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# Using residential location to assess the environmental value-action gap of students at James Madison University

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Using Residential Location to Assess the Environmental Value-Action Gap of Students at James Madison University

An Honors Program Project Presented to

the Faculty of the Undergraduate

College of Science and Engineering

James Madison University

by Emma Rose Martin

May 2016

Accepted by the faculty of the Department of Integrated Science and Technology, James Madison University, in partial fulfillment of the requirements for the Honors Program.

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PUBLIC PRESENTATION

This work was accepted for presentation in full at the American Association of Geographers Annual Meeting 2016 on March 30, 2016.

## Dedication

To my grandparents, for having an overwhelming amount of pride in all of my accomplishments, and for supporting me with the occasional five dollars in the mail.

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**Acknowledgements**

There are many people who helped to make this research project remarkable and I would like to express my gratitude for their support. First, I want to thank the Geographic Science program. I believe that this project is truly the apotheosis of what I have learned during my four years in GS, and is truly a reflection of how well the program has prepared me for a future in geography.

I want to thank Dr. Brodrick-Hartman and the JMU Office of Environmental Stewardship for consulting with me throughout this project, providing me with the funding necessary to travel to the AAG Annual Meeting in San Francisco, and ultimately providing a platform to make my paper accessible to the public through the OESS Environmental Stewardship Tour.

Similarly, I would like to thank the Integrated Science and Technology department for granting me the funding necessary to provide an incentive for participants to take my survey and to support my travel to the AAG Annual Meeting, an invaluable experience from which I have learned a lot.

Finally, the completion of this project would not have been possible without the time and support dedicated to me by Dr. Carole Nash. I have learned a lot from you throughout this process, and that to me is invaluable.

## Abstract

This study focuses on the environmental Value-Action Gap of students at James Madison University (JMU) in Harrisonburg, Virginia. This gap occurs when a person has pro-environmental beliefs but does not have congruent actions. Often, there are other factors apart from a person's values that influence his/her willingness to participate in eco-friendly behavior (Howell 2013). For this study, the factor of influence being addressed is location. When students live on-campus at JMU they are surrounded by 'green' initiatives. Understanding the diffusion of environmental behavior from on-campus living to off-campus living is important because the majority of a JMU student's residency is often off-campus. It is hypothesized that the Value-Action gap is wider in students who reside in off-campus housing compared to students who reside in on-campus housing as a result of reduced proximity to these initiatives. 1,004 JMU students were sampled using an IRB-approved Qualtrics survey that included questions about age, gender, academic year, environmental values, and environmental actions. Additionally, each participant indicated his/her location of residence using an ArcGIS Online map of Harrisonburg divided into eight generalized on-and off-campus zones. A 2-Dimensional Model of Ecological Values (2-MEV) was used to assess students' preservation and utilization values, and a series of Likert-scaled statements assessed the frequency of students' environmental actions. An ANOVA test was used to determine variation in the responses of on-campus and off-campus participants. Contrary to the hypothesis, it is understood that off-campus students have a higher mean value and action score than that of on-campus students, although a Value-Action Gap does exist in both populations. Additionally, there is a moderate correlation between the values and actions within both groups, indicating that stronger values might lead to more frequent actions. The results of this study can be applied to help enhance 'green' behavior in JMU students.



**Keywords:** Environmental Value-Action Gap, Higher Education, 2-MEV, Attitudes, Behaviors

## Introduction

James Madison University (JMU) is a public university located in Harrisonburg, Virginia and enrolls nearly 21,000 students. The university plans to increase enrollment as part of its six-year institutional plan. In addition to this, JMU intends to continue to support academic programs related to STEM and environmental sustainability (James Madison University 2013). As the number of students in Harrisonburg increases, greater pressure will put on the university to maintain and improve its sustainable practices. Currently, the JMU Environmental Stewardship Action Plan outlines a series of university-wide and nationally-recognized sustainability practices. Some practices which have already been implemented include: accessible alternative transportation; LEED gold and silver certified buildings; partnering with local farms to supply food to the dining halls; and composting waste (The Office of Environmental Stewardship 2011). However, despite strides made by the university to encourage sustainability and positive environmental action, people tend to have strong beliefs in favor of protecting the environment and conserving resources, but they do not always follow through with these values. This is known as the Value-Action Gap. This gap occurs because there are other factors that influence a person's environmentally-supportive behavior (Howell 2013).

The purpose of this research is to test the hypothesis that location is a factor that affects students' actions towards the environment and thereby determine whether a Value-Action Gap exists at JMU. It is hypothesized that on-campus students participate in pro-environmental actions more frequently than off-campus students because they are surrounded by campus-wide sustainability initiatives, and as a result, have a smaller Value-Action Gap. Pro-environmental

actions are defined as any behavior that protects or encourages the protection of the environment and its resources (Liefländer & Bogner 2014; Malandrakis, Boyes, & Stanisstreet 2011). This term is used throughout the environmental behavioral literature in the same manner. The terms 'value', 'attitude', and 'belief' as well as 'action' and 'behavior' are often used interchangeably in both this project and in comparable studies. Additionally, the term 'motivator' is used to describe a factor that influences a person's beliefs and actions (Howell 2013).

This study is the only known research of its kind to evaluate location as a motivator for behavior of students in higher education. Research often focuses on young children because they are seen as impressionable and more receptive to ideas about protecting the environment (Lieflander & Bogner 2014). A number of other motivators are the focus of these studies—such as peer influence (Carrico 2009), efficacy (Boyes & Stanisstreet 2012; Malandrakis, Boyes and Stanisstreet 2011), and education (Hebel, Montpied & Fontanieu 2014). Location has the potential to motivate pro-environmental behavior because proximity to 'green' initiatives is assumed to produce a higher frequency of pro-environmental action.

Understanding the diffusion of environmental behavior from on-campus living to off-campus living is important because the majority of a JMU student's residency is often off-campus. 1,004 JMU students were sampled using an IRB-approved Qualtrics survey that included questions about age, gender, academic year, environmental values, and environmental actions. Additionally, each participant indicated his/her location of residence using an ArcGIS Online map of Harrisonburg divided into eight generalized on-and off-campus zones. A 2-Dimensional Model of Ecological Values (2-MEV) was used to assess students' preservation and utilization values, and a series of Likert-scaled statements assessed the frequency of students'

environmental actions. An ANOVA test was used to determine variation in the responses of on-campus and off-campus participants.

Values and Actions were shown to differ between on-campus and off-campus as a whole. Contrary to the hypothesis, it is understood that off-campus students have a higher mean value and action score than that of on-campus students, although a Value-Action Gap does exist in both populations. However, the Value-Action Gap between on-campus students and off-campus as a whole shows it is the same. This was determined because there is no statistically significant difference in the correlations of the two locations. The moderate correlation between the Values and Actions for both groups indicates that there is a relationship between Values lead to more frequent actions.

## Literature Review

### *Global Context*

Every two years the National Geographic Society conducts a global study called Greendex that develops an index of countries' environmental sustainability. In partnership with the consulting firm GlobeScan, this study assesses each country based on its citizen's attitudes and habits related to "housing, transportation, food, and consumer goods". Overall, the study found that since 2012 environmental concern and the perceived threat of climate change are increasingly globally (Stone 2014). However, the Greendex reports from the past eight years consistently ranks America as having the lowest overall index score of the surveyed countries. To summarize the study's findings, the United States ranks 18$^{th}$ out of 18 countries when it comes to using public transportation, walking, riding a bicycle and living near places of work. Additionally, U.S. citizens score among the lowest when it comes to buying locally grown foods, used/ pre-owned goods, and buying eco-friendly products if they are more expensive (GlobeScan 2014).

### *Environmental Attitudes*

Studies have been conducted with the purpose of better understanding the factors that affect students' attitudes towards the environment (Hebel, Montpied, Fontanieu 2014; Lieflander & Bogner 2014; Boyes & Stanisstreet 2012; Malandrakis, Boyes & Stanisstreet 2011; Wiseman & Bogner 2003). Hebel, Montpied and Fontanieu study the link between students' interest in learning about environmental topics, environmental extra-curricular activities and future career goals and their environmental attitudes. They determined that students who are interested in

learning about the environment as well as students who are involved in nature-related extra-curricular activities show higher levels of concern for the environment. On the other hand, students whose career goals involved "earning lots of money," "controlling other people," or "becoming famous" tended to have a more apathetic view of the environment (Hebel, Montpied & Fontanieu 2014). Additional studies take environmental attitude research a step further to determine the influence attitude has on environmental action. Efficacy has been determined to play a major role in whether or not a person participates in environmental actions. Students who feel their behavior will actually impact the environment in a positive manner are more likely to continue this behavior (Boyes & Stanisstreet 2012; Malandakis, Boyes & Stanisstreet 2011). The majority of attitude research uses a 2-Dimensional Model of Ecological Values (2-MEV) questionnaire in order to keep results comparable between studies (Lieflander & Bogner 2014). A 2-MEV assesses a person's ecological values in order to quantify his/her beliefs about the environment on a 2 dimensional scale, ranging from biocentrism to anthropocentrism (Wiseman & Bogner 2003).

