Why Do Some College Students Recycle?
Exploring the Relationship Between College-Specific and College-Independent Factors

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ABSTRACT

The United States produces vast quantities of waste, threatening both ecosystem and human health through extensive landfill creation which causes hazardous chemical emissions and groundwater contamination. Encouraging recycling is a key means of addressing this issue by mitigating waste production. I address how the college environment influences the development of pro-environmental recycling behavior, and compare the contribution of college-specific factors with those of college-independent factors. College-specific factors are defined as factors that only occur in college, such as academic major or exposure to environmental classes, while college-independent factors are factors that exert influence before college, such as parental recycling habits. I surveyed students regarding college-specific and college-independent factors, and used a multiple linear regression model to determine how much influence each factor exerts on recycling behavior. Then I qualitatively compared the influences of college-specific versus college-independent factors. I found that college-independent factors have an overall greater influence on recycling than college-specific ones. Certain background and demographic factors also are significant in recycling behavior. My results may benefit policymakers seeking to increase pro-environmental behavior by encouraging focus on students before they reach college. They will also aid college campus waste reduction initiatives by highlighting factors of convenience and social pressures as most important in increasing student recycling.

KEYWORDS

recycling behavior, college students, framework, factors of influence

INTRODUCTION

Recycling is an important means of reducing waste that can be used to address negative environmental, social justice, and human health impacts associated with excess waste. In 2012, the United States produced over 250 million tons of trash, and only recycled about one third of it (EPA 2012). This level of waste production is unsustainable because of declining landfill space. Additionally, landfills have consequences for human and environmental health, including carcinogen and toxic leaching, groundwater contamination, and increasing greenhouse gas emissions (Lee and Jones-Lee 1994). Excess waste also has social justice implications, because landfills and toxic waste dumps are disproportionately sited near communities of color (Pastor et al. 2001). Individuals need to be encouraged to waste less and to recycle, since individual lifestyle choices help to collectively determine sustainability at the national level (Barr 2007). This necessitates research on the myriad factors that influence individuals in their choices regarding recycling behavior.

Researchers have identified and categorized a wide range of factors that influence recycling behavior (Hornik et al. 1995, Schultz et al. 1995). For instance, internal factors may be distinguished from external factors, with external factors being attributable to outside pressures like socially normative pressure to do what is considered correct by society, while internal factors are personal attitudes that come from within a person (Hornik et al. 1995). These factors can be further sub-categorized as incentives or facilitators, with incentives including monetary or social status rewards for meeting recycling behavior standards, and facilitators including knowledge-based and accessibility factors that influence recycling behavior without being reward-based (Hornik et al. 1995). Factors can also be categorized as intrinsic or extrinsic values, with intrinsic being internal self-motivation, and extrinsic being external pressure from social norms and values (McCarty and Shrum 1994). Specific intrinsic values include personal experiences with recycling and general environmental attitude which are among the most influential factors (McCarty and Shrum 1994). Factors can also be categorized based on empirical economic influences, rather than effects of attitude of social influences, using factors like the direct costs of waste recycling or accessibility of neighborhood recycling programs (Sidique et al. 2010, Kirakozian 2016). Waste disposal prices and monetary incentives constitute the most influential factors in this categorization

scheme (Sidique et al. 2010, Kirakozian 2016). Despite extensive research on recycling behavior determinants, college as a time period of influence is still under-studied in this regard.

The relationship between college-specific factors, those associated with presence in college, and college-independent factors, those not dependent on presence in college, offers a useful framework for examining recycling behavior by college students. Research on college-specific influences on recycling behavior has primarily focused on the demographic influences of factors like income-level, ethnicity, and gender, without deeper consideration of motivations and relationships between college-specific and college-independent factors (Kelly et al. 2006; Kashyap and Iyer 2015; Meyer 2016). College is a formative time for pro-environmental behaviors, and length of time in college correlates positively with improved recycling behaviors (Meyer 2016). However, attitudes toward the environment are developed at and sustained from a young age (Jaus 1984), and first exposures to recycling and accumulated experiences are critical to determining recycling behavior (Kashyap and Iyer 2015). These types of studies suggest the importance of both college-specific and college-independent factors, but they fail to address any relationship between the two. The influence of college-specific factors needs to be compared directly with that of college-independent factors to better understand this relationship and its impacts on the initial development of recycling behavior.

I addressed the following central research question: How do college-specific and college-independent factors influence recycling behavior? Within the context of my central research question, I addressed the following sub-questions to specify my study objectives: What degree of variance is there in the relative influences of my studied factors (Figure 1)? Do college-specific or college-independent factors have more influence over recycling behavior? My informal working hypotheses were that there would be a large degree of variance in the influences of the studied factors, and that college-independent factors would overall have a greater influence on recycling behavior than college-dependent factors.

College-Specific Factors	College-Independent Factors	Background Factors
interaction with environmental media during college (e.g., posters, documentaries, etc.)	interaction with environmental media prior to college (e.g., posters, documentaries, etc.)	participation in Greek life
exposure to environmental science classes in college	exposure to environmental science classes prior to college	type of college housing
exposure to sustainability themes in college classes	exposure to sustainability themes in classes prior to college	current year in college
interaction with college environmental organizations/clubs	interaction with environmental organizations/clubs prior to college	choice of major
college roommate/house-mate recycling habits	parental recycling habits	city/region of residence
number of college friends that recycle	number of friends that recycle prior to college	household economic status
convenience of recycling in college residence	neighborhood convenience of recycling	urbanity
---	---	gender identity
---	---	political alignment
---	---	ethnic/racial background
---	---	hometown population
---	---	age

Figure 1. List of studied factors. A complete list of the factors that I investigated using my survey instrument, organized into the three framework categories of college-specific, college-independent, and background.

College-Focused Studies

Few recycling studies focus on college students, and most that do cover similar factors. Out of over 35 recycling studies reviewed, only six targeted college students and the factors influencing their recycling. Of these six college-focused studies, one study based at the University of Michigan found that past recycling experience was more influential for males and social norms of recycling were more influential for females (Goldenhar and Connell 1993). Another study found similar results by looking at the same factors of past recycling experience, gender, and attitude towards recycling; they concluded that gender and attitude towards recycling were influential factors, just like the University of Michigan study (Kashyap and Iyer 2015). A study at Massey University in New Zealand looked at the same influence factor of attitude towards recycling as well as a few college-specific factors like occupation at the university, finding that place of work, type of occupation, and attitude towards recycling were all significant factors in recycling (Kelly

et al. 2006). A study at Appalachian University investigated convenience and access as influence factors, and found them highly influential in recycling behavior (Ludwig et al. 1998), findings which were supported by another study surveying North American university students by phone (Williams 1991). All five of these studies focused on many of the same factors, such as gender, attitude towards recycling, and convenience, with hardly any investigation of college-specific factors. The sixth study also considered choice of academic major as a potential factor, and found that number of years in college was the most influential variable (Meyer 2016). However, this study still focused mostly on similar factors to the previous six, like the demographic factor of gender. These six studies looked at attitudes, social norms, and demographic factors as influences on student recycling behavior, but only two looked at college-specific factors, and out of those two, only one explored college factors in any depth (Kelly et al, 2006; Meyer 2016). No previous studies have investigated college-specific factors sufficiently, nor have they compared these factors with more frequently studied variables like demographics.

Methodological Framework

I have drawn on the work of previous studies to create a new framework of college-specific and college-independent factors to uncover the impact of college on environmental recycling behavior by directly comparing with college-independent factors of influence. In this framework, I separate factors into three types: college-specific, college-independent, and background. Background factors include demographics, as well as factors that do not fall under either of the other two categories such as number of cohabitants. The two categories of college-specific and college-independent factors are each divided into the four sub-categories of academic, social influence, convenience, and environmental engagement. Each of these sub-categories under college-specific or college-independent has one to three factors, and each factor has a direct counterpart when compared between the college-specific and college-independent sub-categories (Figure 2). This framework helps distinguish between the influences of college-specific and college-independent factors, while grouping the factors by sub-category.

My study used similar methods to those used in most other college-focused studies, although it deviates in my chosen data analysis methods. Almost all previous college-based studies used some form of survey instrument to collect data. The only exception is Ludwig et al.

(1998), which used observational experiments on the placement of recycling bins. Despite the nearly universal method of surveying, no studies used the same data analysis method, nor did any of them use qualitative analysis methods as a follow-up to the surveys. In my study, I used a survey instrument like the other studies, then followed with a multiple linear regression model and analysis of variance tests for data analysis. I used qualitative analysis of open-response answers to add greater depth to my understanding of the survey answers, and made use of my framework to allow direct comparison between the two categories of factors. These types of methods have not been used before in this context, so their use allowed me to address unanswered questions about more specific college factors, and the overall relationship between college-specific and college-independent factors. This can help expand the field of college-focused studies on environmental behavior, since there are so few studies that look at college influence factors in great depth. My study brings valuable knowledge to the general community.

