**Results**

**Sample**

I recruited the sample for this study from a college campus (*n* = 300). I recruited 48.67% of participants on campus and 51.33% of participants off campus. The ages of participants I recruited ranged from 19 to 26. When I enrolled the participants 49.33% identified as female, 37.67% identified as male and 13% identified as self-described. The population I recruited was diverse with 16.33% identifying as Asian, 10.67%, identifying as black, 24.67%, identifying as latine, 30.67% identifying as white and 9% identifying as self-described. I assigned each participant to a bike share condition where 50% of participants were enrolled and 50% of participants are waitlisted. Additionally, I assigned each participant to a messaging condition where 33.30% of participants were in the few bikers messaging condition, 33.30% of participants were in the many bikers condition and 33.30% were in the neutral bikers condition.

**Descriptive Statistics and Correlations**

When I ran the analyses, I began by looking at the continuous variables which are miles biked, environmental commitment and age. I began by looking at the descriptive statistics and correlations that can be found in Table: 1. The average amount of miles biked was higher than I expected with a mean of 170.45 (*SD* = 26.4). Age of participants averaged a 22.45 (*SD* = 2.34). I measured environmental commitment using an 11-item measure on an 8-point scale. I evaluated the internal consistency using Cronbach’s alpha and found that the environmental commitment scale and an acceptable alpha level (*α* = .84). I averaged this into a single score for each participant called environmental commitment average. After I created the variable of environmental commitment average, I found the average score across participants to be 2.26 (*SD* = 0.67). After I looked at the average score for each variable, I looked at the correlations between variables, which are also displayed in Table: 1. I expected there was a positive correlation between environmental commitment and age (*r* = .13). Additionally, there was a negative correlation between age and environmental commitment (*r* = -.03) and a positive correlation between age and miles biked (*r* = .01).

**Recruitment Method Differences**

In this study I used two different recruitment methods. Students were recruited from on campus and off campus. I wanted to evaluate whether there was a difference in recruitment sources to ensure that the source of recruitment would not influence my results. When I initially looked at the recruitment sources the off-campus group biked more miles on average (*M* = 171.62) than the on-campus group (*M* = 169.33). I chose to evaluate the significance and effect size of the recruitment sources using an independent sample t-test because I am comparing the means of exactly two samples that have no relationship, because each group was recruited at random. I used a two tailed independent samples t-test to evaluate the difference between groups. I set a critical value at *α* = .05 and obtained a t statistic of 0.75 (*df* = 298), *p* = .45, Cohen’s d = 0.09. As a result, we failed to reject the null hypothesis and could not conclude that the difference observed was significant. These results support the idea that there is no difference in recruitment source.

**Effects of enrollment condition and messaging condition**

I had two main effect hypotheses for the study and one interaction hypothesis. Hypothesis one (H1) was that participants who are enrolled in the bicycle program will travel more miles by bike than participants in the waitlisted condition. The second hypothesis (H2) is that participants in the many bikers messaging condition will have higher scores on the miles biked measure compared to participants in the neutral and few bikers condition. My third hypothesis (H3) is the interaction stating that there will be a positive effect of enrollment condition when messaging condition is many bikers but a negative effect when messaging condition is neutral or few bikers.

I chose to test all three of these hypotheses in a two-way ANOVA, given there are two factors each containing multiple levels and I wanted to prevent a multiple comparison problem. The means and standard deviations for each condition are displayed in Table: 2. Participants in the enrollment condition biked more miles on average (*M* = 540.06) than participants enrolled in the waitlisted condition (*M* = 482.62). I found that participants in the enrolled condition who received the many bikers messaged biked the most miles (*M* = 183.54) and participants waitlisted who received the neutral bikers message biked the least (*M* = 156.46).

In table 3: I present the results of the two-way ANOVA omnibus test with a set alpha level of *α* = .05 for all three hypotheses. The main effect for bike share condition was significant *F*(1, 294) = 45.75, *p* <.01. The main effect for messaging was also significant, *F*(2,294) = 3.45, *p* = .03. However, the interaction between bike share condition and messaging was not significant, *F* (2,294) = 0.09, *p* = .91.

My findings from the two-way ANOVA omnibus test for the main effect, bike share condition was as I predicted in H1. Participants in the enrolled bike share condition showed better outcomes compared to participants in the waitlisted condition. My findings for messaging condition were not consistent with my prediction from H2. Participants in the many bikers messaging condition and the few bikers conditions showed better outcomes compared to participants in the neutral bikers condition, as displayed in Figure: 1. The null for H1 and H2 was rejected based on these findings.