*Age and Gender*

This project is particularly important because there are few studies that use students in higher education as the subjects of study—the age of students in the literature range from 9-15 years old. Younger students are considered more impressionable and therefore can be easily influenced to care about the environment (Lieflander & Bogner 2014). However, older students in this age range have a greater understanding of the context associated with environmental issues (Hebel, Montpied and Fontanieu 2014). Focusing on college students is important because it is hypothesized that this population has the greatest potential to promote and practice environmental conservation and sustainability after graduation. In terms of gender, the results

are inconsistent. Some studies found that females show higher concern for the environment than males (Boyes, & Stanisstreet 2012; Zelezney, Chua & Aldrich 2000) while others have produced results showing that both genders share near equal concern (Lieflander & Bogner 2014).

*Location*

Not enough research has been conducted on the link between location and the value-action gap, and the research that has been conducted produces a lot of questions. The Greendex measures the environmental values and ecological actions of different countries in order to determine how these variables change over time, but does not suggest why these countries display these results (Greendex 2014). Furthermore, the global scale of this study makes it difficult to apply these results on a more local level, to college campuses, for instance. A Chinese study of the environmental knowledge, attitudes and behaviors of university students more closely relates to the purposes of the present study in its sample population and spatial component. The research provides some insight into the relationship between developed versus less-developed hometowns and environmental awareness. The results showed an overall low level of environmental knowledge, but pro-environmental attitudes and a propensity for eco-friendly behavior were also seen. The students from the developed, urban area show slightly greater environmental knowledge and more positive environmental attitudes than those from less-developed area, despite the similar educations (He, Hong, Liu & Tiefenbacher 2011).

Although the attitudes and behaviors of Chinese students in higher education may not transfer well to that of American students because of cultural differences, these results can be used as a case study to better understand the Value-Action gap in JMU living. The off-campus living locations vary from highly developed to lesser developed, with JMU being, in many ways,

the most developed area. If JMU is considered an urban center, then the hypothesis that on-campus students participate in more "green" initiatives due to the proximity to these initiatives aligns with the results of the Chinese study. Nonetheless, the need for more research into the spatial analysis of the value-action gap is apparent.

Overall, the literature mostly seeks to understand what factors influence Values, and to then determine if these Values lead to more frequent Actions. In contrast, my survey was administered to understand how factors (location) influence both Values and Actions, almost as two distinct entities. Rather than seeing if location influences beliefs, which then influences values, I am attempting to determine if there are differences in Values and Actions at each location, and ultimately determining if there is a Gap.

## Methods

*Survey Development*

In order to determine whether environmental beliefs and behaviors change as a student transitions from on-campus to off-campus living, an IRB-approved (16-0239) online survey was administered using Qualtrics, an on-line survey platform, to maintain anonymity and prevent responses being associated with the respondents. The survey was distributed using the JMU bulk email system and was sent to 20,297 students. This number represents all students enrolled in the university at the time the study was administered who are either commuters (live off-campus) or have a housing contract (live on-campus). Students under the age of 18 were not permitted to participate in this survey. In exchange for completion of the survey, participants were informed in the initial bulk e-mail and research consent form that 50 people would be randomly selected to receive cookies from Campus Cookies, a well-known local bakery, after the data were collected. A total of 1,004 students fully completed the survey, a response rate of 4.9%.

*Background Section*

The survey was divided into three sections and can be accessed in Appendix I. The first section contained data about the participant's gender, age, year in college, major, and where he/she lives in Harrisonburg. In order to generalize where students live without asking for any identifiable information an interactive ArcGIS Online map was embedded into the survey. On the map, the extent within the boundary of Harrisonburg was divided into eight general areas, or 'zones', in order to maintain the anonymity of the participant while also allowing for spatial data to be collected regarding his/her on-campus or off-campus living situation (Figure 1).

Participants were directed to search for his/her Harrisonburg address—which could not be recorded—and determine in which zone they live. If the participant lived outside of Harrisonburg, he/she was able to select the closest town from a given list.

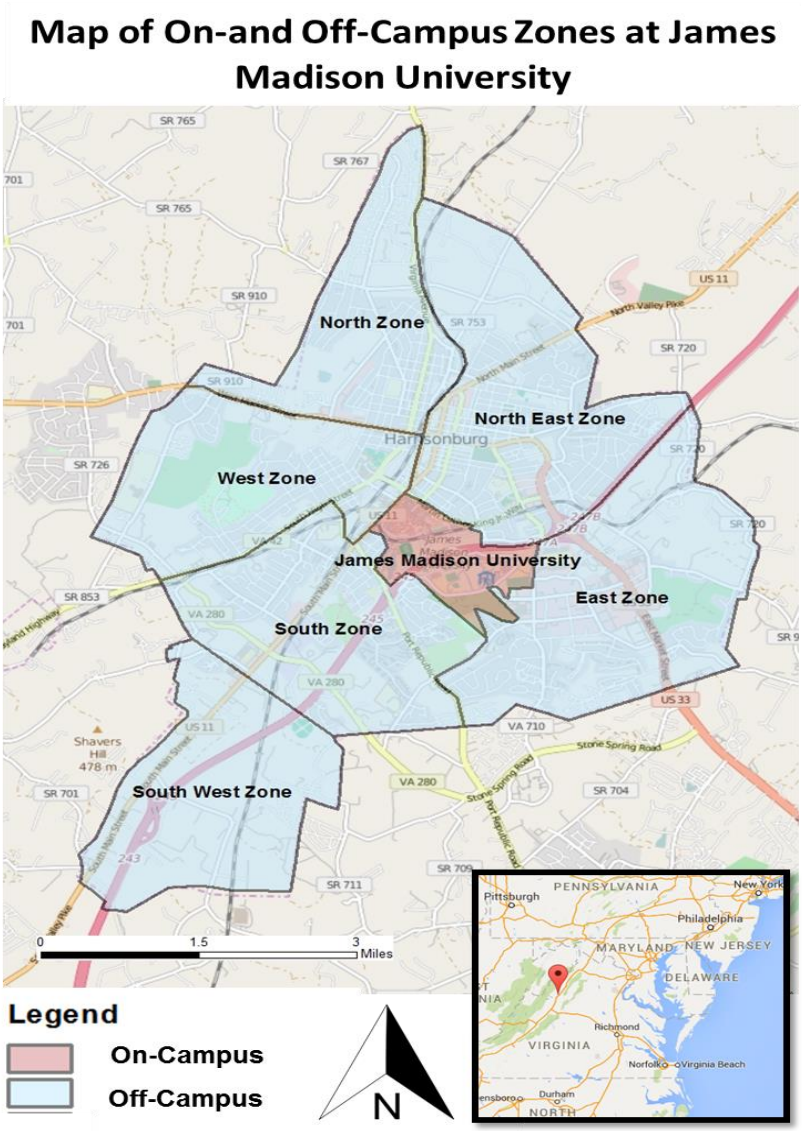


**Figure 1: Map showing the eight on-and off-campus locations at JMU in Harrisonburg, VA.**

*Values Section*

The second section of the survey assessed each person's environmental beliefs using Likert-scaled statements. This part of the survey design was based on the methodologies of Hebel, Montpied & Fontanieu (2014) and Boyes & Stanisstreet (2012) and utilized a Two-Dimensional Model of Ecological Values (2-MEV) questionnaire, first proposed by Wisemen and Bogner (2003). A 2-MEV questionnaire assesses a person's ecological values based on his/her beliefs about two orthogonal dimensions, the biocentric dimension (Preservation) and the anthropocentric dimension (Utilization). A biocentric view holds that it is important to take care of the environment whereas an anthropocentric view holds that it is acceptable for humans to utilize the environment to their advantage. The orthogonal aspect of this model is important because it states that Preservation and Utilization are mutually exclusive and not correlated. A high preservation (PRE+) score and a low utilization (UT-) score means that the person cares about the environment and believes in conservation. (PRE- UT+) means that the person uses the environment for his/her own personal gain and does not care much about conservation. On the other hand, (PRE-, UT-) is associated with someone who is generally uninterested in the subject while, lastly, (PRE+, UT+) corresponds with someone who is spontaneously dissonant and is easily able to switch his/her position (Wiseman & Bogner 2003). The purpose of using this methodology was to make the results of this study comparable to the results of other studies that used this test. Additionally, the 2-MEV analysis provides a deeper understanding of how students view the world, whether biocentric or anthropocentric, which can allow for more targeted on-or off-campus environmental initiatives.