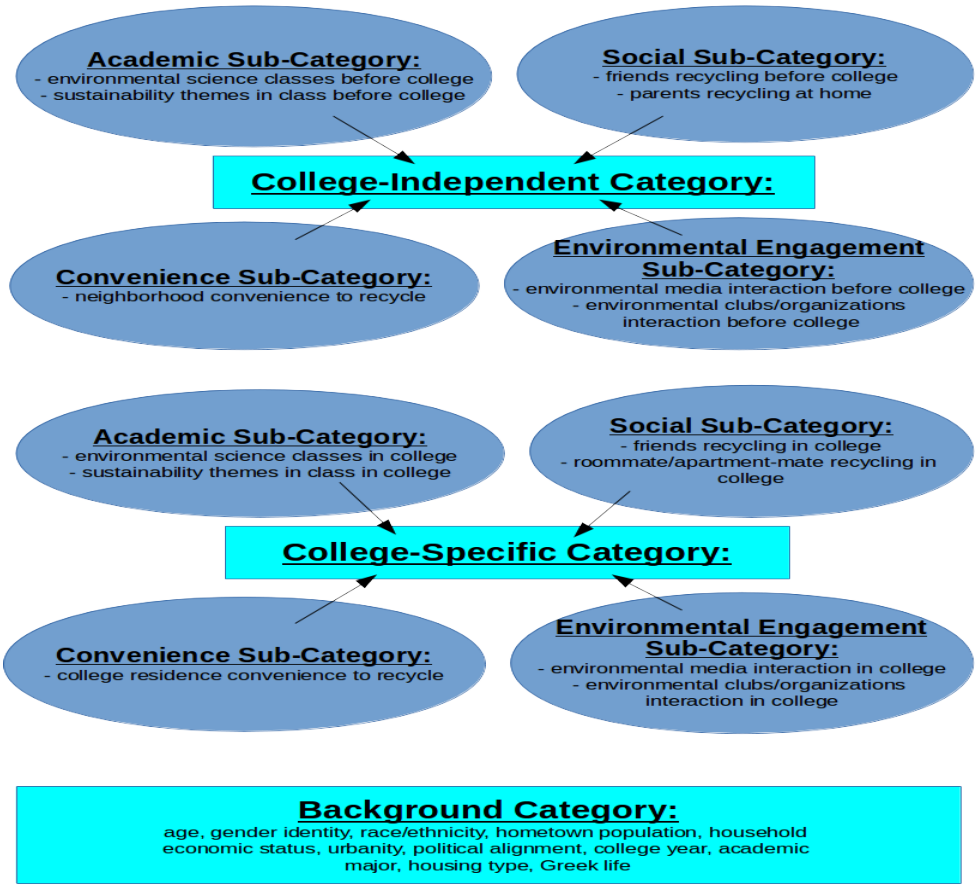


Figure 2. Framework of factors organized into their categories and sub-categories. The categories of college-specific, college-independent, and background have been separated, with the two categories of college-specific and college-independent each being divided into four sub-categories, with all factors organized under those sub-categories.

METHODS

Background

My case study site is University of California, Berkeley, a world-renowned university with a long history of students fighting for social and environmental justice. The San Francisco Bay region and city of Berkeley are well-known for their liberal political attitudes towards both social and environmental issues. The students in one high enrollment undergraduate course provided my study sample population. These students are all from the total university undergraduate student population of 27,496 students (OPA 2016), and they provide a fairly representative sample of the total undergraduate population because the class I sampled from attracts a wide variety of majors and class years (Spreyer, K. *personal communication*). The class for my case study was ESPM 50AC, Introduction to Culture and Natural Resource Management. The course tends to draw slightly more first-years and students with environmentally interests, but it also attracts many upper classmen and non-environmental majors from diverse university departments because it fulfills the university-wide graduation requirement of American Cultures (Spreyer, K. *personal communication*). The Fall 2016 class had 465 students and the Spring 2017 class had 458 students, making my total population 923 undergraduate students. The course has a different complement every year, so it cannot provide a perfect representation of the university student population, but it still makes a useful case study and can somewhat demonstrate the context of the university.

Survey Design

I designed my questionnaires to gather data about respondents' recycling behavior, along with college-specific and college-independent factors in their lives. My college-specific factors include influences like exposure to environmental classes and recycling habits of college friends and roommates. My college-independent factors include influences like parental recycling habits and exposure to environmental media before college. My background factors include influences like household economic status, academic major, and age (Figure 1). Questions 1-5 from my survey gather data regarding recycling behavior. Questions 6-12 gather data about college-

independent factors. Questions 13-20 inquire about college-specific factors. Questions 59-69 gather data regarding background factors (Appendix I).

My survey used Likert-type scale questions to generate ordered, categorical data for analysis. Therefore, nearly all of my questions were organized with five multiple choice answers on a scale from low to high (eg. scale of frequency). Since some of my variables were categorical rather than ordinal, (e.g., choices for academic major being social science, engineering, biological science, etc.), I converted most categorical data to ordinal data by changing the category into a new variable on an ordered scale of 0-1, with 0 being no and 1 being yes. This converted all of my collected data ordinal for consistency with my data analysis. For example, I made each individual racial and ethnic category ordinal by setting it on a scale of 0-1 as no to yes. The only data that I kept in their unaltered forms were the open-ended response answers from Questions 21-23, and from Question 62 where I collected geographic data. Questions 21-23 allowed respondents to qualitatively describe what factors influence their recycling practices, and attempt to answer my research questions in their own words. The answers from these questions provided the data for my qualitative data analysis.

I collaborated with four other UC Berkeley Environmental Sciences senior thesis students to create a survey instrument using Survey Monkey to incorporate all of our surveys into one for distribution. The other three surveys were intervention studies, so they needed to go to separate sub-groups within the population to avoid biasing responses. My survey was not intervention-based, so it was placed at the beginning of our combined survey which was distributed to all members of the study population. There were ten different versions of the final survey created, but each one an identical version of my survey incorporated into it.

Survey Data Collection

To collect my data, Professor Kurt Spreyer distributed our combined survey via an email to the Fall 2016 ESPM 50AC class, with a link to the Survey Monkey questionnaires. This survey was released the weekend after classes ended, and was given a completion deadline one week after distribution. Professor Spreyer incentivized responses using a process that he has used in previous years for other Environmental Science senior thesis studies, by offering seven points of extra credit to all respondents. Once we had closed the survey, I collected the response data from the individual

surveys, and compiled it in Microsoft Excel to be ready for analysis. Then I cleaned the data by deleting responses that were obviously inaccurate or left blank. We repeated the process for the Spring 2017 ESPM 50AC class, which had a participation level approximately equal to the Fall cohort. We collected data in the same way for the Spring 2017 class, and I repeated my response data collection and compilation process. Then I combined all of my data from both class collections.

Survey Data Analysis

After data collection, I grouped my survey responses to create a recycling score for each respondent. I used the collected data about current recycling behavior from Questions 1-5 (Appendix I) to create a recycling behavior score for each survey participant. Each question was on a scale of 1-5, so I summed the five values for each participant to create their score, with higher values on a 5-25 scale indicating stronger recycling behavior.

In order to complete my statistical tests in R, I created an R command series that converted all of my data into factors, ordering them when appropriate (R Development Core Team). This prepared my data for all statistical testing using R functions. Then I used analysis of variance tests (ANOVA) to analyze whether there were statistically significant differences in respondent recycling scores between groups in the background category of factors. I selected gender identity, racial/ethnic identity, and choice of academic major for these tests because they have been previously tested in other college-based studies, and provide interesting comparative examples. For each categorical variable, I used the R function for an ANOVA test and followed with a Tukey correction to account for the large differences in sample sizes between individual groups.

I also implemented a multiple linear regression model, using the Relaimpo library in R (R Development Core Team), thereby modeling the outcome for my recycling scores based on each surveyed factor. The Relaimpo library runs every possible combination of factors in regressions with recycling score, then generates a model of each factor's relative importance in determining recycling score.

Qualitative Data Analysis

I used an iterative qualitative analysis of my open-ended survey response questions to supplement my survey findings. I began by analyzing the responses to look for patterns. As I familiarized myself with the types of responses, I looked for specific words or forms of reasoning that were common responses. Upon finding these patterns, I noted particular words and then searched for all responses containing those terms. I chose my search terms based on my sub-categories to allow stronger comparison with my quantitative data analysis results. I also used the open-ended response results to qualitatively explore what rationales participants had for giving different survey question answers, deepening my understanding of why individual factors showed greater or lower influence over recycling behavior.

RESULTS

Survey Data Results

I received 773 useable responses from my surveyed population of 923 students, yielding an 84% response rate. I generated all of my results using the relevant packages and commands in R. Then I took my recycling scores as a composite value on a scale of 5-25 indicating how good a respondent was at recycling, and used them as the main outcome variable in my tests. Recycling scores from my entire population were skewed overall positively but still had a fairly normal distribution (Figure 3). Then I conducted Tukey-corrected ANOVA-tests and Relaimpo multiple linear regression.

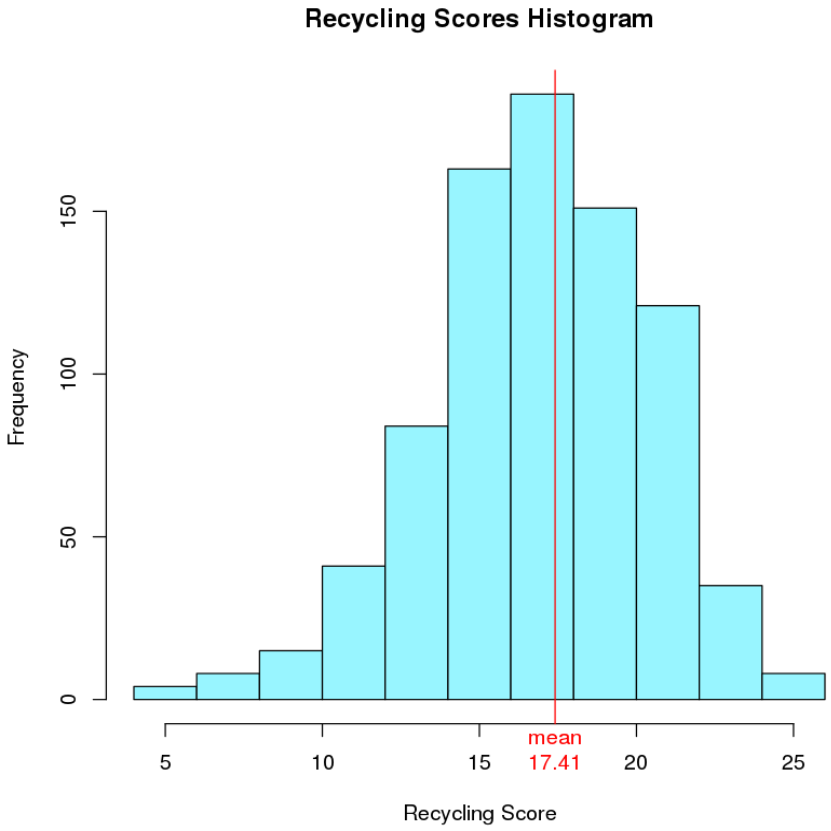
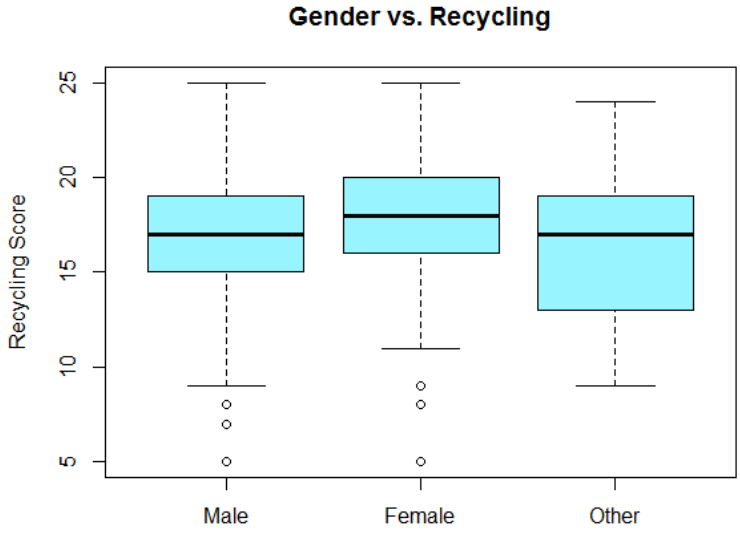


Figure 3. Recycling scores histogram. I summed the numerical answers for my five recycling questions for all respondents to create their recycling scores.

