey. With the information gathered, students will critically examine how different individuals understand or engage in health promoting activities or health promotion initiatives.

*You may only complete this survey once.*

**Project outcomes:**

The information gathered will be part of a written report for the class project. The written report will be shared with campus partners involved with the project. Summaries of findings will also be posted on the following websites. *No personal information/information that could identify participants will be included in these reports or shared with campus partners.*

**UBC SEEDS Program Library:**

https://sustain.ubc.ca/courses-degrees/alternative-credit-options/seeds-sustainability-program/seeds-sustainability-library

**Potential benefits of class project:**

There are no explicit benefits to you by taking part in this class project. However, the interview will provide you with the opportunity to voice your opinion on your experiences with health promoting activities or initiatives in a broad sense and will provide the students with an opportunity to learn from your experiences.

**Confidentiality:**

Maintaining the confidentiality of the participants involved in the research is paramount, and no names of participants will be collected.

At the completion of the course, all data (i.e. notes) and signed consent forms will be stored on a secure electronic drive by Dr. Bundon. All data and consent forms will be destroyed 1 year after completion of the course.

**Risks:**

The risks associated with participating in this research are minimal. There are no known physical, economic, or social risks associated with participation in this study. You should know that your participation is completely voluntary and **you are free to withdraw from the study** and there will not be negative impacts related to your withdrawal. If you withdraw from the study, all of the information you have shared up until that point will be destroyed.

**Contact for information about the study:**

If you have any questions about this class project, you can contact Andrea Bundon by phone at 604-822-9168 or by email at andrea.bundon@ubc.ca

**Research ethics complaints:**

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or e-mail RSIL@ors.ubc.ca . or call toll free 1-877-822-8598.

**Consent:**

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time.

## Appendix D

### Survey Questions

1. Are you currently a UBC Kinesiology student?
    - Yes
    - No
2. What year of study are you in?
    - 1st year
    - 2nd year
    - 3rd year
    - 4th year
3. Do you use the gyms/recreational facilities available at UBC?
    - Yes
    - Sometimes
    - No
4. How often do you use the gyms/recreational facilities available at UBC?
    - 7 days a week
    - 5-6 days a week
    - 3-4 days a week
    - 1-2 days a week
    - Not at all
5. How do you get to campus?
    - Live on campus
    - Drive/driven
    - Bus
    - Bicycle
    - Walk

The following questions will give you an opportunity to tell us more about your experience with energy efficiency and its involvement in the new UBC Kinesiology Building slated for development in 2025.

6. I worry about climate change
    - Yes
    - Maybe
    - No

7. What impacts do you think climate change can have?

8. How much does your concern about the environment impact your daily decisions?
    - Impacts each decision I make
    - Impacts most decisions
    - Impacts about half of the decisions I make
    - Impacts some decisions
    - Does not impact decisions at all

9. How concerned are you about your carbon footprint?
    - Very concerned
    - Somewhat concerned
    - Neutral
    - Somewhat unconcerned
    - Not concerned at all

10. On a scale of 1 to 5, how much do you believe climate change is a threat to your personal safety?
    - 1 No threat
    - 2 Slight threat
    - 3 Neutral
    - 4 Threat
    - 5 Large threat

11. Please describe what motivates you to make climate-conscious choices

Energy-efficiency is a method of using less energy to attain the same amount of output from a product or service (e.g. using fluorescent light bulbs)

12. How aware are you of energy-efficient options that are across campus?
    - Highly aware
    - Fairly aware
    - Somewhat aware
    - Not very aware
    - Not aware at all

13. If you are presented with signage and information regarding energy consumption within the new Kinesiology building, are you more likely to choose energy-efficient options?
    - Yes
    - Maybe
    - No

14. Have you ever used the community garden on campus? If yes, what motivated you to use it?

    - Yes (explain)
    - No

15. Would the promotion of energy efficiency within the new Kinesiology building make you more inclined to choose energy-responsible options elsewhere?
    - Definitely yes
    - Probably yes
    - Might or might not
    - Probably not
    - Definitely not