The 2-MEV section consisted of eight Preservation statements and six Utilization statements. Participants were prompted to indicate how strongly they agree/disagree with each

environmental belief, using a five point Likert scale ranging from *Agree* to *Disagree* with a "No Opinion" option. The Preservation and Utilization sub-categories were known to the researcher and were only used as a means to analyze the data. The statements in this section were developed from comparable surveys (Hebel, Montpied & Fontanieu,2014; Boyes & Stanisstreet 2012; Malandrakis, Boyes & Stanisstreet 2011). The statements were created to be clear and to provide general responses pertaining to environmental values about which the average JMU student could have an opinion.

*Actions Section*

The final section of the survey evaluated students' environmental behaviors. Participants were directed to indicate how often they performed each action using a four point Likert scale—*Never, Occasionally, Often, Always*. Fourteen statements related to environmental actions were chosen such that they would correspond to a similar statement in the Values section, similar to the methodology of Boyes and Stanisstreet (2012). For example, the Value statement "It is important to learn about new ways to protect the environment" is paired with the corresponding Action statement "Investigate new ways to protect the environment". The idea behind this was to determine if the participant's values correlate with his/her ongoing actions. In other words, this ascertained whether or not there exists a Value-Action Gap.

The Action statements were divided into 6 sub-categories of typically surveyed environmental behaviors: recycling, recreation, energy consumption, participation in 'green' events, water consumption and responsible consumerism (Stone 2014; Hebel, Montpied & Fontanieu 2014; Boyes & Stanisstreet 2012; Malandrakis, Boyes & Stanisstreet 2011) .

*Analysis*

In order to address the research question of whether or not environmental actions differ from on-campus students to off-campus students, basic descriptive statistics were employed. Each response on the Likert-scale for the Actions section was given a number (*Never*=1, *Occasionally*= 2, *Often*=3, *Always*=4) to produce a 'score' for that statement. The average response score for each *Action* statement was calculated for every participant. This was first done for on-campus versus all off-campus locations as whole, then again for on-campus versus the seven off-campus zones individually. Starting with this analysis was important to see how participants responded and to get an idea of the initial survey results.

At this point, an Analysis of Variance (ANOVA) test was performed using the average on-campus Action scores and the aggregated off-campus action scores. This test determined if a statistically significant difference existed between the mean responses for each location. If the null hypothesis, that the means for each location were the same, was rejected by a p-value of 0.05 or less, then there existed variance in the data.

A similar analysis was performed for the Values Section. The average score for each statement at the two general locations was calculated. Then, the ANOVA test was performed to identify if there was significant variance in mean response between the locations. However, in contrast to the Action section analysis, the Likert-scale responses for Preservation statements were assigned numbers (*Disagree*=1, *Slightly Disagree*=2, *No Opinion*= 3, *Slightly Agree*=4, *Agree*=5) differently than the responses for Utilization statements (*Disagree*=5, *Slightly Disagree*=4, *No Opinion*= 3, *Slightly Agree*=2, *Agree*=1) in order to account for a change in the way statements were designed. In other words, the Preservation statements were designed such

that *Agree* indicates the strongest pro-environmental belief whereas the Utilization statements were designed such that *Disagree* indicates the strongest pro-environmental belief. Switching the numbering scale made it easier to aggregate scores for each section as a whole, perform ANOVA tests, and Pearson's correlation tests with the Action statements. The only instance where the Utilization scores were not adjusted, or reversed, was for the 2-MEV analysis. This was done in order to keep the results consistent with the formatting of results from the comparable studies indicated earlier.

In order to acquire a deeper understanding of the data in each section, an ANOVA test was repeated for on-campus responses compared to the seven off-campus zones—the only difference being, if there was variance in the data, the next step was to use a Tukey's comparison test to determine between which pair of locations there existed a discrepancy in means. In sum, the ANOVA test made it possible to see differences in responses between on-campus and off-campus students.

Acquiring data about each participant's environmental values was an important step in determining if pro-environmental beliefs are correlated with pro environmental actions—in other words, testing the hypothesis that people do not act on their pro-environmental beliefs. A Pearson's correlation was calculated for each pair of value and action statements. The correlation produces a p-value as well as a number between -1 and 1 in order to indicate whether or not a correlation exists and to evaluate the strength of this correlation, respectively. The strength of the absolute value of each coefficient was evaluated using this scale: .00-.19= very weak, .20-.39=weak, .40-.59= moderate, .60-.79= strong, .80-1.0= very strong.

*Data Achieve*

At the conclusion of this study, the data were stored with the JMU Office of Environmental Stewardship and Sustainability. The data remain password protected to ensure the anonymity of the information contributed by the participants.

## Results

*Background Data*

It is interesting to note that 83% of respondents are female, while17% are male. This differs significantly from the female-to-male ratio of enrolled JMU students. However, it is hypothesized that this could suggest a greater amount of concern for the environment from women because they are more willing to contribute to research related to the environment. If this hypothesis is correct, this would support the conclusions made by Boyes, & Stanisstreet (2012) and Zelezney, Chua & Aldrich (2000). However, the Value and Action scores for each gender were not evaluated.

41% of students who participated in this survey live on-campus at JMU while 59% live off-campus. South zone and East zone have the greatest response rates for off-campus zones, 21% and 20% respectively. The average participant age was 20.25 years old. However, when looking at each zone individually, on-campus respondents have the lowest mean age, 19.02 years old, which is rationalized by the fact that 91.6% of on-campus students are Freshmen. Participants in the non-Harrisonburg zone have the highest, 25.15 years old, which is assumed to be because older adults are likely returning to school, or attending graduate school, and commute from outside of Harrisonburg. It should also be noted that on-campus students have the lowest average number of years in completed at JMU, 1.54 years, while all off-campus zones have between 3.0 and 3.28 years. However, across all locations there is an even spread of response from each academic level—Freshman (28%), Sophomore (22%), Junior (22%), Senior (28%).

*Action Section: Combined Sample*

The mean Action score for the responses of all survey participants is 2.76 out of 4, which means that overall students at JMU participate in pro-environmental behavior more than *Occasionally* (2) and slightly less than *Often* (3). This statistic can also be interpreted as meaning students follow through with pro-environmental actions 2.76/4, or 69% of the time.

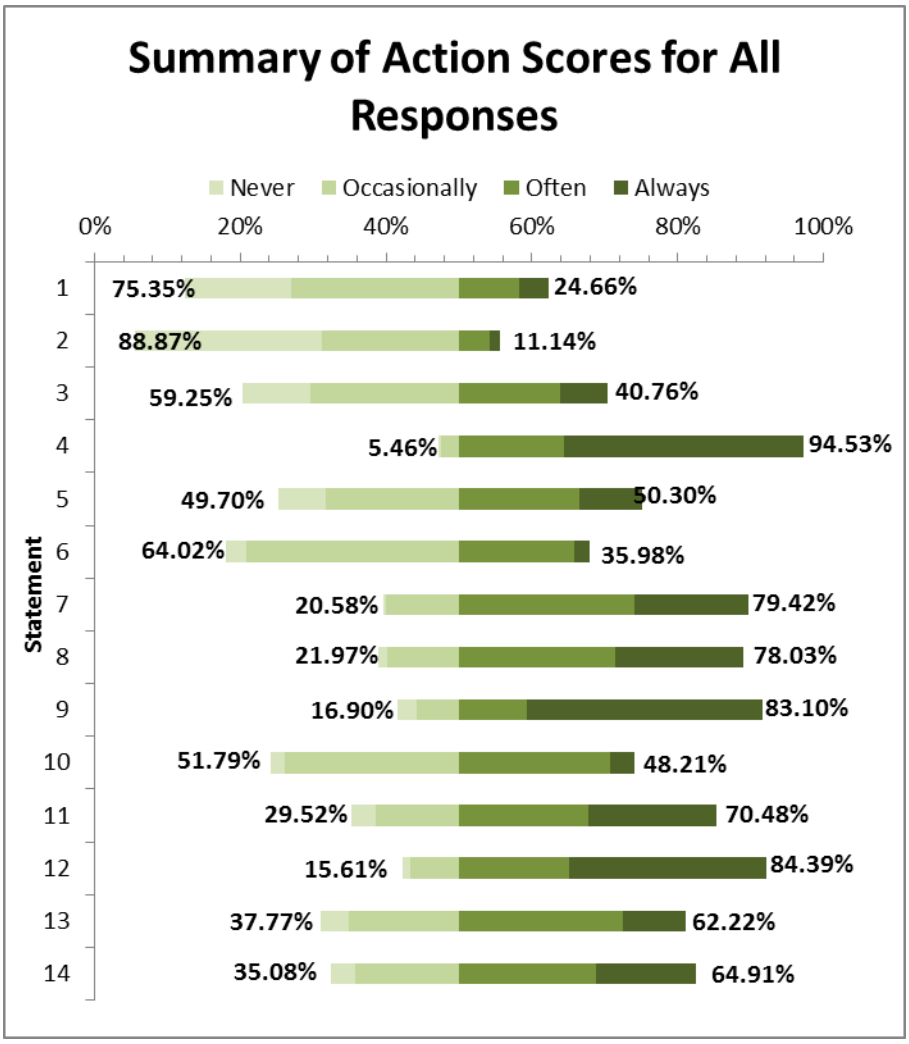


**Figure 2: Graph showing the percent distribution of Action scores for all survey responses. The numbers on the right of the graph indicate the percent of participants that secleted *Often* or *Always,* whereas the numbers on the left indicated the percent of participants that selected *Never* or *Occasionally.***

