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Exploring Factors Promoting Recycling Behavior in Student Housing

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Abstract: As climate-related issues are important and concern all aspects of the built environment, there is a need to better understand the motives underlying household recycling behavior. The purpose of the present study is twofold: to investigate factors important for explaining the recycling behavior of young people and to explore respondents' own ideas regarding barriers to recycling. This paper reports on a survey conducted from 2020 to 2021 among residents of student housing in Stockholm, Sweden. Eight hypotheses were formulated based on earlier research and a model was constructed. Answers from 1202 respondents were first analyzed by logistic regression to test factors affecting respondents' self-reported recycling of paper, plastic, glass, and metal. Results show that the full model containing all predictors was statistically significant. The results showed that only four of the hypotheses were confirmed. Positive attitude toward recycling, personal norms, perceived behavioral control, and perceived convenience of recycling are positively affecting recycling behavior. In addition, 673 open answers were analyzed to provide information on unforeseen factors of importance for recycling behavior. This study adds to research by testing factors affecting recycling behaviors in a national context and by identifying new possible factors of importance. The results are also of benefit to business practitioners within the construction sector or within facility management in identifying activities that would add to sustainable development.

Keywords: recycling; personal norms; social norms; theory of planned behavior; students

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1. Introduction

The increased focus on the consequences of climate change and environmental degradation highlights the need to better understand the underlying motives and rationalities behind human behavior in relation to the environment. From this perspective, areas such as individual consumption, household energy use, and travel choices have been explored [1–5]. In addition, attention has been given to examining the relationship between the built environment and the individual, since a deeper understanding of occupants' behavior in buildings is crucial for achieving sustainability goals [6–10]. Among the many behaviors individuals engage in, recycling is one that it is important to understand in order to decrease the environmental impact of production and consumption. In this paper, our focus is on recycling, as this is one activity where individual households are expected to contribute to increased sustainability.

The aim of this study is to explore factors promoting the recycling behavior of students. First, we rely on previous research to formulate hypotheses and test the relevance of several factors that were identified as affecting behavioral choices. Secondly, we explore qualitative data to identify any new factors of importance for understanding recycling behavior as well as identifying the relative importance to the residents of different perceived barriers to recycling.

Students are an interesting group to examine, as there is an articulated need for more knowledge about young people's behavior and actions related to recycling. Firstly, age has been identified as a strong predictor in recycling behavior [11]. Secondly, young peoples' first accommodations, after they move from their family housing, is often a dwelling in an apartment complex, which has been identified as one of the most challenging building types in the context of recycling participation [12,13]. Moreover, research has found that students might perceive that they lack significant influence compared to other groups [14], highlighting the need for the better understanding of students' situations. This study fulfils this call by examining student housing and the factors that affect young people's recycling behavior. Considering that the total number of international students reached 6.3 million in 2018 [15], the presented study is highly relevant and applicable.

This article is structured in six sections. Relevant literature is presented in Section 2. In Section 3, a model is presented based on relevant literature, and materials and methods for data collection for both the quantitative and the qualitative analyses of the material are described. In Section 4, results from the quantitative regression analysis and the qualitative thematic analysis are presented. Section 5 consists of a discussion on the implications of the results, and lastly, conclusions are presented in Section 6.

2. Theoretical Background

The awareness of and interest in recycling has changed over the last 50 years. Between the 1970s and 1990s, research focused on two main strands, with the first focusing on impacts of different interventions [16–18]. Here, the aim was to better understand how different forms of rewards or incentives affected the willingness to recycle. It could be seen that there was an increase in recycling behavior for the duration of the intervention but that the levels dropped off as soon as it ended. The second strand of research investigated the role of convenience, or the lack thereof, as a barrier to recycling [19,20]. The results from these studies indicated that there was not enough space within households for recycling bins, or that the distance to a recycling bin was too great.

During the 2000s, the role of individual motivations, values, and attitudes gained increased focus. In this context, the theory of planned behavior (TPB), developed by Ajzen (1991), gained momentum and was applied in numerous studies lens of [21]. In brief, this model focused on three factors that predicted human intention to behave in a specific manner. These three factors are personal attitudes, subjective norm, and perceived behavioral control [22]. That means that our intention to engage in a specific behavior—such as recycling—is influenced by our beliefs, what we believe is expected of us, and the control we feel we have over the behavior. The personal attitudes reflect whether we believe the behavior (or the consequence) is good or bad. The subjective (or social) norm can be understood as internalized expectations on what is seen as acceptable behavior [22–24]. In other words, what others do and how individuals adjust their own behavior to match this behavior is expressed by this norm. The perceived behavioral control is an assessment of which factors might facilitate or hinder the behavior, such as believing that we can execute the specific behavior and have access to a recycling facility [25]. Convenience is similar to perceived behavioral control but relates to the ease with which a behavior can be performed [25,26].