16. How do you feel about using pre-owned/recycled equipment?
    - Definitely would use
    - May use
    - Does not matter
    - Would not use
    - Refuse to use

17. On average, how much time a day do you spend sitting?
    - Less than 1 hour
    - 2-3 hours
    - 4-5 hours
    - 6+ hours

18. Which of the following options would motivate you to use a study space the most?

Standing Desk

Under-Desk Elliptical

Exercise Ball Chair

Desk Treadmill

19. Would the presence of standing desks motivate you to study in the building?
    - Definitely yes
    - Probably yes
    - Might or might not
    - Probably not
    - Definitely not

20. How do you feel energy efficient options will affect your use of the space?

21. Out of the following options, which building do you prefer and why?

A

B

C

D

22. In response to the previous question, why did you choose that building?

23. Please list any additional ideas that you have which would make this building more environmentally friendly

## Appendix E

## University Buildings

York University - Student Centre: LEED Gold Certification

University of Utah - College of Law: LEED Platinum Certification

UBC Student Union Building - The Nest: LEED Gold Certification

University of Washington - Life Science Building: LEED Gold Certification

## Appendix F

## Graphs & Figures

**Figure 1**

*I worry about climate change*

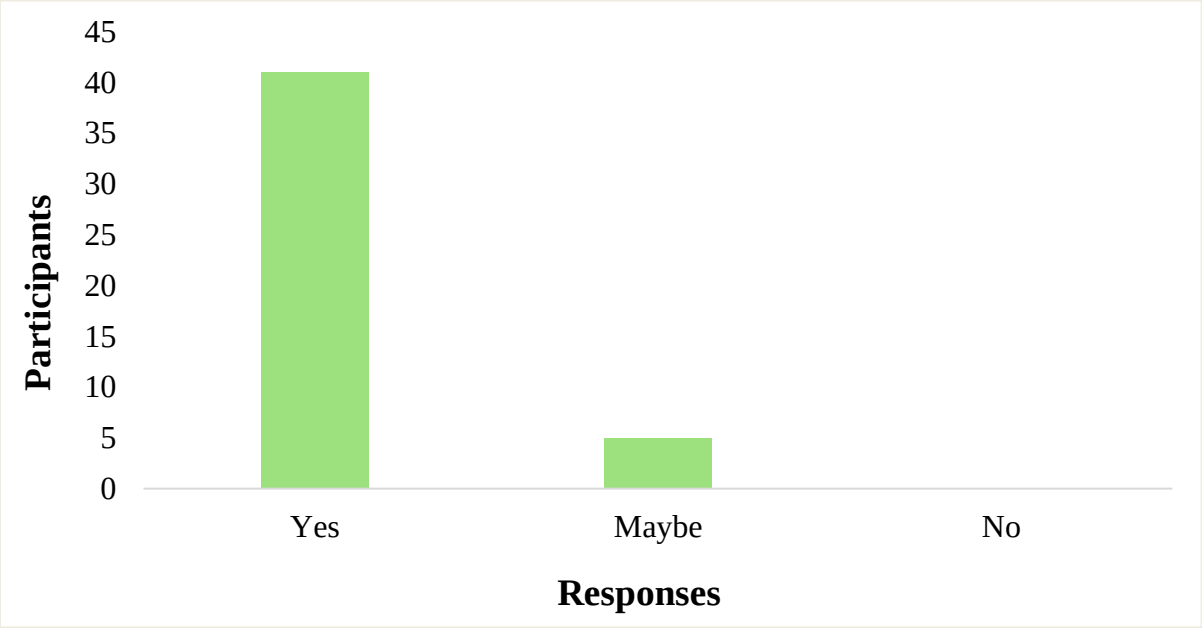



**Figure 2**

*How aware are you of energy-efficient options that are across campus?*

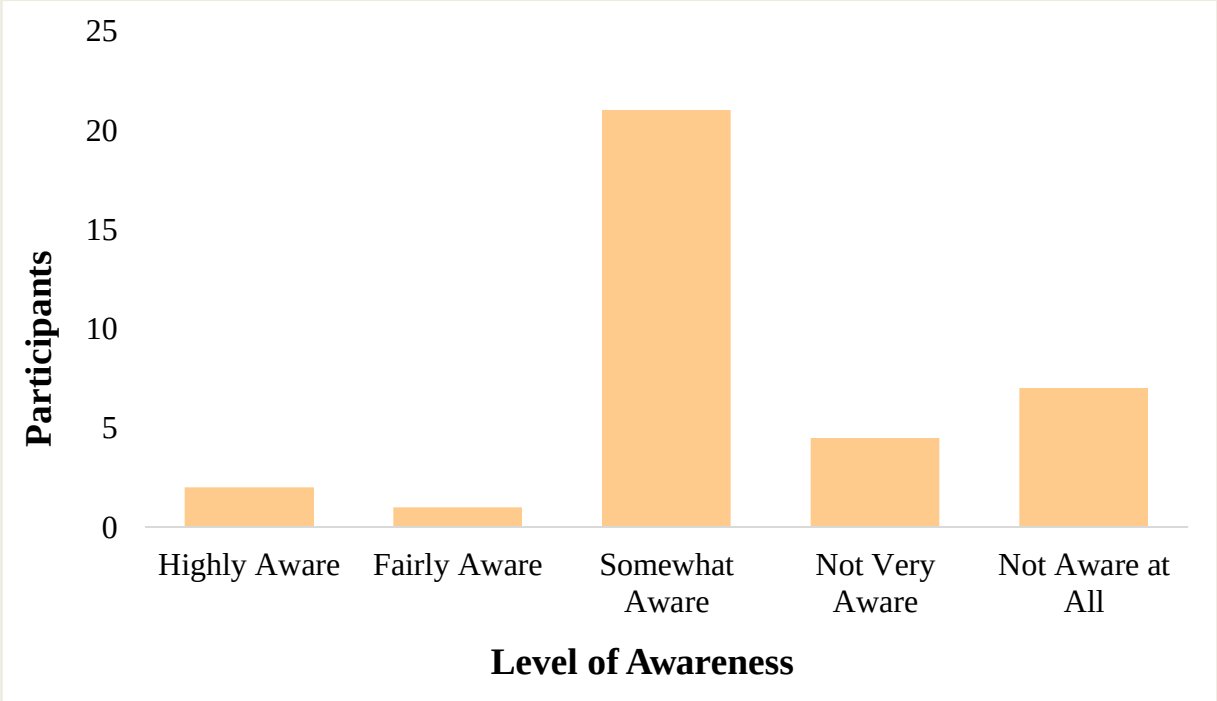


**Figure 3**

*On average, how much time a day do you spend sitting?*

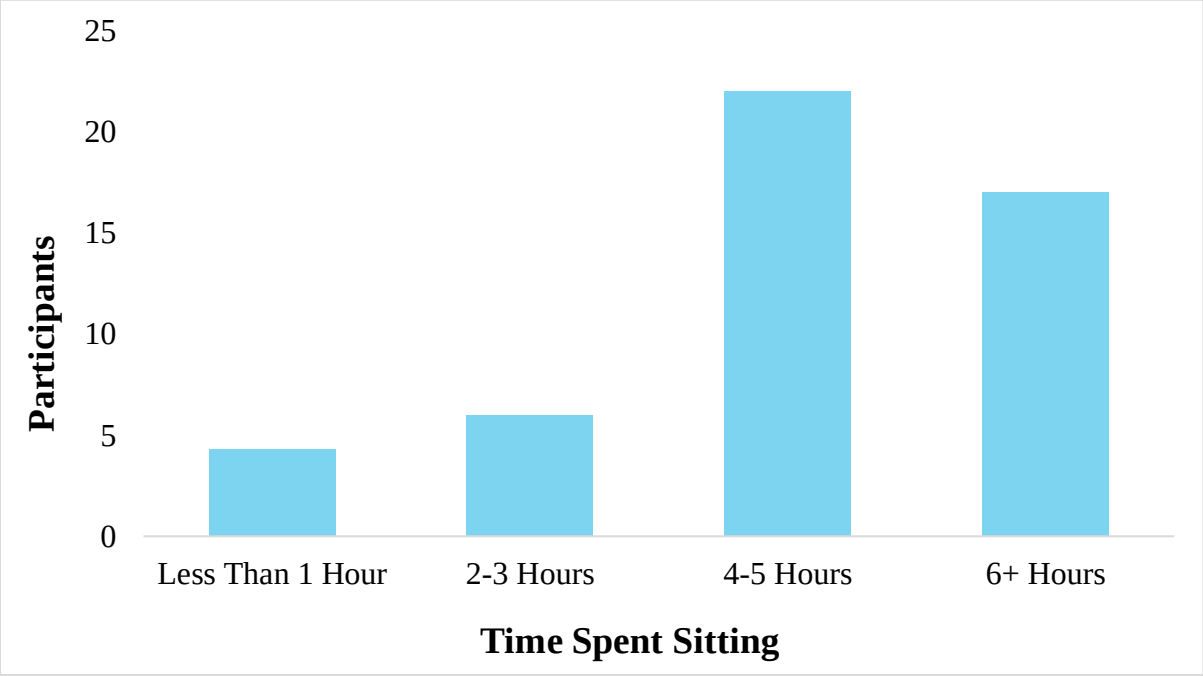
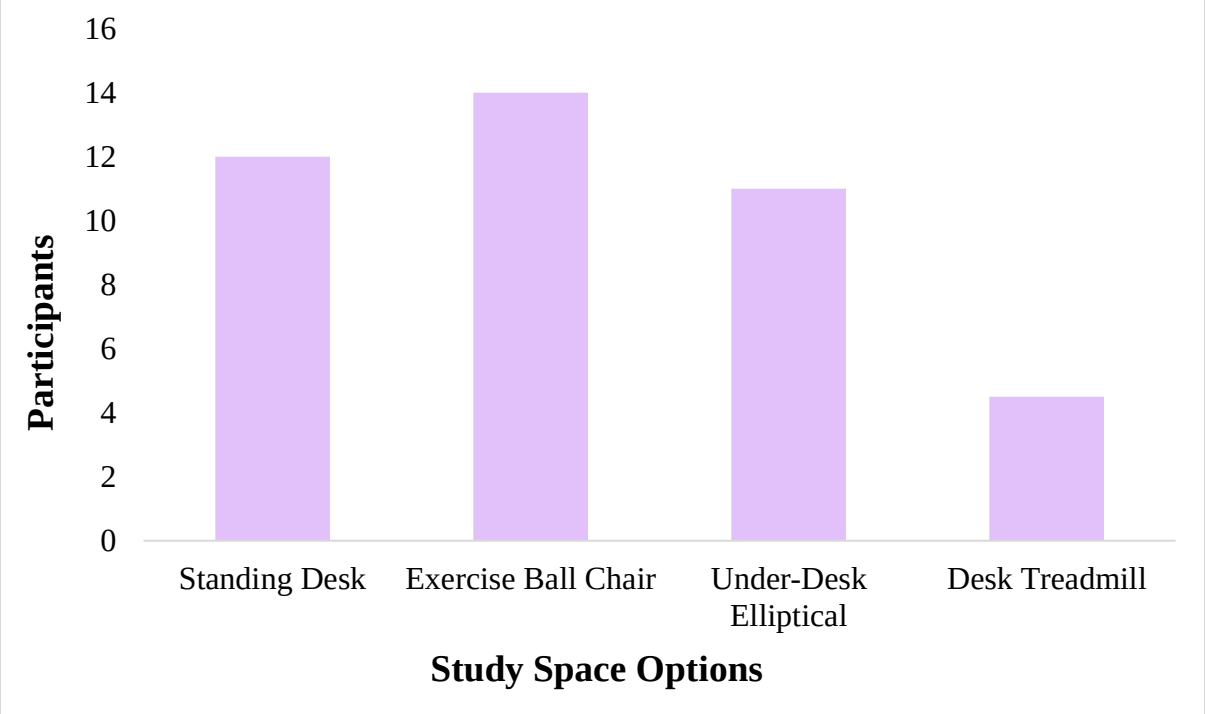



**Figure 4**

*Which of the following options would motivate you to use a study space the most?*



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