As shown in Figure 2, five of the 14 statements have less than 50% of participants respond *Often* or *Always* when asked about frequency of participation in that activity, and three statements have 80% or more students choose one of these two options. Statement 2 has the lowest frequency of Action with 11.1% of students indicating they *Often* or *Always* "Participate in 'green' events, such as Blacks Run CleanUp Day." The second lowest, Statement 1, indicates 24.7% *Often* or *Always* "Investigate new ways to protect the environment." "Eat locally grown food" (Statements 6) , "Help others understand the impact their actions have on the environment (ie: encouraging friends to recycle)" (Statement 3) , and "Buy recycled products" (Statement10) also have less than half of students responding *Often* or *Always,* with 36%, 40.8%, and 48.2% respectively.

The action that students perform the most is "Turn the lights off when they are not needed" (Statement 4) with 94.5% responding *Often* or *Always.* 84.4% responded in the same way about "Drink from a reusable water bottle" (Statement 12), and 83.1% for "Turn off the water when brushing your teeth" (Statement 9).

*Value Section: Combined Sample*

The overall Value score for the total population of survey participants is 4.22 out of 5, which indicates that students have strong pro-environmental beliefs. The mean Preservation score for the sample population as a whole is 4.51 out of a possible 5, indicating a strong biocentric view of the world and an affinity for environmental protection. The mean Utilization score, without calculating the inverse score, is 2.06 out of 5, indicating a non-anthropocentric viewpoint with some feelings against consumption of environmental resources. Nevertheless,

the Utilization scores are less defined than that of Preservation, which can be seen in Appendix II.

Appendix II also shows the overall strong affinity of JMU students to pro-environmental beliefs. At least 80% of participants *Slightly Agree* or *Agree* with the eight Preservation statements, or *Slightly Disagree* or *Disagree* with three of the six Utilizations statements. "It is a good thing to turn off the lights when they are not needed" (Statement 4) produced the strongest response with 98% of students choosing *Slightly Agree* or *Agree* to this Preservation statement. "There is no need to reduce, reuse or recycle because humans are meant to use nature for their own benefit" (Statement 12) garnered the second strongest response with 96.6% of students choosing *Slightly Disagree* or *Disagree* with this Utilization statement

Two statements were noticeable outliers. Only 51.4% of students *Slightly Agree* or *Agree* with Statement 13 "I use air conditioning whenever possible." Similarly, 54.7% of students *Slightly Disagree* or *Disagree* that "Recycling does not do enough good to make up for the harm we cause the environment" (Statement 10). Lastly, it should be noted that the only other statement that does not indicate strong beliefs one way or the other is "Understanding which items should be put in compost, recycling and landfill bins takes too much time" (Statement 14). Due to the fact that these statements have close to 50% of respondents choosing agreement and disagreement, there is a clear division in the JMU community about the importance of these three values.

*Actions Section: On-campus v. Combined Off-campus*

The ANOVA test between the on-campus and aggregate off-campus responses for the Action section indicates that there is a statistically significant difference in the mean Action scores for the two locations. As a whole, off-campus students scored higher with 2.90, while on-campus students scored 2.64. In other words, off-campus students perform pro-environmental action more frequently than on-campus students.

Based on the ANOVA test, the statements in particular differ between the two locations are that of 4, 5, 12, and 14. Off-campus students "Turn the lights off when they are not needed" (Statement 4) and "Drink from a reusable water bottle" (Statement 12) more often than on-campus students. However, more on-campus students "Walk or bike rather than taking the bus" (Statement 5) and "Sort trash into proper receptacle (i.e.: compost, landfill, etc.)" (Statement 14) than off-campus.

*Actions Section: On-campus v. Off-campus Zones*

Figure 3 shows the mean responses for the 14 statements at each of the eight on-and off-campus locations. The graph shows that students from the off-campus locations follow the same response trend with minimal deviation from the on-campus location highlighted in red. The ANOVA test shows that there is variance in the data for Statements 4, 5 and 14, which is consistent with the combined Action section results except for Statement 12.

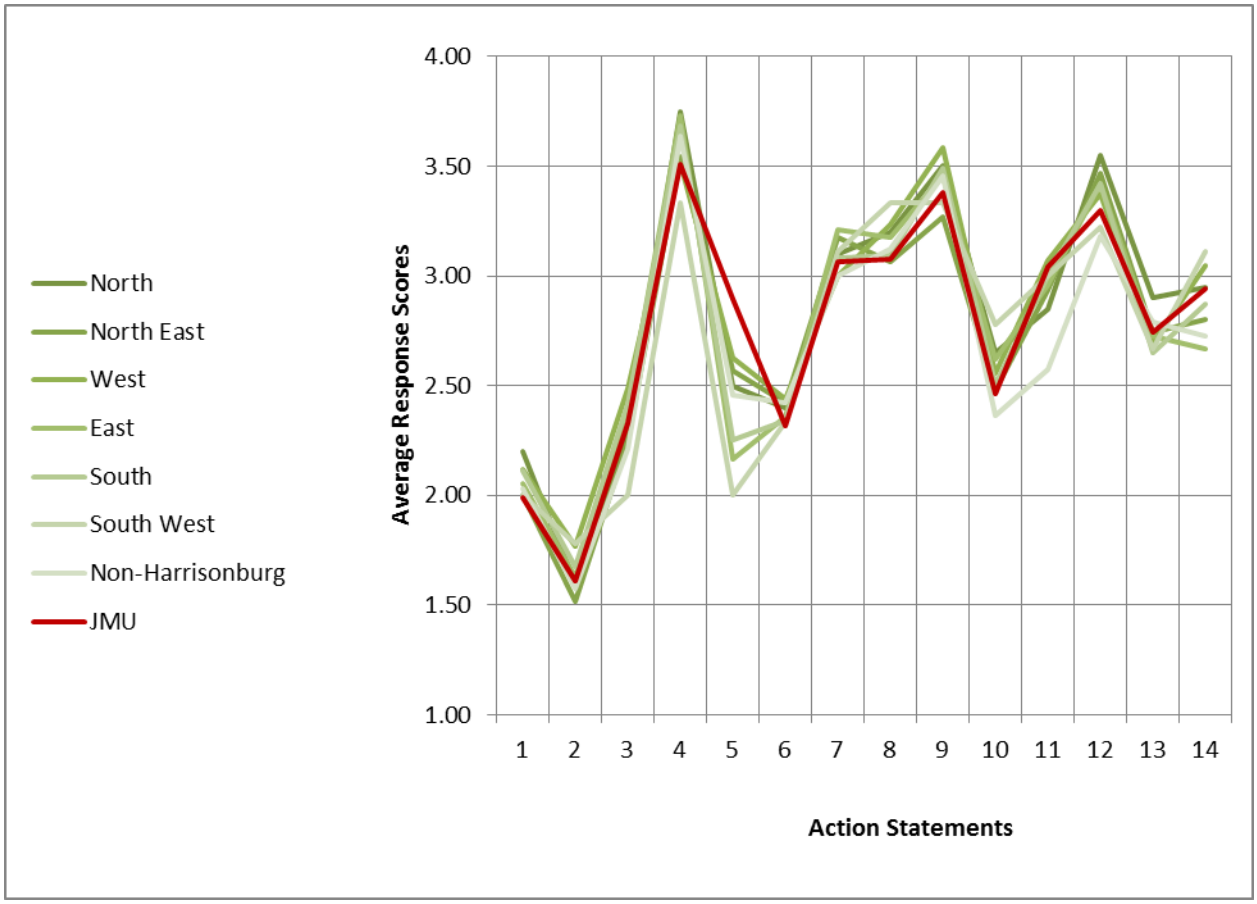


**Figure3: Mean Action response scores for the eight on-and off-campus locations.**

The Tukey comparison test indicates that for the statement "Turn the lights off when they are not needed" (Statement 4), the East zone and the South zone have greater means than JMU (the on-campus zone). The fact that the two off-campus locations scored higher for this statement is again consistent with the combined off-campus to on-campus ANOVA comparison.