ANOVA of Demographic and Background Factors

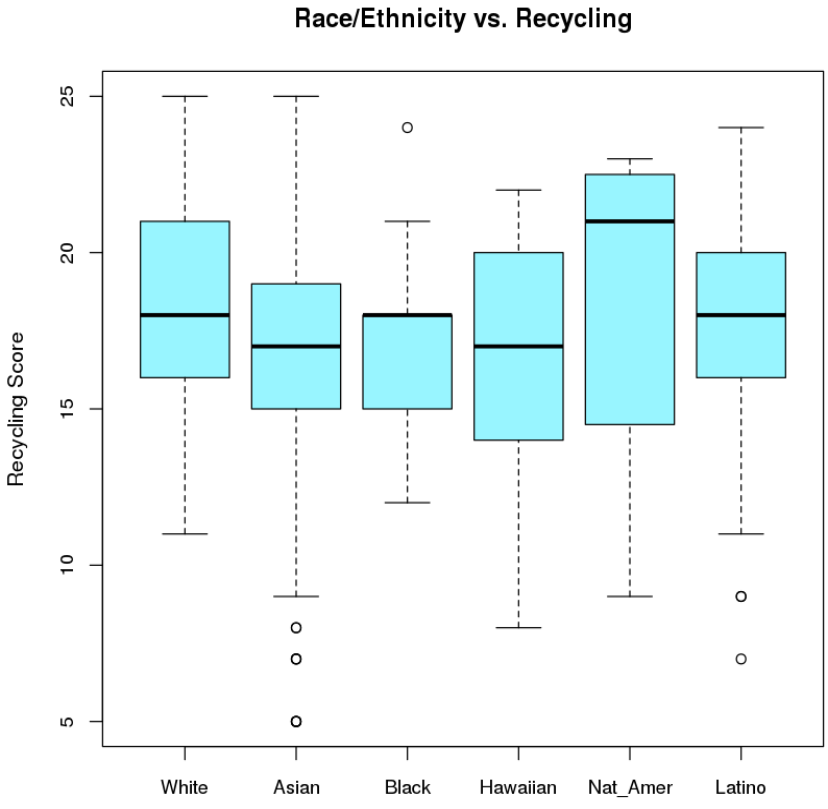
I found that there were significant differences between the average recycling scores of several groups in the categories of gender identity, racial/ethnic identity, and academic major.

An ANOVA test for gender identity and recycling scores revealed that females had the highest recycling scores, with males being significantly lower (Figure 4). All other gender identities and respondents who chose not to answer were combined into a single category to create a large enough sample. The recycling scores for this category were between males and females, but not significantly lower or higher than either (Figure 4). An ANOVA test for racial/ethnic identity and recycling scores revealed that Whites had the highest scores, with Asians having the lowest. Out of all of the relationships between the different groups, the only significantly different averages were between Asians and Whites (Figure 5). An ANOVA test for academic major and recycling scores revealed that Biological Science majors had the highest recycling scores with Social Sciences having the second highest. Business/Economics majors had the lowest recycling scores, with Engineering/Computer Science majors being second lowest. The differences were only significant between Biological and Business/Economics, Biological and Engineering/Computer Science, and Social Science and Business/Economics (Figure 6).



Comparison Pairings	Adjusted P-Value
Other-Male	0.7700015
Other-Female	0.3099441
Female-Male	0.0001298

Figure 4. Means for gender identity recycling scores (left) and ANOVA significance results (right). I conducted a Tukey-corrected ANOVA of the recycling scores of all gender identity groups.



Comparison Pairings	Adjusted P-Values
Asian-White	6.05331E-06
Black-White	0.799033165
Hawaiian-White	0.449095089
Nat_Amer-White	0.999999888
Latino-White	0.247522858
Black-Asian	0.999875362
Hawaiian-Asian	0.999593304
Nat_Amer-Asian	0.940258555
Hawaiian-Black	0.784407253
Nat_Amer-Black	0.998638844
Latino-Black	0.982997744
Nat_Amer-Hawaiian	0.999751931
Latino-Hawaiian	0.928296598
Latino-Nat_Amer	0.964860418

Figure 5. Means for racial/ethnic identity recycling scores (left) and ANOVA significance results (right). I conducted a Tukey-corrected ANOVA of the recycling scores of all racial/ethnic identity groups.

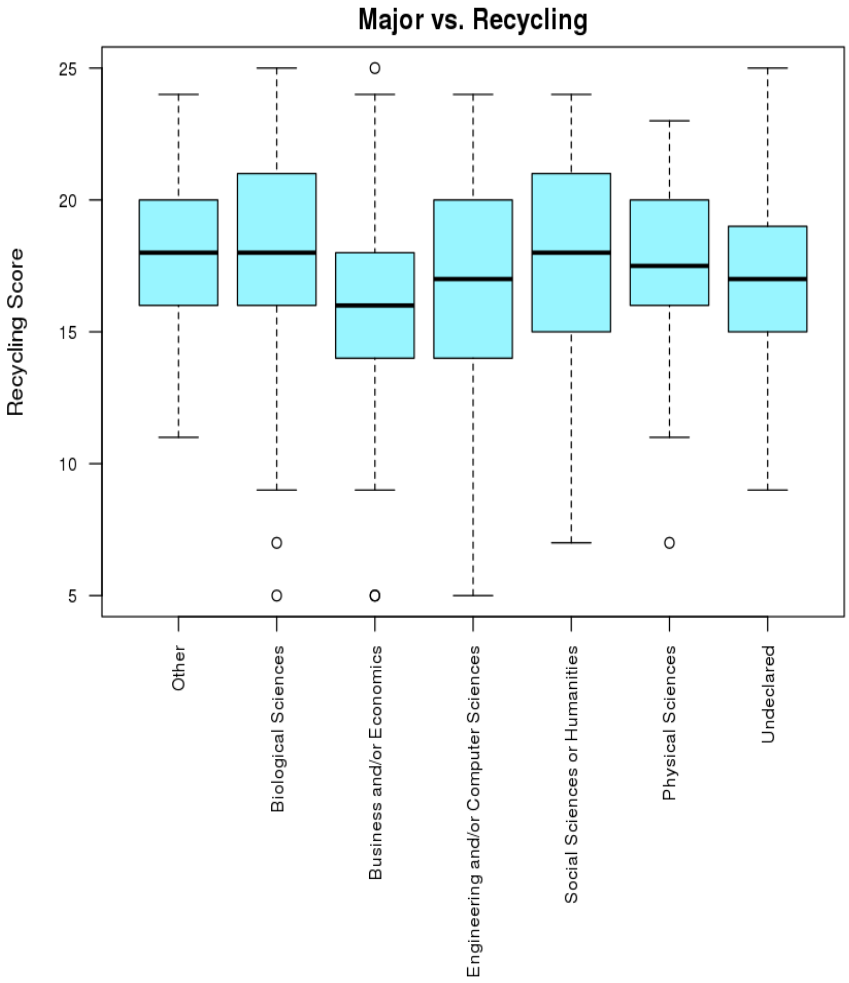


Figure 6. Means for academic major recycling scores (left) and ANOVA significance results (right). I conducted a Tukey-corrected ANOVA of the recycling scores of all academic major groups.