It has been argued that habits should be included in the model, as habits are repetitive behaviors that can be difficult to challenge [27,28]. Habits encourage us to do the same thing over and over, thereby reducing the amount of cognitive energy invested in making behavioral choices. There is some evidence that recycling is a repetitive action, and this should increase the likelihood of engaging in recycling behavior, as it reduces the need for conscious decisions [29]. This could imply that behaviors we adopt at a young age will continue throughout adulthood.

Thørgersen demonstrated that personal norms are of great importance for the decision to recycle [30]. It is the sense of a personal obligation, a moral obligation, to act. In order to activate this moral obligation, the individual must be made aware of the need to recycle, the

consequences of not recycling, and that it is expected of you to recycle (social norm). Indeed, a sense of personal responsibility is proven to influence behavior, as pro-environmental behavior increases when people feel personally responsible to act [31]. It seems that guilt also has an effect on recycling behavior [32,33], suggesting that breaking one's own personal sense of responsibility is an important factor driving behavior. However, studies also indicate that people tend to overestimate the effects of their own behavior [34–36]. This indicates the need for better communication regarding the effects of recycling.

There are also studies where researchers try to combine psychological factors with structural conditions in order to better understand how the built environment affects behavior. Valle et al. [37] suggested a complex model to explain recycling behavior. Here, variables such as general environmental attitudes, specific knowledge, and communication complement traditional models to better understand what encourages recycling behavior. The results indicate that the TBP is a good predictor of behavior. Other theoretical developments include Klöckner and Blöbaum [38], who described the "comprehensive action determination model," which suggests that behavior is determined from three possible sources: intentional, situational, or habitual (p. 576). For recycling, this means that individuals will recycle if they have the intention to do so, if their surroundings permit it, and if they usually engage in recycling.

Moving away from the internal workings of the individual, researchers have tried to find explanations in the built environment that can aid in our understanding of recycling behavior. Many studies stress the importance of recycling being easy and convenient, as this has an effect on recycling behavior [39–44]. Dahlén and Lagerkvist [45] identified nine structural conditions that affect recycling behavior. For example, having recycling bins close to properties increased recycling compared to having drop-off points, but introducing a weight-based fee for recycling decreased the amount of recycled material. Interestingly, other studies suggested that walking to a drop-off recycling site might not be a barrier for students that usually do not have access to a car compared to other types of households [43]. In addition, some recycling behaviors require other types of knowledge beyond knowing that one can simply walk to a recycling bin. Research on attempts at composing organic waste at university campuses indicates that this requires proper knowledge of composting, such as a proper nutrient balance to prevent odor [46]. This indicates that behavior is complex and constantly negotiated between relevant internal and external conditions.

Students are an important group when it comes to recycling, as they are young and on the brink of starting independent lives away from their families [39]. In this transition, students develop their own strategies and specific habits that will be influenced both by their previous home environment and their new surroundings. Previous studies indicate that young people are concerned about climate change and future environmental degradation [39,47]. This raises questions relating to the link between attitudes and behavior, where it is vital to understand how this concern translates into behavior. Here, results indicate that there is a gap between what students want to do and what they can do, as factors such as accessibility and number of recycling stations are seen to affect recycling behavior [14]. Earlier studies showed that just a minor intervention by the property management and management involvement in the recycling issue can make a difference in tenants' approach to recycling [11,13,48].

Based on the literature review above, it can be argued that the following factors are important determinants of students' household waste recycling behavior: attitude, personal norms, social norms, perceived behavioral control, and perceived recycling convenience. These factors were included in the design of our study and are discussed in the following section.

3. Model, Materials, and Method

3.1. Model

Based on previous literature described in Section 2, we constructed a basic model with eight variables.

Household waste recycling behavior = B0 + B1 (Attitude) + B2 (Personal norms) + B3 (Social norms) + B4 (Perceived behavioral control) + B5 (Perceived recycling convenience) + B6 (Age) + B7 (Gender) + B8 (Nationality) + e

The model predicts that residents are more likely to take part in recycling household waste if they have positive attitudes toward recycling, it is according to their personal norms, is consistent with social norms, they feel capable of recycling, and they consider the premises for recycling to be convenient. Being young, female, and living in your native country are also considered to positively affect recycling.

The construction of the explanatory variables in the model are described below. To test the proposed model, we constructed a survey with 34 items. In this article, 25 questions were selected for further quantitative analysis, together with four questions on self-reported recycling behavior.