On the other hand, JMU has a greater mean for "Walk or bike rather than taking the bus" (Statement 5) than the Northeast and South zones. The same can be said for Statement 14,"Sort trash into proper receptacle (i.e.: compost, landfill, etc.)", where on-campus scored higher than the East zone. Again, the fact that the on-campus location scored higher for this statement than the off-campus locations is consistent with the combined off-campus to on-campus ANOVA comparison.

*Values Section: On-campus v. Combined Off-campus*

The difference in Value scores for the on-campus and off campus locations was shown to be statistically significant by the ANOVA test, and higher for the combined off-campus location—4.3 compared to 4.21, out of 5. This shows that, in addition to having more frequent behaviors, off-campus students have stronger pro-environmental beliefs than that of on-campus. Based on the ANOVA test, the statements in particular that differ between the two locations are that of numbers 5, 10, 13, and 14. In fact, for each of these statements the higher mean score is that of off-campus responses. In other words, all of the off-campus locations combined believe that it is important to turn the lights off, use alternative transportation, recycle, and understand how to sort trash into proper receptacles more so than on-campus. The ANOVA test also showed that "It is a good thing to turn off the lights when they are not needed" (Statement 4) also indicated variance in means, but this was proven to be not statistically significant because the on-campus location had a higher average by only 0.07. It is assumed that the ANOVA gave a false indication of variance because the data for this question was highly skewed. 99% of off-campus respondents chose *Slightly Agree* or *Agree* for this statement, and 97.7% chose either of these for on-campus. Additionally, the difference in mean response scores for all of the statements is less than 0.09, except for these four statistically significant outliers (ranging from 0.16 to 0.58),

which shows that on-and off-campus students generally have very similar beliefs, but are more divisive on these subjects.

*Values Section: On-campus v. Off-Campus Zones*

Figure 4, shows the mean responses for the 14 statements at each of the eight on-and off-campus locations. Similar to the Action graph in Figure 2, the data shows that the locations follow the same general trend in comparison to the on-campus location highlighted in red. However, the ANOVA test for each statement was inaccurate at determining statistically significant variation between on-campus and the various off-campus zones. For example, "I would volunteer to help clean-up the environment" (Statements 2) and "Taking the bus, walking or riding a bike decreases a person's energy consumption" (Statement 5) were singled out as being the only two statements with variance. For Statement 5, the South zone has a higher mean (4.5), than on-campus (4.2), a difference of 0.3. However, there were even greater variations that the ANOVA did not specify. For example, the North zone has a mean of 4.7 for this statement, a difference of 0.5. It is assumed that this is because the sample size for the North zone was much smaller (22 people) than that of the South zone (208 people) which altered the results of the ANOVA test. As a result of the uneven distribution of students in each zone, the results of this analysis cannot be deemed conclusive. Future research should be conducted that focuses on achieving even sample sizes from each zone in order to provide more statistically significant evidence about these students' Values and Actions.

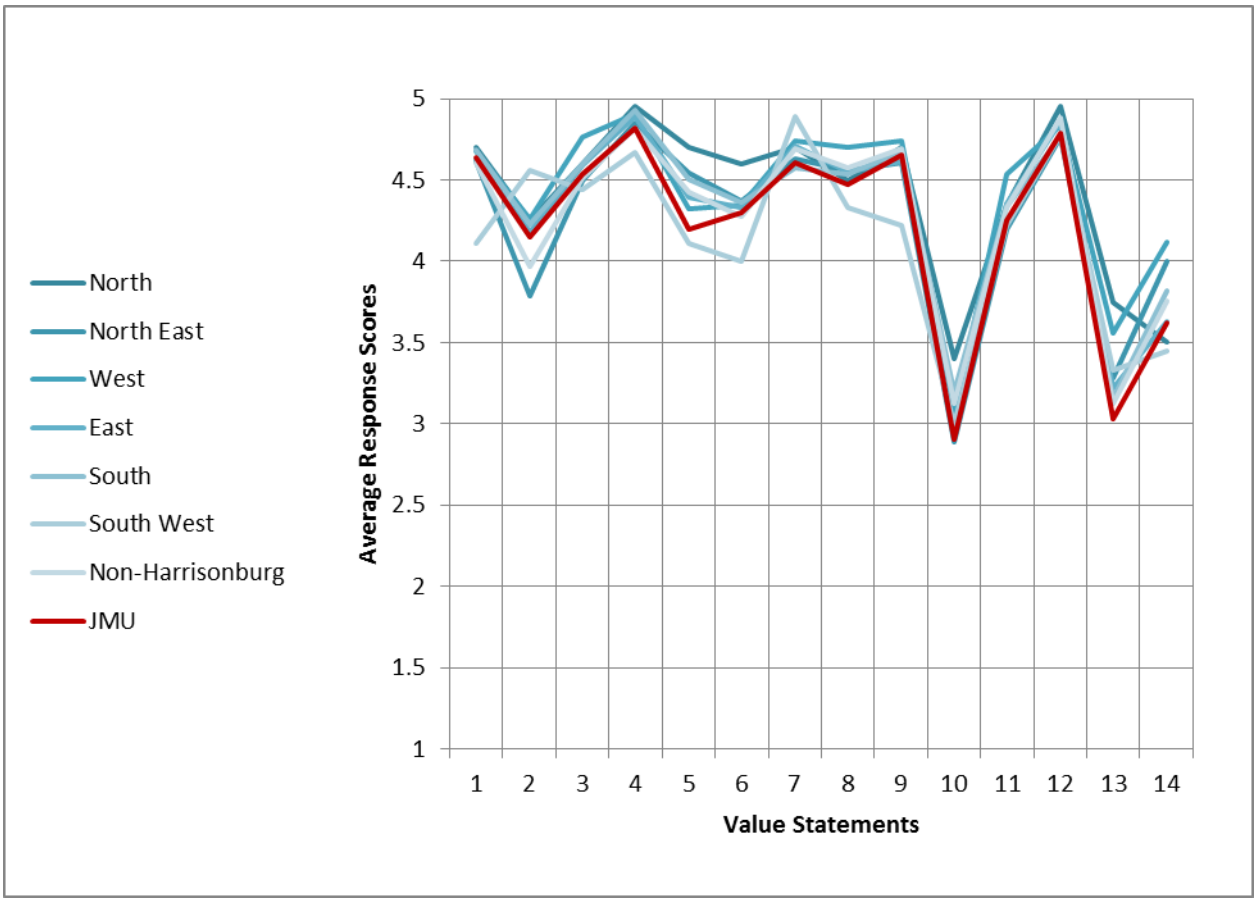


**Figure 4: Mean Value responses for fourteen statements at the eight on-and off-campus locations.**

*2-MEV*

The ANOVA indicates that when comparing the Preservation and Utilization Value scores of on-campus and combined off-campus respondents, the means are statistically different and better in both cases for off-campus as a whole. On-campus has a Preservation score of 4.47 and Utilization score of 2.13, whereas combined off-campus is 4.53 and 2.00. Due to the fact that these Utilization score are not inverted, the lower score indicated the 'better,' or more environmentally protective, response.

Figure 5 shows the 2-MEV comparison of on-campus and the seven off-campus locations. The greatest difference in average Preservation scores is between on-campus (4.47) and the North zone (4.63) which also has the highest Preservation response.