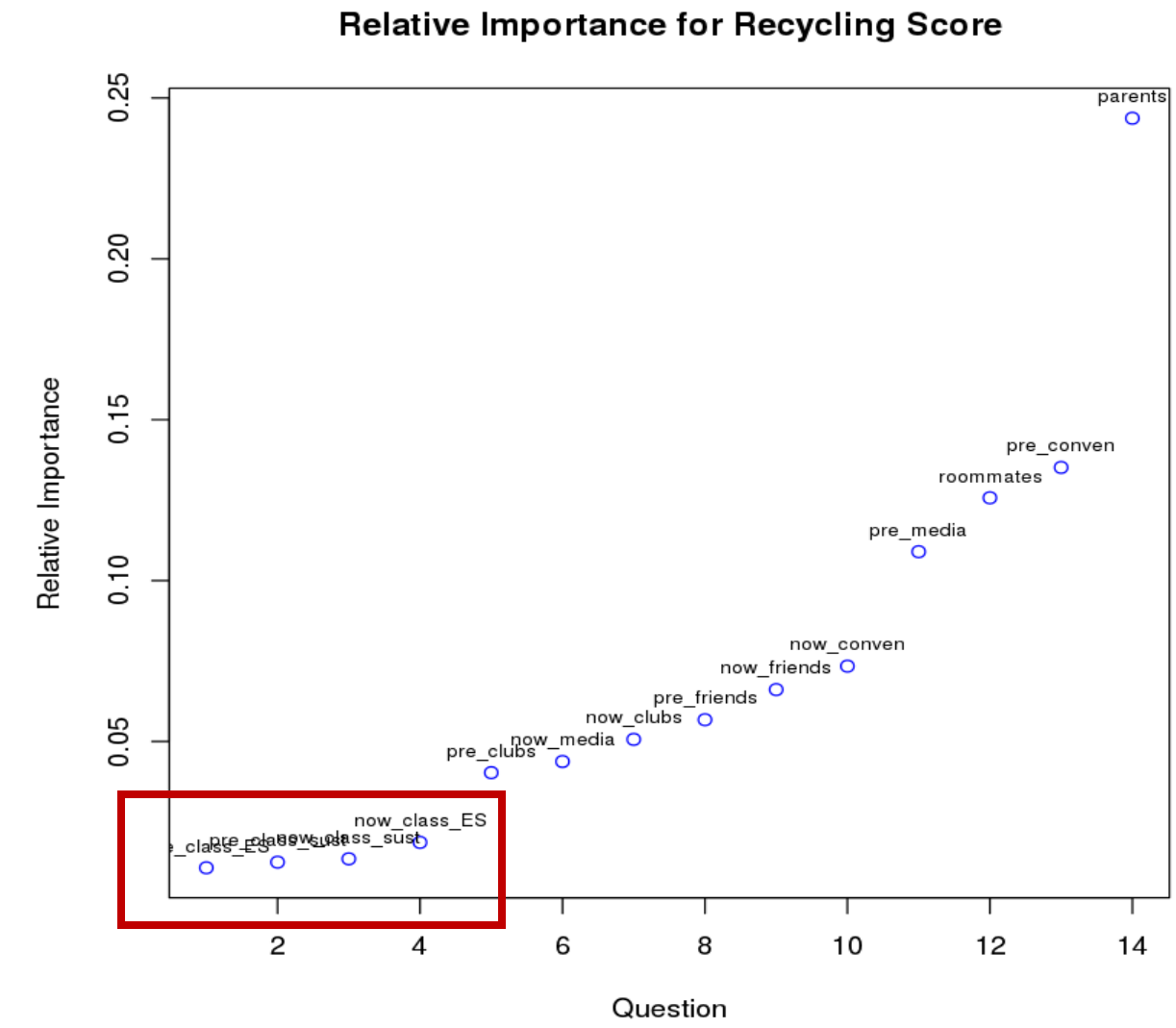
Comparison Pairings	**Adjusted P-Values**
Business and/or Economics-Other	0.06750664
Engineering and/or Computer Sciences-Other	0.6937015
Physical Sciences-Other	0.9983663
Undeclared-Other	0.8396368
Business and/or Economics-Biological Sciences	3.50518E-06
Engineering and/or Computer Sciences-Biological Sciences	0.01228142
Social Sciences or Humanities-Biological Sciences	0.9710628
Physical Sciences-Biological Sciences	0.8774917
Undeclared-Biological Sciences	0.1364958
Engineering and/or Computer Sciences-Business and/or Economics	0.4855106
Social Sciences or Humanities-Business and/or Economics	0.002663127
Physical Sciences-Business and/or Economics	0.2627359
Undeclared-Business and/or Economics	0.594386
Social Sciences or Humanities-Engineering and/or Computer Sciences	0.3462263
Physical Sciences-Engineering and/or Computer Sciences	0.9632856
Undeclared-Social Sciences or Humanities	0.6645284
Undeclared-Physical Sciences	0.9893898

Multiple Linear Regression Model

My multiple linear regression model revealed that many factors were predictive of recycling score, with some factors also showing strong correlations with each other. My model generated a score of relative importance in determining recycling score for each college-specific and college-independent factor (Table 1). The full model accounted for 47.58% of the variance, based on my 14 chosen regressors. Parental recycling had the highest relative importance, with convenience before college being second, college roommate recycling being third, and pre-college interaction with environmental media being fourth; factors involving coursework had the lowest relative importance, whether before or during college (Figure 7). These factors influenced each other as well as recycling score. A correlation plot of the relative influences on each other shows that every factor correlates with the other factors in varying degrees (Figure 8). Parental recycling correlates relatively strongly with convenience before college, as do sustainability-themed classes with environmental science classes, friends' recycling with roommates' recycling, and convenience in college with roommates' recycling (Figure 9).

Table 1. Relative importance values. I generated values for how relatively important each of my college-specific and college-independent factors was in predicting recycling score. Refer to Legend for R factor names.

Corresponding Factor	R Factor Label	Value
classes with environmental science themes taken before college	pre_class_ES	0.01482642
classes with sustainability themes taken before college	pre_class_sust	0.01367270
friends before college that recycle frequently	pre_friends	0.05493942
interaction with environmental media before college	pre_media	0.11629046
interaction with environmental clubs/organizations before college	pre_clubs	0.04356495
parental recycling habits	parents	0.22978092
convenience of recycling before college	pre_conven	0.13602174
classes with environmental science themes taken during college	now_class_ES	0.02162457
classes with sustainability themes taken during college	now_class_sust	0.01643034
friends during college that recycle frequently	now_friends	0.07075773
interaction with environmental media during college	now_media	0.04405123
interaction with environmental clubs/organizations during college	now_clubs	0.04799011
roommates' recycling habits	roommates	0.12204900
convenience of recycling during college	now_conven	0.06800040



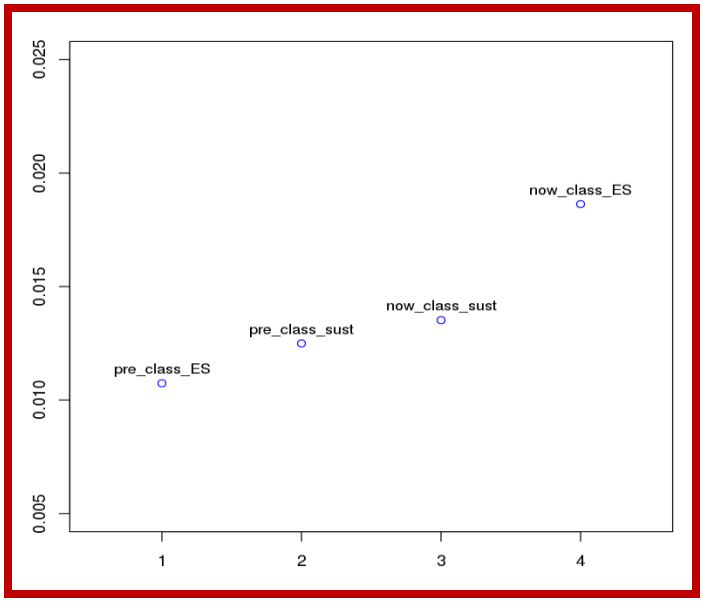


Figure 7. Multiple linear regression model of all non-background factors (top), and a close-up of the bottom left corner in the model (left). I conducted a multiple linear regression using my college-specific and college-independent variables. Refer to Table 1 for R factor names.

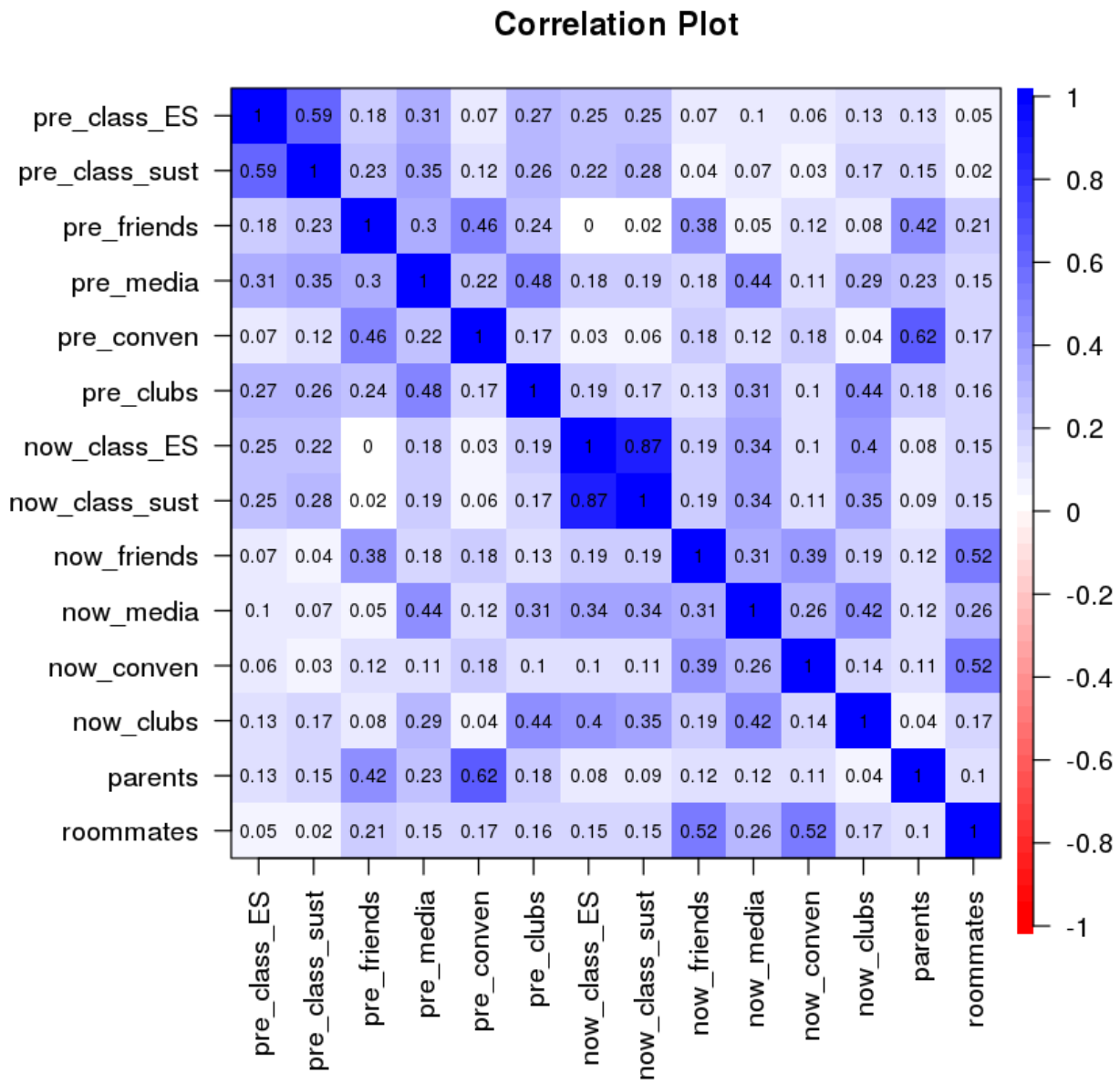


Figure 8. Relative influences of factors on each other. I created a correlation model showing the relative influences for each of my college-specific and college-independent factors on each other. Refer to Table 1 for R factor names.