I created the graph in Figure: 1 so that I could visually look at the interaction. The graph indicates that there may be an interaction given that the lines are not parallel between any conditions, however this was not supported in the omnibus ANOVA. The findings from the two-way ANOVA did not support H3, as the effect of bike share condition was strongest for participants in the many bikers and few bikers messaging groups and weaker for participants in the neutral messaging groups and there were no significant p-values found in the omnibus 2-way ANOVA test, so I failed to reject the null.

After conducting my omnibus test, I chose to conduct a post hoc test using Scheffe’s test to see exactly which conditions were significant. I made the decision to use a post hoc test because I had significant p-values in the omnibus test. I chose to use Scheffe’s test because I wanted to minimize type I error. My findings for the bike share main effect are consistent between the omnibus test and Scheffe’s test (*p* < .01). This supports H1, which is that there is a significant difference in enrollment conditions with those who are enrolled biking more miles than those waitlisted, therefore I was able to reject the null.

When I looked at the messaging condition main effect using Scheffe’s test, the results did not support those that were found in the omnibus test. The findings from the messaging condition using the post hoc test were not significant (*p* > .05). This does not support H2 and suggests that there are no significant differences in messaging condition on miles biked and this data is why I made the decision to fail to reject the null. When I conducted the omnibus test there was no significant interaction, therefore I chose not to evaluate the interaction using Scheffe’s test.

**Covariate Commitment to the Environment**

My covariate for this study was commitment to the environment measured on a 11-item, 8-point scale and then averaged into one score to represent each participants average commitment to the environment. The hypothesis (H4) for my covariate was that participants who have a higher score on the commitment to the environment scale will travel more miles by bike than participants with lower commitment to the environment. I tested H4 using a simple linear regression evaluated at an alpha level of *α* = .05. People who scored higher on the environmental commitment scale biked more miles than those that were lower. The overall regression was significant, F(1,298) = 4.83, p = .03, with overall R2 = .02. The effect of environmental commitment was positive, b = 4.97 (SE = -2.26). Therefore, I chose to reject the null and was able to conclude that environmental commitment significantly predicts miles biked. These conclusions I found in the simple linear regression support H4 that people with higher scores on commitment to the environment will travel more miles by bike than those with lower scores.

**Discussion**

After I conducted the analyses, the findings suggest that access to bikes and commitment to the environment are significant in predicting miles traveled. Meaning that messaging condition was not a significant predictor of miles biked. These findings suggest that students are more likely to travel more miles by bike if they have access to bikes that are not their own and/or if they have a commitment to the environment.

These findings from the bike share condition are consistent with a study that was done in Canada also looking at students and bicycle use (Agarwal & North, 2012). The study in Canada conducted a survey and found that the majority of students who don’t bike, choose not to due to obstacles such as having their bike stolen (Agarwal & North, 2012). This idea is supported by the results of the current study because students who were in the waitlist condition did not bike as much. When bikes were not available to students, there were obstacles that lead to them biking less on average than the participants who were enrolled in the bike share condition. Suggesting that this difference in miles biked may be to the removal of obstacles. This was not something that was predicted but was not surprising given the economical state of most college students.

Another article looked at intention to bike as an influence of miles biked. It is likely that intention to bike and commitment to the environment could be related and leading to similar findings (Zhanyou et al., 2020). The study found that intention was a predictor of miles biked as environmental commitment was in the current study (Zhanyou et al., 2020). Overall supporting the findings of commitment to the environment as a predictor of miles biked.

A different study looked at the influence of messages on behavior (Cialdini & Jacobson, 2021). This is similar to the current study and my analyses on the relationship between the normative messaging condition and miles biked (Cialdini & Jacobson, 2021). The study found that messaging intervention was more likely to be successful for those who identified with the domain it was under (Cialdini & Jacobson, 2021). Connecting this back to the current analysis, this is saying that normative messaging was more likely to be successful for those with a higher commitment to the environment. This is consistent with the results that I found because environmental commitment was a significant predictor of miles biked, but messaging condition was not.

The idea of social norms predicting behavior was expected to be a predictor of miles biked, but this was not supported in the current study. However, it was found to be a valid predictor in other studies. A study looked at social norms in terms of environmental behavior (Farrow et al., 2017). The research found that social norms such as saving the environment and driving less are more likely to encourage that same behavior (Farrow et al., 2017). When looking at the findings from the current study it connects because normative messaging and social norms follow the same construct, and it was predicted that this would result in more miles biked. However, this was not the case. The current study does not support the idea that social norms predict behavior (Farrow et al., 2017). The current study found messaging condition to not be a significant predictor of miles biked.