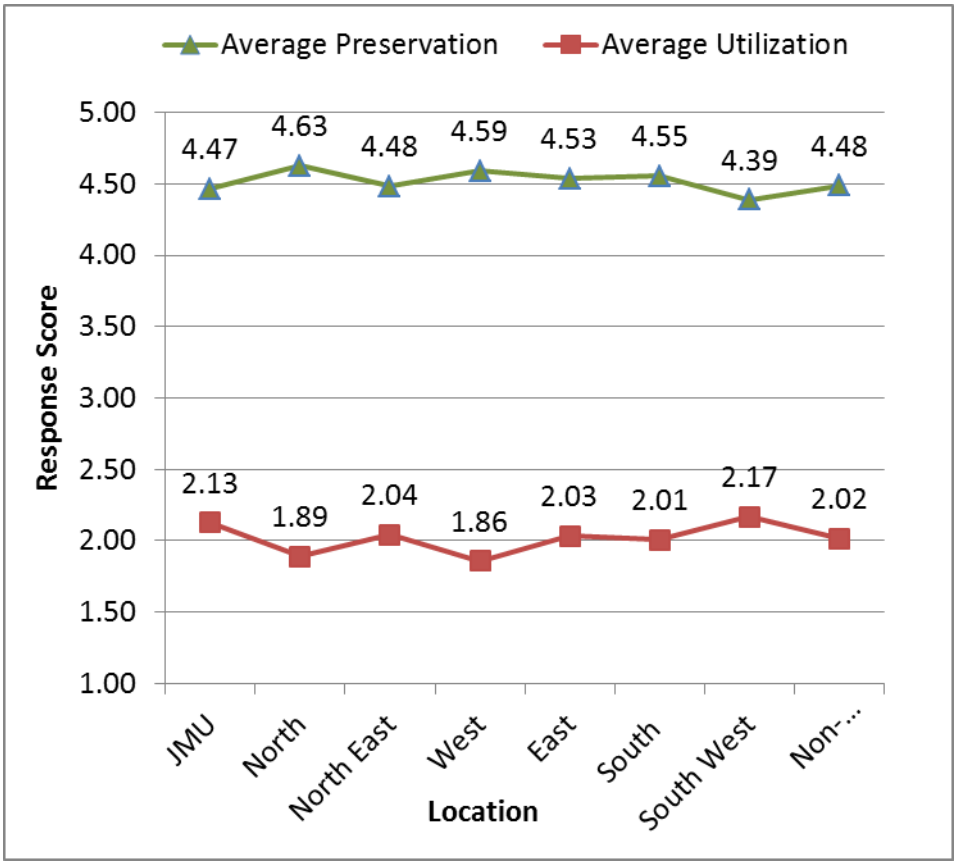


**Figure 5: Graph showing the 2-MEV comparison of On-campus respondents and the seven off-campus locations.**

In other words, North zone has stronger biocentric and protective environmental values than both on-campus and all of the other off-campus zones. The lowest Preservation response, and therefore the least concerned with preservation, is the Southwest zone (4.39). For Utilization, the greatest difference occurs between on-campus (2.13) and the West zone, 1.86. The West zone has the lowest, and therefore least anthropocentric, Utilization beliefs. The highest, or least pro-environmental, Utilization score is for the Southwest zone. Additionally, when considering the 2-MEV scores for each location, represented as (Preservation, Utilization), it is clear that the North

zone is the most environmentally friendly zone with a score of (4.63, 1.89) because it has the greatest gap between the two scores. In other words, it has the strongest combination of biocentric values and non-anthropocentric values.

*Value- Action Gap*

Appendix III shows the correlation between Value corresponding Action statements for three groups of responses: "All Responses", "On-Campus" and "Off-Campus". The closer the correlation is to 1.0, the smaller the Value-Action Gap. There is not statistically significant difference in the correlations of the three groups. In other words, there is a moderate correlation between the Values and Actions responses for all participants, on-campus participants, and the combined off-campus participants.

For "All Respondents", the strongest correlations were between Value and Action Statements 7, 8 and 13. Namely, participants act on values related to spending time outside and reducing the use of air conditioning more so than that of other statements. The weakest correlations were for Statements 9, 10, and 12, indicating that JMU students as a whole do not often act on their strong values related to conserving water, recycling and minimalizing waste.

The "On-Campus" and "Off-Campus" locations show no difference in correlation for all statement pairs except for numbers 4, 10, and 14. Statement 4 indicates no correlation between the Value and Action statements related to turning off the lights when they are not needed, whereas off-campus shows a weak correlation. This means that there is no relationship between on-campus students' beliefs and behaviors when it comes to lights, while off-campus students' higher beliefs might result in more frequent actions. Additionally, there is no relationship between the efficacy of recycling, and buying recycled products (Statements 10) for on-campus

while there is a very weak relationship for that of off-campus. Lastly, the relationship between identifying recyclables and compostable and acting on this value (Statement 14) is weaker for off-campus than on-campus.

*Sub-categories*

Figure 6 shows the mean Action scores for on-and off-campus responses in the seven sub-categories. The two locations have no statistically significant difference between average scores in all categories except for transportation.

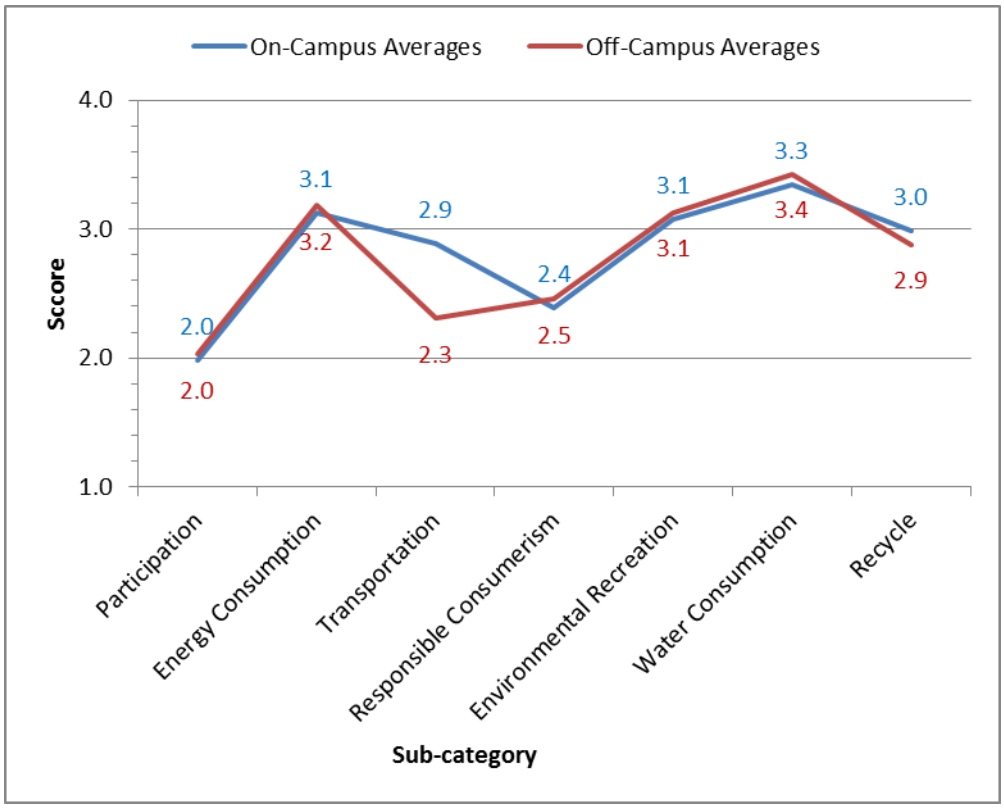


**Figure 6: Graph of average Action scores for on-and off-campus responses in the seven sub-categories**

The transportation sub-category has an average response score of 2.9 for on-campus and 2.3 for off-campus. In other words, on-campus students take alternative forms of transportation more than off-campus students. Lastly, the sub-category with the highest average response score for

both locations is water consumption, followed in second by energy consumption. This shows that students make positive environmental action more frequently when it comes to these two areas of conservation.

## Discussion

*Value-Action Gap*

There are several results that indicate the presence of a Value-Action Gap in students at James Madison University as a whole. First, the percent of participants that chose environmentally favorable Value responses is better defined than the percent of participants that chose favorable Action responses, which is diffuse. Appendix II shows the percent distribution of all survey responses for the Values section. The percent of people who chose the most pro-environmental response, *Agree* for the Preservation statements and *Disagree* for the Utilization statements, was more than 50% for 10 of the 14 statements. Compared to Figure 1, in which only *Always* was selected for only 3 of the 14 statements, it appears that participants have stronger pro-environmental Values and less committed Actions. This is even more apparent when considering the number of people who selected the *Agree* or *Slightly Agree* for the Preservation statements and *Disagree* or *Slightly Disagree* for the Utilization statements. At least 80% of people chose either of these responses for 11 of the statements. Compared to Action statements, *Always* or *Often* accrued greater than 80% of responses for only two statements (Figure 1).

Another measure of the Value-Action Gap is the correlation between Value statements and their corresponding Action statements. It is shown that there is a moderate correlation for on-campus, off-campus and all responses as a whole. In other words, strong pro-environmental values do not always relate to more frequent pro-environmental behavior. This is consistent with the definition of a Value-Action Gap presented by earlier by (Howell 2013). Additionally, because the difference between on-campus and off-campus correlation is not statistically

significant, it does not seem to be that location is a factor that affects the size of this gap. That is to say, one location does not have a larger Value-Action Gap than another. However, some statement pairs do appear to have stronger correlations at one location than another. For example, there is no correlation between on-campus Value and Action Statement 4, relating to turning off the lights. Yet, there is a weak correlation for off-campus. This means that people who understand it is important to turn off the lights when they are not needed are more likely to do so living off-campus. The same can be said for Statement 14, which relates to sorting waste. Other statistically significant differences occur between on-and off-campus locations—for example, Statement 10, which relates to the efficacy of recycling—but this variation (0.04) is not realistically significant. In other words, a difference of 0.04 does not offer strong enough evidence of real-world variation. In sum, although location might not affect the Value-Action Gap for all statements as whole, there are location-dependent variations in the size of the gap for different sub-categories (responsible consumerism and recycling).

Moreover, there is significant difference in the size of the Value-Action Gap when comparing the correlations of different statements. For example, there is less of a gap for Statements 7, 8 and 13, which relate to recreation and energy consumption, than there is for Statements 1, 2, 3, 6 and 11, which relate to participation in green events, responsible consumerism and recycling. Similarly, the largest gap exists for Statements 5, 9 and 12, which relate to transportation and water consumption because they have the weakest correlations.