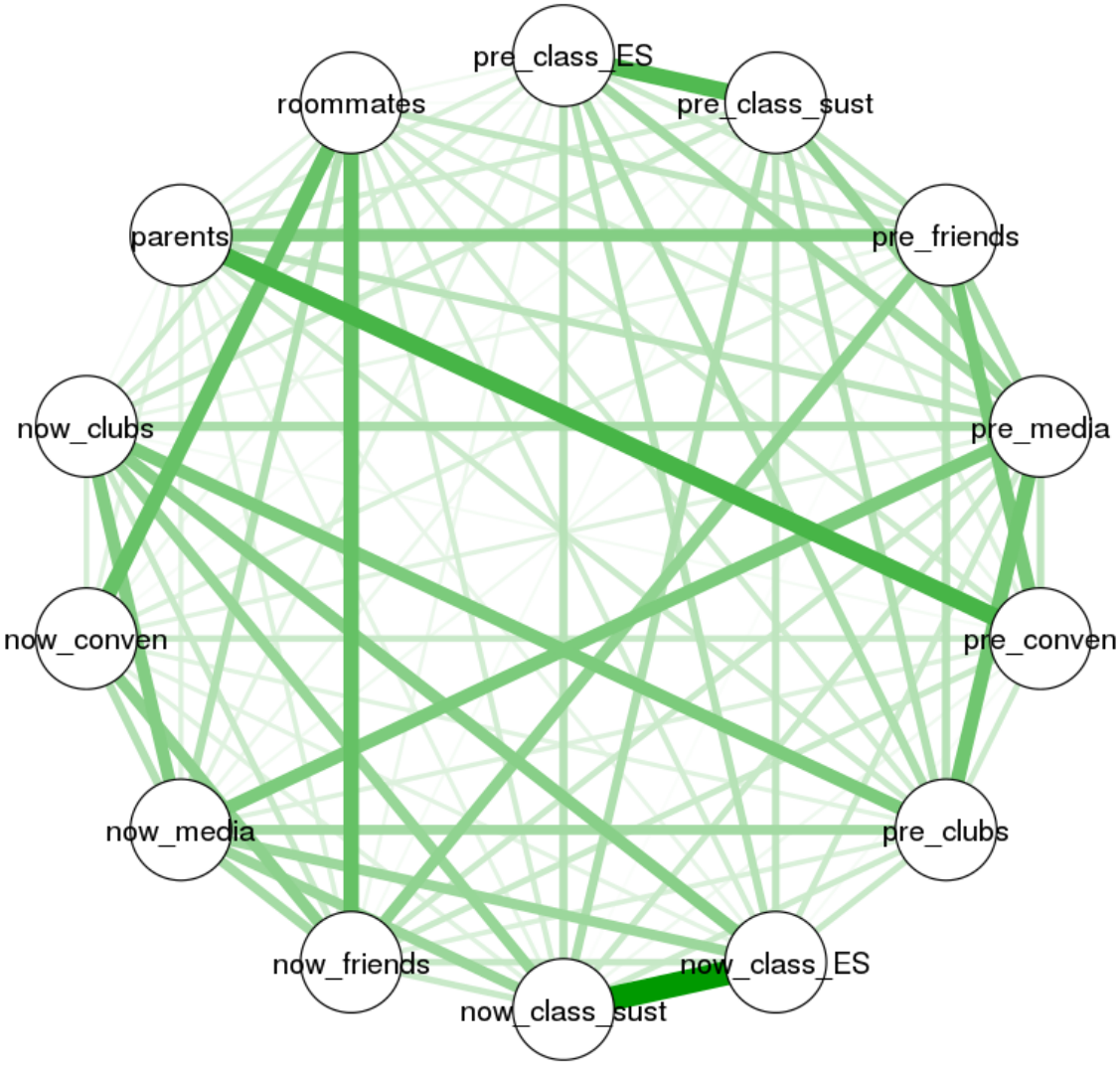


Figure 9. Second representation of relative influences of factors on each other. This is a visual representation of the correlation model from Figure 8. Refer to Table 1 for R factor names.

I found that three out of seven college-independent factors showed higher coefficient values than their college-specific counterparts (Table 1). When correlated with my recycling scores, I found the three factor pairs of parents versus roommates, pre_conven versus now_conven, and pre_media versus now_media all had higher coefficient values in the college-independent category, with differences of 0.10773192, 0.06802134, and 0.07223923 respectively (refer to

Table 1 for factor names). The other four factors had relatively similar coefficient values to each other when compared between categories, with values being within 0.00679815 of each other at the largest difference.

Examining different iterations of the multiple regression process showed that the relative importance of each factor changed depending on how many factors were added into the model (Appendix II). A model including three or more factors results in a negative coefficient value for the number of sustainability-themed courses taken before college. A model including all fourteen factors results in a negative coefficient value for the frequency of interaction with environmental media before college (Appendix II).

Qualitative Analysis Results

I found that friends were the most common source of encouragement to recycle given in participant self-assessments. Out of the respondents that had been encouraged to recycle by someone, the largest percentage at 66.14% responded with friends, with teachers, housemates/roommates/apartment-mates, co-workers, and other following in descending order (Table 2). These answers dealt purely with encouragement to recycle, not whether participants were influenced by their answers or if they changed their recycling behaviors.

I found that factors from my convenience sub-category were my most commonly found search terms in participant open-ended responses. 217 responses referenced convenience, availability, or ease as a factor that had influenced their recycling, accounting for 26.53% of answers (Table 3). Factors from my social influences sub-category were second most common, with friends, family, and parents referenced in 158 responses, accounting for 19.31% of answers (Table 3). My search term coding accounted for 53.42% of total open-ended responses.

Table 2. Summary of responses about people who encouraged recycling. I summarized participant responses about who had encouraged them to recycle.

Response	Percentage
Friends	66.14%
Teachers	36.92%
Housemates/roommates/apartment-mates	35.70%
Co-workers	10.15%
Other (~82% wrote Family/Parents)	8.80%

Table 3. Summary of coding searches for pertinent terms in open-ended responses. I searched for several terms within all open-ended responses about what had influenced recycling, organized them by sub-category, and produced percentages.

Search Terms	**Number of Times Found**	**Percentage**	**Sub-category**	**Number of Times Found (by sub-category)**	**Percentage (by sub-category)**
"parents"	57	6.87%	Social Influences	158	19.31%
"family"	30	3.67%			
"friend"	71	8.68%			
"convenience"	134	16.38%	Convenience	217	26.53%
"availability"	29	3.54%			
"ease"	54	6.60%			
"teacher"	15	1.83%	Academics	41	5.01%
"class"	26	3.18%			
"media"	18	2.20%	Environmental Engagement	21	2.57%
"clubs"	0	0%			
"organizations"	3	0.36%			

DISCUSSION

Introduction

College-specific and college-independent factors are both important in determining college student recycling behavior, but the substantially larger college-independent coefficients suggest that this category is more influential. I used my framework of categories and sub-categories of factors to organize my investigation of influences on recycling (Figure 2). I found that both college-specific and college-independent factors seem to be important in determining recycling behavior, but several factors exhibited varying levels of influence. My results for the college-specific category suggest that factors of social influences from roommates and friends and convenience were the most important factors to target in current college students. I compared the college-specific sub-categories with the college-independent sub-categories to address the question of whether college-specific or college-independent factors are more important. This analysis helped me determine that college-independent factors were overall more influential in college student recycling behavior, with social influences being the most influential sub-category, followed by convenience, then environmental engagement, and finally academics being the least important.

Academics

My findings about academic factors suggest that classroom themes of sustainability or environmental science are much less influential in determining recycling behavior than any other sub-category. I found that this sub-category has the lowest influence on recycling behavior relative to the other three sub-categories, regardless of whether it is before or during college. This conclusion was further supported by my qualitative analysis, which revealed that only about 5% of respondents believed that teachers or classes had influenced recycling. From my correlation plots delineating the level of correlation between factors, I found that my two academic factors were practically interchangeable. Comparing my findings regarding college-specific versus college-independent variables in this sub-category shows that academics during college appear more influential for recycling behavior than academics before college. However, the difference in

coefficients was quite small, at less than one hundredth, suggesting that there is very little difference between their influences overall. In my survey, I used an open-ended question to ask who had encouraged students to recycle, and 36.92% responded with teachers. This was much less than friends at 66.14%, but still showed that teachers had encouraged many students to recycle. The influence of teachers can serve as a proxy for the influence of my academic factors such as taking environmental science classes, so both of my methods of inquiry indicated that teachers potentially have some influence over student recycling behavior. In a college setting, teachers are also influenced in their recycling choices by personal values depending on the situation (Mtutu and Thondhlana 2016). This might be one avenue through which student recycling choices are influenced, where influences on teachers affect how they in turn influence their students. However, academics as a sub-category overall appears less influential than the other three sub-categories.

Social Influence

My findings about social influence factors suggest that the people you live with and interact with are the most important factor out of my four sub-categories in determining recycling behavior. Recycling habits of people that you live with, namely parents and roommates, appeared highly influential being first and third respectively. The influence of friends' recycling habits was weaker than that of cohabitants, but still was somewhat important, respectively being the fifth and seventh most influential for during college and before college. My qualitative analysis results also support these conclusions, since family and parents were more common answers than friends as influences from open-ended responses. Factors from social influence accounted for nearly one fifth of open-ended responses, and were placed high in importance within my regression model, suggesting that social influence is very important in determining recycling behavior both during and before college. Comparing between college-specific and college-independent under this sub-category shows that college-independent is much more important in one pairing (parents vs. roommates), while college-specific is only slightly more important in the other pairing (friends before vs. friends now). Based on this comparison, college-independent factors seem more influential in this sub-category. Other studies have found social norms to be a significant influence from their studies of general populations (Hornik et al. 1995). Social norms of recycling may not be a significant influence for college males, but may be for college females when influencing recycling behavior

(Goldenhar and Connell 1993). My results neither support nor challenge their conclusions about social norms of recycling only influencing females, because my statistical test only measured a significant difference between males and females, not which had been influenced. Overall, my results support the conclusions of the literature on general populations, suggesting that college students may respond similarly to non-college students to social influences when it comes to recycling.