Other research in support of the idea that messaging condition may predict more miles biked discussed the importance of psychological marketing during the implementation of sustainability programs (McKenzie-Mohr, 2000). This is done in the current study by using the messaging conditions to try and have a psychological influence to see if it will result in students traveling more miles by bike. Case studies from this article support the idea that additional psychological marketing and using concepts from the field of psychology make it, so people are more likely to commit to being sustainable (McKenzie-Mohr, 2000). However, this idea is also not supported within the current findings as messaging condition was not a significant predictor.

Other, research suggests that social intervention is likely to support environmental change (Nolan, 2021). This is idea is not supported in the current study as it is most related to the normative messaging condition. The current study initially found significance of messaging condition, however when I conducted a post hoc test I found that there were no significant differences between messaging conditions.

**Contributions**

This study was successful in the fact that it was a true experiment. It was designed from the beginning to have random assignment. The study had a good sample size to make conclusions from (*n* = 300). Additionally, the study has good internal validity because the covariate of environmental commitment is controlled for, and this ended up being important in the results. The study also did well at ensuring the 11-item environmental commitment scale was consistent. This study adds to research by supporting the idea that commitment to the environment is a factor the impacts people’s choices on what they will do. The study itself focuses on biking but it was found that psychological influences did not have the effect on miles biked that commitment to the environment had. Although full true experiments would be needed this could potentially suggest that a person’s commitment to the environment is more telling of certain behaviors than outside influences.

**Limitations**

In evaluating the limitations, it is important to look at the fact that this study was conducted with college age participants. College students tend to have a different type of physical ability than those older than them and may have more time to commute by bike. Limitations look at applying these results to people outside of the college age group. Additionally, this research was conducted at a western university. Results may be limited to this region as it is unknown how the region may impact the success of the bike share program. Universities with more extreme weather conditions may influence the relationship between environmental commitment and miles biked.

**Future Directions**

Based on the limitations of this study I recommend research be furthered in a few ways. I think research should look at the extent environmental commitment has on behavior as it did in this study in relation to miles biked. Research needs to be furthered to look at how region may influence behavior through differences in culture between regions and potentially whether. Will people bike as much somewhere that has more extreme weather? How does different weather affect the connection between miles biked and environmental commitment? Research should replicate this study in different regions to see how this differs.

Additionally, research needs to look at environmental commitment’s influence on miles biked in different age groups. This study was focused on college age participants who are typically more abled with less ailments. I think research should replicated to look at older age groups to see if there is still a predictive relationship between environmental commitment and miles biked. People may be unable to follow through on their environmental commitment due to age.

This paper looks at the implementation of a bike share program looking at enrollment condition, messaging condition and commitment to the environment. The study found no significant effect of messaging commitment, and a significant effect of enrollment condition and commitment to the environment. This study suggests that previous commitment or ideals are more predictive than outside influence. To understand the scope of these findings research must be furthered to look at individuals in more broad age groups and different regions around the world.

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**Tables**

Table: 1

*Descriptive Statistics*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  | Correlations (*r*) |  |
|  | *M* | *SD* | 1 | 2 | 3 |
| 1.Miles | 170.45 | 26.4 | -- |  |  |
| 2.Environmental Commitment | 2.26 | 0.67 | .13 | -- |  |
| 3.Age | 22.46 | 2.34 | .01 | -.03 | -- |

Table: 2

*Descriptive Statistics*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | Messaging | Condition |  |
|  |  | Many Bikers | Few Bikers | Neutral | Total |
| Enrollment condition | Enrolled | 183.54  (19.23) | 182.58  (29.97) | 173.94  (22.36) | 540.06 |
|  | Waitlisted | 163.24  (23.75) | 162.92  (22.35) | 156.46  (28.86) | 482.62 |

Table: 3

*Two-way ANOVA Summary*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *SS* | *df* | *MS* | *F* | *p* | *η2* |
| Enrollment condition | 27495 | 1 | 27495 | 45.75 | <.01\* | .13 |
| Messaging condition | 4150 | 2 | 2075 | 3.453 | .03\* | .02 |
| Interaction | 109 | 2 | 55 | 0.091 | .91 | <.01 |
| Residual | 176679 | 294 | 601 |  |  |  |
| Total | 208433 | 299 | 30226 |  |  |  |

**Figure**

Figure 1:

Interaction of enrollment condition and messaging condition

Graphical user interface, text, application

Description automatically generated