*Sub-Categories*

Two of the weakest three sub-categories are transportation and responsible consumerism. Although based on a much smaller questionnaire of statements, this result seems to align with

that of the Greendex survey which noted that Americans ranked 18th out of 18 for use of alternative transportation as well as buying environmentally sustainable products (GlobeScan 2014). However, participation in 'green' events was significantly the weakest sub-category.

It is also important to note that the results of this study indicate that the statements and associated sub-categories related to participation in 'green' events, and environmental recreation (Statements 1, 2, 3, 7, and 8) have weak or moderate correlation. These conclusions support the work of Hebel, Montpied & Fontanieu (2014) who also found that behaviors that include interest in learning about the environment and participation in extra-curricular activities are correlated to pro-environmental beliefs. However, these researchers also determined that students whose career goals relate to "earning lots of money", "controlling other people", or "becoming famous" tend to care less about the environment. Additional research would have to be conducted in order to associate students' majors with their response scores in order to weigh in on this subject.

*Efficacy*

Based on the Pearson's correlations for each statement, it is determined that there is no relationship between the efficacy of recycling, and buying recycled products (Statements 10) for on-campus, while there is a very weak relationship for that of off-campus. However, it was also found that this difference is not realistically significant. This appears to refute the conclusions made by Boyes & Stanisstreet (2012) and Malandakis, Boyes & Stanisstreet (2011), which concluded that belief in the efficacy of a pro-environmental action increases the likelihood that behavior will be continued.

*Values and Actions*

Despite there not being a difference in the size of the Value-Action Gap between on-and off-campus, the ANOVA indicates that off-campus does have stronger overall Values and Actions (Figure 7).

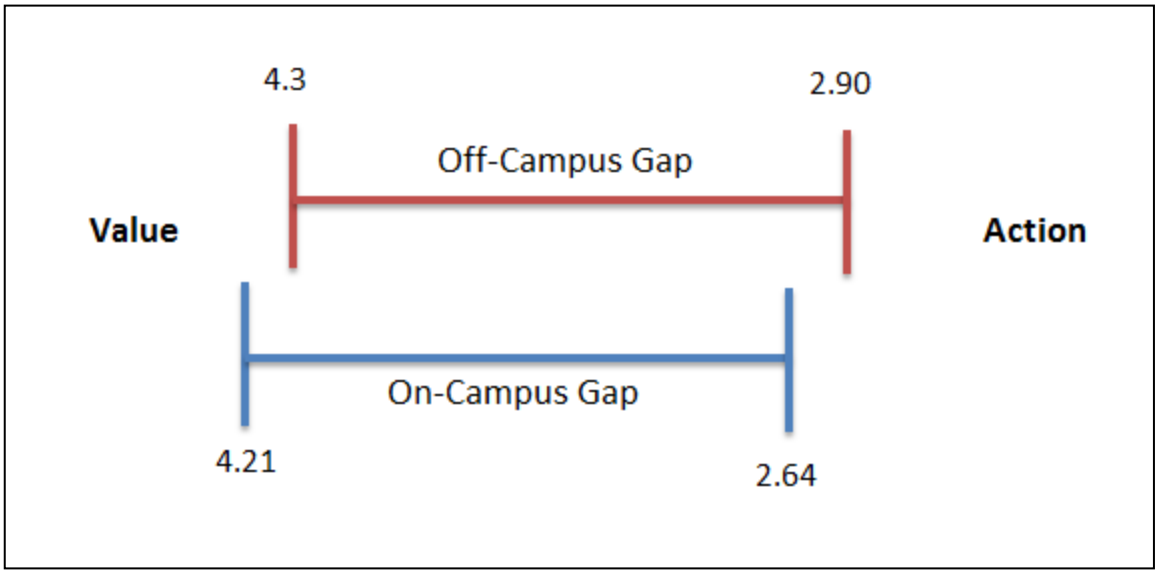


**Figure 7: Visualization of the Value-Action Gap taking into account Location as a factor. This numbers on the left indicate the mean Value score for that location while the numbers on the right indicate the mean Action scores.**

When seeking to understand why this might be the case, a closer look was given to the statements that the Tukey test indicate were of statistically significant difference. The four Action statements of which off-campus students score higher (Statements 4, 9, 12 and 13) indicate strong conservation in the sub-categories 'Water Consumption' and 'Energy Consumption'. It is assumed that this may be motivated by students' desire to pay less for utility bills because turning off the lights when they are not needed (Statement 4), and opening the windows rather than turning on the air conditioning (Statement 13) are associated with financial burden. This is something that on-campus students do not need to concern themselves with because they cannot influence their utility costs which are built into room and board fees. Similarly, when considering the 2-MEV scores, off-campus students had significantly higher

Preservation scores and lower Utilization scores, indicating higher biocentrism and lower anthropocentrism. This result could also root itself in the factor of financial awareness. However, higher mean age could also be a factor if greater age is assumed to be correlated to greater pro-environmental knowledge. Finally, it is assumed that on-campus students' pro-environmental responses for Statements 5 and 11 (transportation and recycling) are because they walk to classes, cannot have cars, use the city transit system around town, and use the recycling and compost bins located in on-campus buildings. This result is especially interesting because it suggests that on-campus sustainability initiatives are proving effective.

*Age and Gender*

Based on the difference in age between the on-and off-campus respondents (19.0 and 25.2), future researchers should consider how the maturity of older students affects their values and actions when compared to younger students. A similar analysis could be performed to understand the influence of academic year, or number of years of higher education, on behavior and belief. The difference in mean completed years of college at JMU between on-campus (1.5) and off-campus (3.2) could indicate if education is an influential factor.

## Conclusions

Location does not appear to influence the size of the Value-Action Gap. However, it is a factor when considering the strength of Values and Actions as well as 2-MEV for each location. The stronger Values and Actions exhibited by off-campus students contradict the initial hypothesis that on-campus students are more likely to engage in pro-environmental behavior because they are in closer proximity to 'green' initiatives.

A limitation to this study was the fact that the ANOVA analysis results for the eight on- and off-campus locations were inconclusive because an uneven number of students responded from each zone. The zones follow major roads in order to avoid dividing apartment complexes. However, it was not known where all concentrations of students are located. As a result, some zones have more respondents than others. For example, the Southwest zone only has nine completed responses while on-campus has 409. This could explain why the Southwest zone scored poorly in the 2-MEV analysis, having the Highest Utilization score and the Lowest Preservation score. For future research, the zones should be changed to reflect where large clusters of off-campus students live in Harrisonburg in order to achieve an even distribution of responses from each area.

This research is the only known study of its kind for higher education. As mentioned previously, existing literature does not take into account the factor of location, and also underemphasizes the importance of understanding the values and actions of students in higher education. Current research mostly seeks to understand what factors influence values, and to then determine if these values lead to more frequent actions.

The methodology that framed this project does not assume that values directly influence actions. Rather, this survey was primarily administered to understand how the factor of location influences both values and actions individually and attempts to determine if there are differences at each location. As a result, future research should seek to understand what motivates students' actions if location is determined not to be a strong stimulus. For example, why do off-campus students have higher Value and Action scores than on-campus? Are financial resources the underlying factor that causes off-campus students to conserve energy and water resources? Do higher age or academic year correlate to stronger beliefs or more frequent behavior?

This study will be deployed annually by the JMU Office of Environmental Stewardship and Sustainability (OESS). Ultimately, the survey statements could be expanded to include a greater variety of environmental behaviors and actions. In order to make sure this survey could be completed in about five minutes, the Value and Action sections were limited to 14 statements each. As a result, the transportation sub-category had only one statement while the participation in 'green' events sub-category had three. Similarly, the Preservation statements numbered eight while Utilization only numbered six. Also, evening out the statements in each Value and Action sub-category would serve to normalize the data.

After completing this study, it is clear that there is no single factor that influences a person's beliefs and behaviors. It should be considered that location is not a direct motivator for change in values and action in the way that education or peer influence is. Rather, location embodies a number of different factors that simultaneous act upon the attitudes of the student. For example, the on-campus location has the benefit of resources, classes, alternative transportation, and recycling in close proximity to the actual place of residence. By contrast, off-campus locations are not in as close in proximity to these 'green' behavior support systems. A

location that has the greatest influence on a person's behaviors would then be a place that has a number of characteristics making it easier to perform the action. Additional study would be needed to determine what characteristics Harrisonburg residential locations have and how these characteristics work together to impact students' beliefs and behaviors. Sustainability initiatives on-campus and in the JMU community will need to target multiple motivators in order to completely diminish the environmental Value-Action Gap in JMU students.