Environmental Engagement

My findings about environmental engagement factors suggest that some factors are much more important than others in this sub-category. Interaction with environmental media before college was the fourth most important factor, while the other three factors in this sub-category were clustered much lower in importance at eighth, ninth, and tenth. This suggests that the pre-college media factor is much more important than interaction with environmental media during college, or interaction with environmental clubs/organizations at any time period. Comparing between college-specific and college-independent under this category shows a very large difference between the media factors before and during college, and only a slight difference between the clubs/organizations factors. Since college-independent media factors were much greater than college-specific ones, while college-specific was only slightly more for the clubs/organizations factors, college-independent factors appear more influential in this sub-category. Very few, if any, other studies have looked at environmental engagement in this way, with most investigating environmental attitude or previous recycling experience instead (Hornik et al. 1995; Schultz et al. 1995). There is a gendered difference between college males and females with past recycling experiences only being significantly influential for males (Goldenhar and Connell 1993). My results neither support nor challenge this conclusion, because my statistical test did not establish which group was influenced. There is debate over whether the past recycling experiences are in fact influential in recycling behavior. Kashyap and Iyer (2015) found that the origins of recycling behavior and past experiences were the most influential factor for all participants in their study. My results support this conclusion because of the overall emphasis on past environmental experiences being more important than present experiences.

Convenience

My findings regarding convenience factors suggest that convenience is an important influence on recycling behavior regardless of being in college or not. Convenience before college was the second most important factor, while convenience during college was the sixth most important factor, suggesting that the college-independent factor is more important than the college-specific factor in this sub-category. Based on this comparison, past recycling experiences seem more influential, further supporting conclusions about past experiences being the most influential factor (Kashyap and Iyer 2015). Other studies have found convenience to be a very strong influence on recycling behavior in non-college populations (Martin et al. 2006). My qualitative analysis results also support these conclusions since convenience factors were referenced as an influence in over a quarter of open-ended responses, more than any other sub-category, including social influences.

Background Factors

I found that there was significant difference in recycling behavior based on factors of gender identity, racial/ethnic identity, and choice of academic major. Other studies have made supporting conclusions based in both college and non-college populations. Females tend to recycle more than males, and ethnic/racial minorities tend to recycle more than whites (Lansana 1992; Meyer 2016; Schultz et al. 1995). My study results supported their conclusion about gender since females did have significantly better recycling scores than males. However, I found that whites were the best recyclers in my study, with the Asians being significantly lower in recycling scores. This would seem to contradict previous findings (Hornik et al. 1995; Meyer 2016), but I hypothesize that the correlation might not actually be with race/ethnicity, but with minority status in the population. Whites were a minority in my population, while Asians were the majority. If this is the case, then my results still corroborate the conclusions from the

literature. Meyer also found a significant correlation between being in an environmental major and recycling behavior (2016), while my results found mild support for this conclusion. There was significant difference highlighting Biological Science majors as the best recyclers, with Business/Economics and Engineering/Computer Science majors being significantly worse. However, I did not include a specifically environmental category in my survey, so I do not have direct conclusions to make related to Meyer's study.

College-Specific vs. College-Independent Framework

Overall, it appears that college-independent factors are more influential in determining recycling behavior than college-specific factors. While more college-specific factors correlated better with recycling behavior than college-independent ones, the level of difference was over an order of magnitude higher for the college-independent factors that were correlated, suggesting that they are overall stronger. Specific background factors of interest showed significant differences in recycling behavior. Overall, the framework seems to suggest that a direct comparison of college and pre-college time periods is feasible, but there are many more factors that need to be addressed since less than half of the variance was explained by my model.

Limitations

This study had several limitations based in its fundamental design and context. The sample population was two classes of ESPM 50AC at UC Berkeley, so the possible respondents were limited to undergraduate students enrolled in those particular semesters. While there is reasonable argument for inferring the results of this study to the rest of UC Berkeley undergraduates and other similar populations, the results for this case study can only be directly applied to the specific class populations. The socio-geographic context provided a bias, with the city of Berkeley providing a liberal majority and the class population was probably skewed toward environmental friendliness. Most of my survey questions were designed on a 1 to 5 Likert scale, so there is inherent uncertainty in the answer choices of participants since they only have discrete number choices, leaving answers based upon participants' individual interpretations of their own experiences and knowledge. Results are also limited by the fact that my survey instrument relied on self-reported data, so there

is no pure objectivity in their answers. Finally, my data analysis methods can only show relationships between factors, so all causation is inferred from my own interpretation. My regression model was limited by the factors that I chose, since they only accounted for a little less than half of total variance. My qualitative analysis was similarly limited by the search terms which I chose and coded for, which accounted for only a little over half of total open-ended responses. Despite these limitations, my results are still important and valid, capable of informing future research.

Future Directions

My study expands knowledge of college student recycling behaviors and contributing factors, but it also poses new questions that need further research. What would happen if we were to compare college-specific and college-independent factors more directly, with a controlled experimental setting instead of relying on self-reported survey answers? How do these factors interact with each other and are there potential synergistic relationships? How do background factors play into the college-specific versus college-independent framework? What deeper reasoning processes and motivations can be explored in explaining my results? How much causation can be explored in future research? While expanding our knowledge of what motivates recycling in college students, my study has also expanded the number of questions we have about the subject. Some of these questions might be addressed by a cohort study following children as they grow up, periodically observing their recycling behavior to compare before and during college time periods. Another way to approach these questions might be to use experiments testing with and without the presence of each isolated factor. Other studies have also looked at work environment and occupation as significant factors that influence college recycling as well (Kelly 2006; Kashyap and Iyer 2015), raising more questions about how other significant factors might interplay with the ones on which I focus here.

Broader Implications

Despite the study limitations, my findings can still be extrapolated out to other populations without unjustified assumption. My population is relatively similar to the UC Berkeley

undergraduate population as a whole in terms of ethnic/racial identity, gender identity, and spread of academic majors, suggesting extrapolation to the rest of the UC Berkeley undergraduate population might be justified. Extrapolation to other liberal college populations might be possible if they also are in similar settings such as the San Francisco Bay Area, and have similar student populations regarding demographics and other factors. In comparing my results with previous findings by other studies that also investigated college factors, I found that most of our general conclusions supported each other, making it more likely that our populations were similar and that extrapolation is warranted. Overall my study has yielded results that support previous college-based study conclusions. In comparing my results with review studies that were not college-based, I found similarities with results regarding gender identity, previous recycling experience, racial/ethnic identity, convenience factors, and social influence factors (Hornik et al. 1995; Kashyap and Iyer 2015; Lansana 1992; Schultz et al. 1995). Despite the limitations, these types of findings are still important in informing how policy and environmental actions should be targeted.

These findings have broader implications for policy and environmental action at the college level and beyond. At colleges and universities, my results can help inform administrators on which factors they should target in sustainability goals. My study indicates that social influences from roommates and friends, and convenience are the most influential factors amongst my college population when motivating recycling behavior, so college administrators could focus on those factors rather than less influential ones like interaction with environmental clubs/organizations. For example, since I identified convenience as particularly influential, UC Berkeley administrators might institute policies increasing the number and availability of recycling bins throughout the campus. My results also help determine whether focusing on college students is the most efficient method of cultivating environmentally-friendly behavior, or if we should focus, instead on college-independent factors. My findings indicate that college-independent factors are more influential, encouraging an emphasis on the pre-college time period when motivating recycling behavior. This can inform sustainability policies at the county, state, and national levels if officials are trying to decide what factors they should target to motivate people in being more environmentally-conscious. For example, since parental recycling habits are the most important factor I identified, state policies might use schools as bases for environmental education efforts targeting parents who have children enrolled, in order to have the greatest impact.

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REFERENCES

Barr, S. 2007. Factors influencing environmental attitudes and behaviors: A U.K. case study of household waste management. Environment and Behavior 39:435-473.

EPA. 2012. Municipal solid waste generation, recycling, and disposal in the United States: Facts and figures for 2012. United States Environmental Protection Agency. Washington, D.C., USA.

Goldenhar, Linda M., and Cathleen M. Connell. 1993. Understanding and predicting recycling behavior: An application of the theory of reasoned action. Journal of Environmental Systems 22:91-91.

Hornik, J., J. Cherian, M. Madansky, and C. Narayana. 1995. Determinants of recycling behavior: A synthesis of research results. The Journal of Socio-Economics 24:105-127.

Jaus, H. K. 1984. The development and retention of environmental attitudes in elementary school children. Journal of Environmental Education 15:33-36.

Kashyap, R., and E. Iyer. 2015. Attitudes and behaviors of college students in regards to the environment and recycling. Pages 71–79 *in* M. Moore and R. S. Moore, editors. New Meanings for Marketing in a New Millennium. Springer International Publishing.

Kelly, T.C., I. G. Mason, M. W. Leiss, and S. Ganesh. 2006. University community responses to on-campus resource recycling. Resources, Conservation and Recycling 47:42-55.

Kirakozian, A. 2016. The determinants of household recycling: Social influence, public policies and environmental preferences. Applied Economics 48:1481-1503.

Lansana, F. M. 1992. Distinguishing potential recyclers from nonrecyclers: A basis for developing recycling strategies. The Journal of Environmental Education 23:16–23.

Lee, G. F., and Jones-Lee, A. 1994. Impact of municipal and industrial non-hazardous waste landfills on public health and the environment: An overview. California Environmental Protection Agency Comparative Risk Project. Sacramento, CA, USA.

Ludwig, Timothy D., Timothy W. Gray, and Allison Rowell. 1998. Increasing recycling in academic buildings: A systematic replication. Journal of Applied Behavior Analysis 31(4):683-686.

McCarty, J. A., and L. J. Shrum. 1994. The recycling of solid wastes: Personal values, value orientations, and attitudes about recycling as antecedents of recycling behavior. Journal of Business Research 30:53-62.

Meyer, A. 2016. Heterogeneity in the preferences and pro-environmental behavior of college students: The effects of years on campus, demographics, and external factors. Journal of Cleaner Production 112:3451-3463.

Mtutu, P., and G. Thondhlana. 2016. Encouraging pro-environmental behaviour: Energy use and recycling at Rhodes University, South Africa. Habitat International 53:142–150.

Pastor, M., J. Sadd, and J. Hipp. 2001. Which came first? Toxic facilities, minority move-in, and environmental justice. Journal of Urban Affairs 23:1–21.

R Development Core Team. 2015. R version 3.3.31. R Project for Statistical Computing, Vienna, Austria. <www.r-project.org>.

Schultz, P. W., S. Oskamp, and T. Mainieri. 1995. Who recycles and when? A review of personal and situational factors. Journal of Environmental Psychology 15:105–121.

Sidique, S. F., S. V. Joshi, and F. Lupi. 2010. Factors influencing the rate of recycling: An analysis of Minnesota counties. Resources, Conservation and Recycling 54:242-249.

SurveyMonkey. 2016. SurveyMonkey: My Surveys. SurveyMonkey. <https://www.surveymonkey.com/home/?ut_source=header>.

UC Berkeley Office of Planning and Analysis (OPA). 2016. Berkeley Undergraduate Profile. University of California Berkeley. <http://opa.berkeley.edu/sites/default/files/undergradprofile_jan2016.pdf>.

Williams, E. 1991. College students and recycling: Their attitudes and behaviors. Journal of College Student Development 32:86–88.

APPENDIX I

ESPM 50AC Spring 2017

1. Recycling Study: Section 1

Please answer all questions to the best of your ability.

* 1. How often do you recycle while at home?

- Almost never
- Rarely
- Sometimes
- Frequently
- Almost always

* 2. How often do you recycle while away from home?

- Almost never
- Rarely
- Sometimes
- Frequently
- Almost always

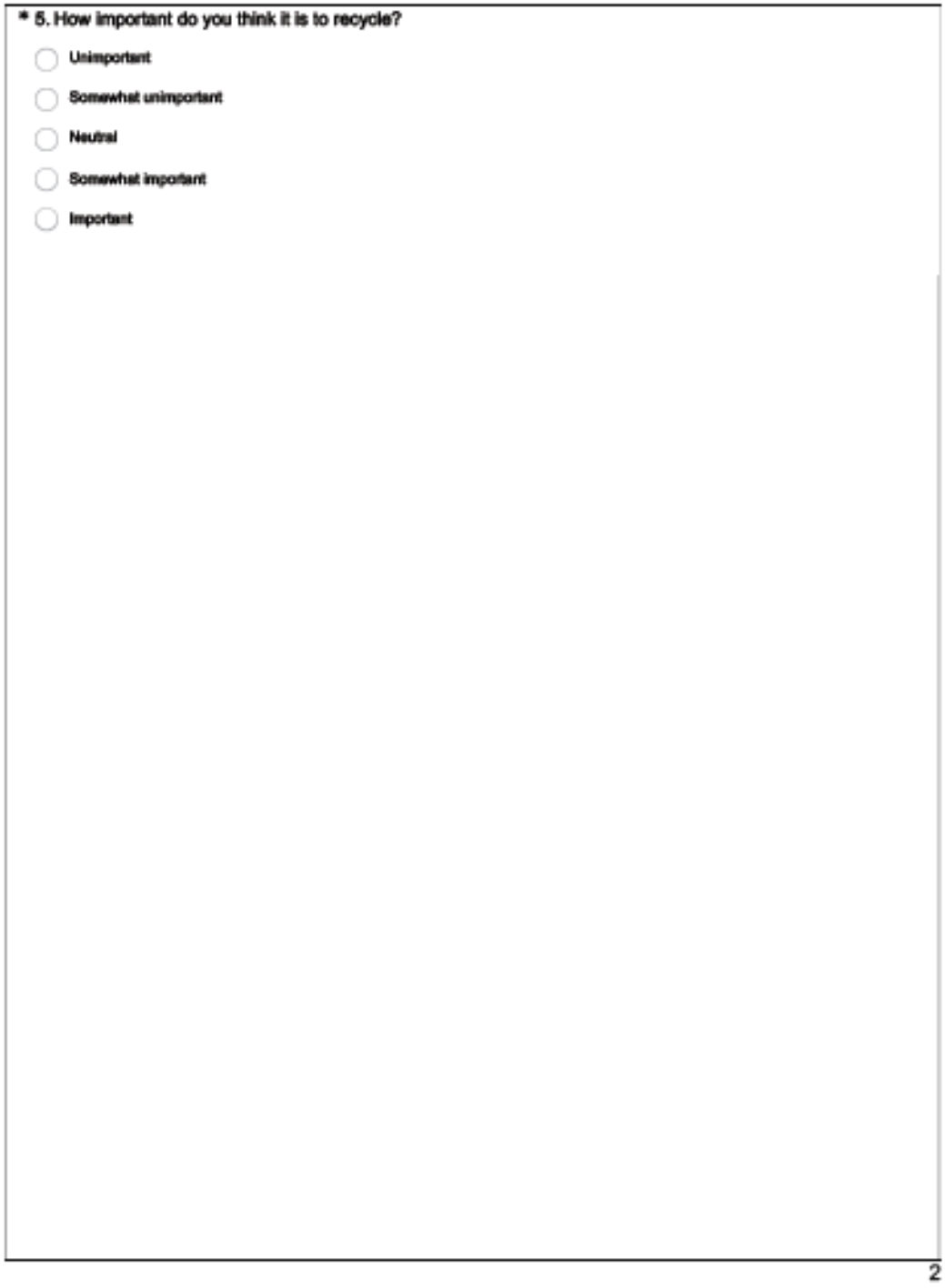
* 3. How confident are you in your ability to correctly sort all of your recyclables?

- Very poor
- Poor
- Average
- Good
- Very good

* 4. Rate your understanding of the "PET 1-7 scale" for plastic recycling.

- Very poor
- Poor
- Average
- Good
- Very good

1


* 5. How important do you think it is to recycle?
Unimportant
Somewhat unimportant
Neutral
Somewhat important
Important
2

ESPM 50AC Spring 2017

2. Recycling Study: Section 2

The following questions correspond to your time BEFORE college.

*** 6. How many classes had you taken before college that addressed environmental themes and/or environmental science?**

- ◯ 0 classes
- ◯ 1 class
- ◯ 2 classes
- ◯ 3 classes
- ◯ 4 or more classes

*** 7. How many classes had you taken before college that displayed themes of sustainability?**

- ◯ 0 classes
- ◯ 1 class
- ◯ 2 classes
- ◯ 3 classes
- ◯ 4 or more classes

*** 8. Estimate the percentage of friends you had before college that recycle more often than not?**

- ◯ 0% - 20%
- ◯ 20% - 40%
- ◯ 40% - 60%
- ◯ 60% - 80%
- ◯ 80% - 100%

3

* 9. How often had you interacted with environmentally-themed media before college (eg: documentaries, posters, social media posts, etc)?

- Almost never
- Rarely
- Sometimes
- Frequently
- Very frequently

* 10. On average, how often do your parents recycle at home?

- Almost never
- Rarely
- Sometimes
- Frequently
- Almost always

* 11. How convenient is it to recycle in your home neighborhood?

- Very inconvenient
- Inconvenient
- Somewhat convenient
- Convenient
- Very convenient

* 12. How often had you interacted with environmental organizations and/or clubs before college (eg. Sierra Club, Greenpeace, etc.)?

- Almost never
- Rarely
- Sometimes
- Frequently
- Very frequently

4

ESPM 50AC Spring 2017

3. Recycling Study: Section 3

The following questions correspond to your time DURING college.

*** 13. How many classes have you taken in college that addressed environmental science or environmental issues (not including ESPM 50AC)?**

- 0 classes
- 1 class
- 2 classes
- 3 classes
- 4 or more classes

*** 14. How many classes have you taken in college that displayed themes of sustainability (not including ESPM 50AC)?**

- 0 classes
- 1 class
- 2 classes
- 3 classes
- 4 or more classes

*** 15. Estimate the percentage of friends you have in college that recycle more often than not?**

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% -100%

5

* 16. How often have you interacted with environmental media during college (eg: documentaries, posters, social media posts, etc)?

- Almost never
- Rarely
- Sometimes
- Frequently
- Very frequently

* 17. On average, how often do your college room-mates and/or apartment-mates recycle?

- Almost never
- Rarely
- Sometimes
- Frequently
- Almost always

* 18. Estimate how involved you are with campus Greek-life (e.g., attending Greek-sponsored parties or events, becoming a member of a sorority or fraternity, interacting with the Greek-life community, etc.)?

- No involvement
- Rare involvement
- Mild involvement
- Moderate involvement
- High involvement

* 19. How convenient is it to recycle at your residence in college?