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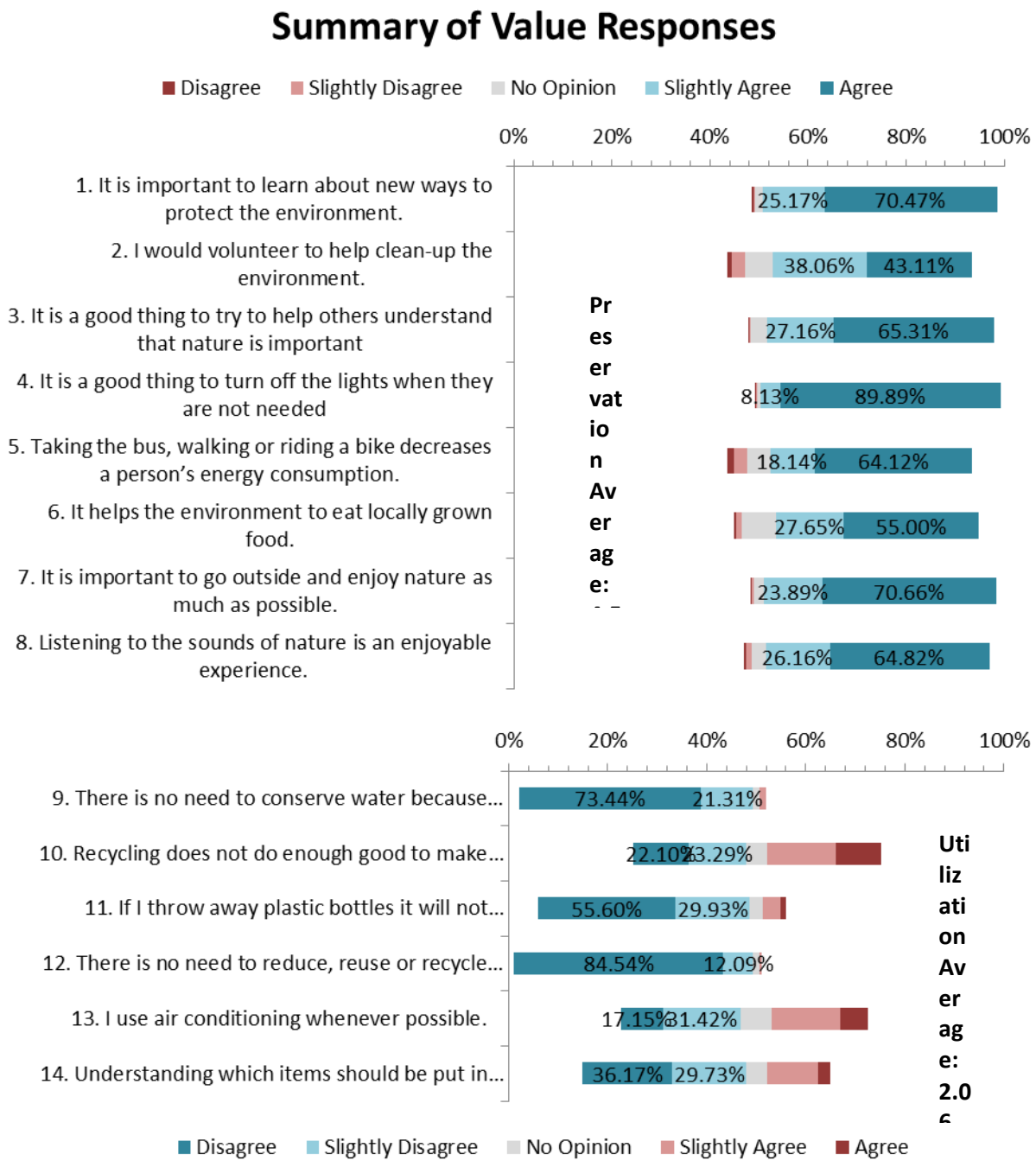
# Appendix I

**Table showing the Value and Action statements used in the online survey. The indicies for the Value section indicate whether the question is related to Preservation or Utilization, while the parenthesis for the Action section indicate what sub-category the statement fall under.**

| Statement Number | Value Statements | Action Statements |
|---|---|---|
| **1** | It is important to learn about new ways to protect the environment (Preservation) | Investigate new ways to protect the environment (Participation) |
| **2** | I would volunteer to help clean-up the environment. (Preservation) | Participate in "green" events, such as Blacks Run CleanUp Day (Participation) |
| **3** | It is a good thing to try to help others understand that nature is important. (Preservation) | Help others understand the impact their actions have on the environment (ie: encouraging friends to recycle) (Participation) |
| **4** | It is a good thing to turn off the lights when they are not needed. (Preservation) | Turn the lights off when they are not needed (Energy consumption) |
| **5** | Taking the bus, walking or riding a bike decreases a person's energy consumption. (Preservation) | Walk or bike rather than taking the bus. (Transportation) |
| **6** | It helps the environment to eat locally grown food. (Preservation) | Eat locally grown food. (Responsible Consumerism) |
| **7** | It is important to go outside and enjoy nature as much as possible. (Preservation) | Spend time outside for fun (Recreation) |
| **8** | Listening to the sounds of nature is an enjoyable experience. (Preservation) | Notice the sounds of nature (Recreation) |
| **9** | There is no need to conserve water because there is so much water. (Utilization) | Turn off the water when brushing your teeth. (Water consumption) |
| **10** | Recycling does not do enough good to make up for the harm we cause the environment. (Utilization) | Buy recycled products. (Responsible Consumerism) |
| **11** | If I throw away plastic bottles it will not make a big difference because I am only one person. (Utilization) | Separate recyclables from garbage. (Recycle) |
| **12** | There is no need to reduce, reuse or recycle because humans are meant to use nature for their own benefit. (Utilization) | Drink from a reusable water bottle. (Water Consumption) |

| | | |
|---|---|---|
| **13** | I use air conditioning whenever possible.<br><br>(Utilization) | Open the windows rather than turn on the air conditioning. (Energy Consumption) |
| **14** | Understanding which items should be put in compost, recycling and landfill bins takes too much time. (Utilization) | Sort trash into proper receptacle (ie: compost, landfill, etc). (Recycle) |

## Appendix II




**Graph showing the percent distribution of cumulative survey responses to statements in the Values section.**

# Appendix III

**Table showing the correlation between Value and corresponding Action statements for All Responses, On-Campus and Off-Campus.**

| Overall Correlation | No Correlation | Very Weak | Weak | Moderate |
|---|---|---|---|---|
| **Value Statement** | **Action Statement** | **All Responses** | **On-Campus Correlation** | **Off-Campus Correlation** |
| | | 0.57 | 0.56 | 0.58 |
| 1. It is important to learn about new ways to protect the environment. | Investigate new ways to protect the environment. | 0.31 | 0.32 | 0.31 |
| 2. I would volunteer to help clean-up the environment. | Participate in "green" events, such as Blacks Run CleanUp Day. | 0.35 | 0.34 | 0.36 |
| 3. It is a good thing to try to help others understand that nature is important | Help others understand the impact their actions have on the environment (ie: encouraging friends to recycle). | 0.36 | 0.37 | 0.35 |
| 4. It is a good thing to turn off the lights when they are not needed | Turn the lights off when they are not needed. | 0.32 | 0.04 | 0.35 |
| 5. Taking the bus, walking or riding a bike decreases a person's energy consumption. | Walk or bike rather than taking the bus. | 0.03 | 0.01 | 0.02 |
| 6. It helps the environment to eat locally grown food. | Eat locally grown food. | 0.29 | 0.24 | 0.32 |
| 7. It is important to go outside and enjoy nature as much as possible. | Spend time outside for fun. | 0.44 | 0.40 | 0.46 |
| 8. Listening to the sounds of nature is an enjoyable experience. | Notice the sounds of nature. | 0.54 | 0.51 | 0.57 |
| 9. There is no need to conserve water because there is so much water. | Turn off the water when brushing your teeth. | 0.17 | 0.16 | 0.19 |
| 10. Recycling does not do enough good to make up for the harm we cause the environment. | Buy recycled products. | 0.08 | 0.05 | 0.09 |
| 11. If I throw away plastic bottles it will not make a big difference because I am only one person. | Separate recyclables from garbage. | 0.30 | 0.28 | 0.21 |

| | | | | |
|---|---|---|---|---|
| 12. There is no need to reduce, reuse or recycle because humans are meant to use nature for their own benefit. | Drink from a reusable water bottle. | 0.13 | 0.13 | 0.12 |
| 13. I use air conditioning whenever possible. | Open the windows rather than turn on the air conditioning. | 0.45 | 0.43 | 0.47 |
| 14. Understanding which items should be put in compost, recycling and landfill bins takes too much time. | Sort trash into proper receptacle (ie: compost, landfill, etc). | 0.36 | 0.41 | 0.34 |