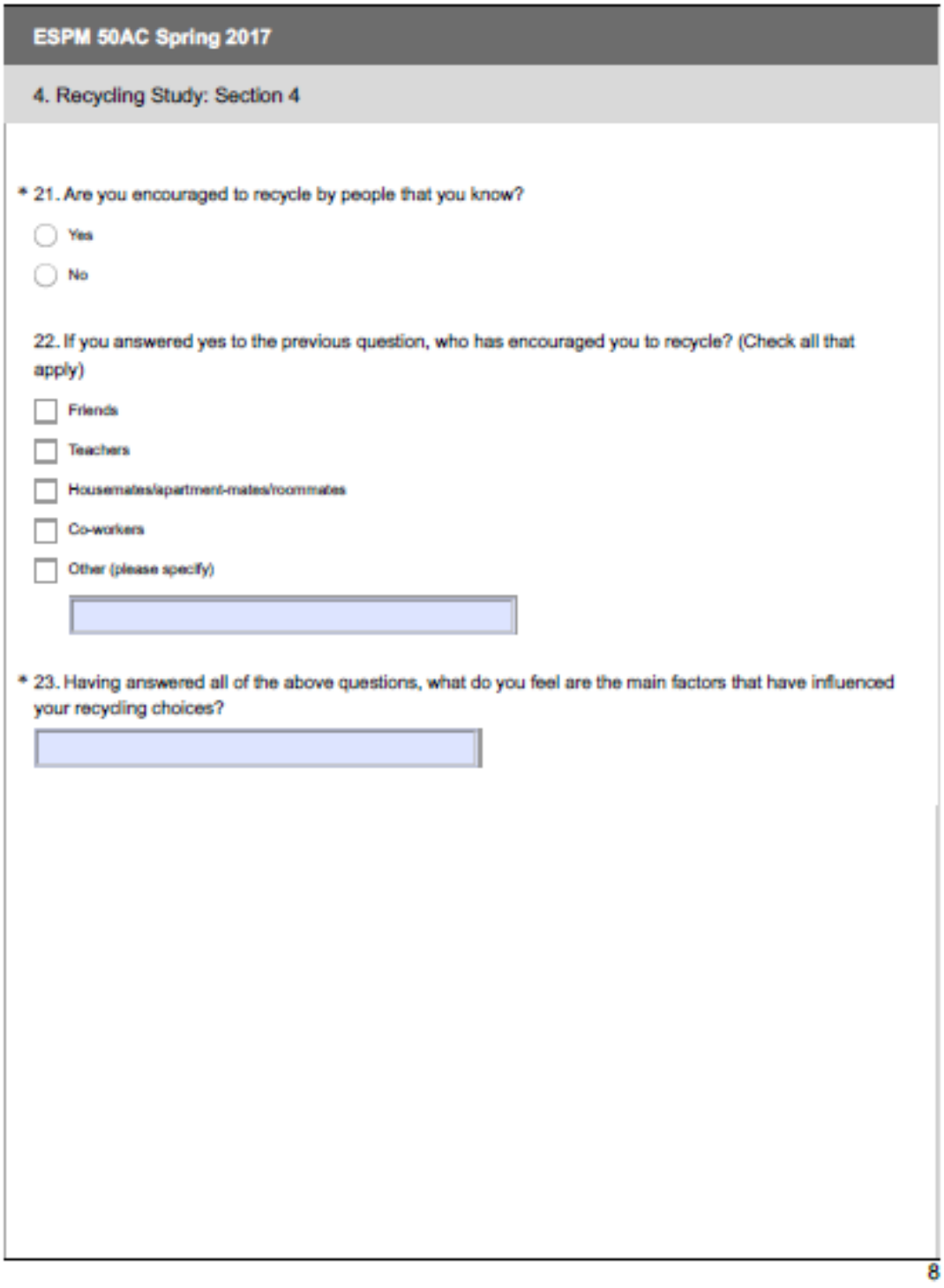
- Very inconvenient
- Inconvenient
- Somewhat convenient
- Convenient
- Very convenient

6

* 20. How often have you interacted with environmental organizations and/or clubs during college (eg. Sierra Club, ASUC Sustainability Team, Student Environmental Resource Center, etc)?

- Almost never
- Rarely
- Sometimes
- Frequently
- Very frequently

7



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4. Recycling Study: Section 4

* 21. Are you encouraged to recycle by people that you know?

- ○ Yes
- ○ No

22. If you answered yes to the previous question, who has encouraged you to recycle? (Check all that apply)

- ☐ Friends
- ☐ Teachers
- ☐ Housemates/apartment-mates/roommates
- ☐ Co-workers
- ☐ Other (please specify)

* 23. Having answered all of the above questions, what do you feel are the main factors that have influenced your recycling choices?

8

ESPM 50AC Spring 2017

12. Demographics

* 76. What year are you at UC Berkeley?

- Freshman
- Sophomore
- Junior
- Junior Transfer
- Senior
- Senior+

* 77. What is your major/minor? If you are not sure or do not have one write N/A.

Major

Major 2

Minor

Minor 2

* 78. In which category would you place your major?

- Undeclared
- Social Sciences
- Biological Sciences
- Physical Sciences
- Humanities
- Arts
- Business and/or Economics
- Engineering and/or Computer Sciences
- Other (please specify)

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* 79. What is your ethnic or racial background? (Mark all that apply)

- ☐ Caucasian/ White
- ☐ Black/ African-American
- ☐ Asian
- ☐ Native Hawaiian or other Pacific Islander
- ☐ Native American
- ☐ Prefer not to say
- ☐ Other (please specify)

* 80. Are you of Spanish, Hispanic or Latino origin or descent?

- ○ Yes
- ○ No
- ○ Prefer not to say

* 81. What gender do you identify with?

- ○ Male
- ○ Female
- ○ Non-binary
- ○ Prefer not to say
- ○ Other (please specify)

* 82. What is your place of longest residence before coming to UC Berkeley? (City and State). If you are international enter your country of longest residence.

City

State

Country

29

* 83. Classify your hometown as one of the following.

- ○ Rural
- ○ Suburban
- ○ Small urban city
- ○ Medium-sized urban city
- ○ Large urban city
- ○ Other (please specify)

* 84. Estimate the population of your hometown. For reference, Berkeley has a population of around 120,000. San Francisco has a population of around 840,000. Los Angeles has a population of nearly 4,000,000.

- ○ Less than 25,000 people
- ○ 25,000 to 100,000 people
- ○ 100,000 to 500,000 people
- ○ 500,000 to 1,000,000 people
- ○ More than 1,000,000 people

* 85. For your home residence (not college residence), please classify your household economic status to the best of your ability.

- ○ Below the poverty line
- ○ Between lower middle class and the poverty line
- ○ Lower middle class
- ○ Upper middle class
- ○ Upper class

* 86. How old are you?

30

* 87. Where do you live while at college?

- ◯ Residence hall or dormitory
- ◯ Non-university student housing (The Berk, Wesley, etc.)
- ◯ Complex (1-6 units)
- ◯ Apartment (6+ units)
- ◯ House
- ◯ Co-op
- ◯ Sorority or fraternity
- ◯ Other (please specify)

* 88. How many people do you live with?

- ◯ None
- ◯ 1 to 3
- ◯ 4 to 5
- ◯ 6 to 7
- ◯ 8 to 9
- ◯ 10+

* 89. Rate how you would consider your political beliefs on the spectrum of liberal to conservative.

- ◯ Very liberal
- ◯ Liberal
- ◯ Neither liberal nor conservative
- ◯ Conservative
- ◯ Very conservative

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APPENDIX II

Average coefficients for different model sizes:

	1X	2Xs	3Xs	4Xs	5Xs
pre_class_ES	0.6174059	0.4598480	0.362698187	0.30104643	0.2620390
pre_class_sust	0.3140142	0.1248763	-0.004850857	-0.09949088	-0.1714825
pre_friends	1.0138408	0.8361236	0.698081290	0.58478523	0.4884829
pre_media	1.3694127	1.2015325	1.076589886	0.98193229	0.9096615
pre_conven	1.2976727	1.1499574	1.035593734	0.94089103	0.8591215
pre_clubs	0.9223943	0.7491127	0.621308060	0.52317298	0.4454085
now_class_ES	0.6611518	0.5186398	0.428524658	0.36882574	0.3275267
now_class_sust	0.6440473	0.4745296	0.355756700	0.26838584	0.2018344
now_friends	1.1057451	0.9329024	0.801699507	0.69792380	0.6138902
now_media	0.9474851	0.7737548	0.641911771	0.53657633	0.4490682
now_conven	0.9970261	0.8479837	0.740198634	0.65715382	0.5906264
now_clubs	0.8794828	0.7231275	0.618090634	0.54462695	0.4919820
parents	1.4183230	1.3030553	1.221831518	1.16109576	1.1138265
roommates	1.1770170	1.0406953	0.941342959	0.86509270	0.8046096

	6Xs	7Xs	8Xs	9Xs	10Xs
pre_class_ES	0.2382069	0.2248753	0.21897366	0.21842669	0.22181780
pre_class_sust	-0.2279636	-0.2733826	-0.31070410	-0.34202184	-0.36889154
pre_friends	0.4048310	0.3312264	0.26600638	0.20804127	0.15651653
pre_media	0.8544527	0.8125340	0.78114385	0.75821364	0.74216877
pre_conven	0.7865453	0.7208777	0.66061422	0.60470438	0.55238190
pre_clubs	0.3820575	0.3290973	0.28371395	0.24388719	0.20813428
now_class_ES	0.2975267	0.2743825	0.25517709	0.23790615	0.22112718
now_class_sust	0.1499603	0.1090538	0.07682419	0.05185167	0.03327116
now_friends	0.5449282	0.4879237	0.44064037	0.40137838	0.36879109
now_media	0.3740980	0.3082761	0.24934380	0.19574109	0.14634716
now_conven	0.5358574	0.4898235	0.45048786	0.41642971	0.38664023
now_clubs	0.4537725	0.4260089	0.40610217	0.39232201	0.38348816
parents	1.0759007	1.0446918	1.01843216	0.99589173	0.97620010
roommates	0.7554792	0.7147894	0.68049424	0.65109574	0.62546996

	11Xs	12Xs	13Xs	14Xs
pre_class_ES	0.2281897	0.23692081	0.24764490	0.260197410
pre_class_sust	-0.3925225	-0.41389294	-0.43382292	-0.453020400
pre_friends	0.1108102	0.07042204	0.03493100	0.003969653
pre_media	0.7317974	0.72616042	0.72452835	0.726334891
pre_conven	0.5030680	0.45631213	0.41175352	0.369095022
pre_clubs	0.1753412	0.14464617	0.11535588	0.086886421
now_class_ES	0.2037491	0.18490227	0.16385501	0.139959597
now_class_sust	0.0205822	0.01353183	0.01204226	0.016165699
now_friends	0.3417804	0.31943287	0.30097699	0.285753745
now_media	0.1003184	0.05698615	0.01579195	-0.023752068
now_conven	0.3603985	0.33718984	0.31664677	0.298505213
now_clubs	0.3787880	0.37766583	0.37975382	0.384825108
parents	0.9587408	0.94308281	0.92893261	0.916098313
roommates	0.6027631	0.58232498	0.56366353	0.546412772