Attitude toward recycling was measured using five different questions and an index was constructed. The answers were provided according to a seven-point Likert scale (1 = totally disagree to 7 = totally agree). The five questions building up the index were constructed using the measures of Klöckner and Oppedal [43], who reported that the scale had a Cronbach's α coefficient of 0.89. In the questionnaire in the present study, the Likert scale consisted of only five points (1 = totally disagree to 5 = totally agree), as we wanted the scales for the different items to be similar. The present scale reported a Cronbach's α of 0.778, a bit lower than the original study but still considered good. The wording of the questions is reported in Appendix A.

Personal norms were measured using three questions (see Appendix A) and the answers were provided according to a three-point scale (1 = totally false, 2 = partially true, and 3 = totally true). An index was constructed using the measures of Valle et al. [37], who reported that the scale had a Cronbach's α coefficient of 0.712, considered adequate to good. In this study, the scale reported a Cronbach's α of 0.894, considered very good.

Social norms (defined as "subjective norms" by Valle et al. 2005) were measured using three questions (see Appendix A) on the respondent's belief about whether family, friends, or neighbors expect him or her to recycle. The answers were provided according to a three-point scale (1 = totally false, 2 = partially true, and 3 = totally true). The three questions were then multiplied by items measuring the importance to the respondent of these three opinions of others. The answers were provided according to a four-point scale (1 = not important to 4 = very important) and an index was constructed. Valle et al. [37] reported a Cronbach's α coefficient of 0.816, considered very good. In this study, the scale had a Cronbach's α of 0.734, considered adequate to good.

Perceived behavioral control, originally a concept by Ajzen [22], was measured using two questions illustrating beliefs in terms of the general difficulty and controllability to carry out specific behavior (see Appendix A). These questions were also used by Valle et al. [37], with answers provided according to a three-point scale (1 = totally false, 2 = partially true, and 3 = totally true). An index was constructed as the product of one item that measured the perceived controllability of recycling with another item that measured the perceived difficulty of recycling.

Inspired by Valle et al. [37] and Tonglet et al. [49], situational factors as the perceived convenience with the specific local recycling facilities were identified as interesting to investigate. In this study, the perceived convenience was measured by a composite of three questions on layout, cleanliness, and security, and questions on the importance of each of these aspects to the respondents' behavior. The answers were provided according to a seven-point Likert scale (1 = totally disagree to 7 = totally agree). The index was created as the sum of each aspect and the importance of that specific item, and the three sums where then added and a mean was calculated.

The abovementioned variables comprised the explanatory variables in our study, where the dependent variable was the respondents' self-reported recycling behavior. This variable was derived from four questions (paper, plastic, glass, and metal) in which the

respondents were asked how much of each fraction of their household waste they had recycled in the last 14 days. Their answers were provided according to a seven-point Likert scale (1 = nothing, 4 = about half, and 7 = all). The variable was constructed to single out respondents who recycle all waste from all four fractions (1) or anything less (0). It is known from other studies [50] that respondents tend to exaggerate their recycling habits, but the investigation of actual individual recycling of household waste was not possible within this study. However, in a review of studies using self-reported behavior, Kormos and Gifford [51] found that statistical analysis indicates that there seems to be an overlap between what people say they do and what they actually do, and that this needs to be interpreted with caution.

We also included two factors that illustrate consumer characteristics identified in earlier research as important to the decision to recycle household waste. A third factor, nationality, was chosen based on an intuitive idea that native citizens might be more familiar with recycling habits and rules than people coming from other countries. As residents in student housing are often a mix of many nationalities, the study's context provided an opportunity to test this idea. This led to eight hypotheses being investigated, as illustrated in Table 1.

Table 1. Hypotheses tested in the study.

Number	Hypotheses
H_1	Respondents' attitudes toward recycling of household waste are positively affecting their recycling behavior.
H_2	Respondents' personal norms toward recycling of household waste are positively affecting their recycling behavior.
H_3	Respondents' perception of social norms toward recycling of household waste is positively affecting their recycling behavior.
H_4	Respondents´ perceived behavioral control is positively affecting their recycling behavior.
H_5	Respondents´ perceived convenience of recycling of household waste is positively affecting their recycling behavior.
H_6	Younger respondents are more likely to self-report a high level of recycling of household waste.
H_7	Female respondents are more inclined to self-report a high level of recycling of household waste.
H_8	Swedish citizens are more likely to self-report a high level of recycling of household waste.

3.2. Respondents

The data used in the present study were collected through a survey (Appendix A) that was conducted from December 2020 to January 2021. The survey was distributed via email to all residents of student housing facilities in Stockholm, Sweden. The survey was distributed to 6617 residents in 25 different student housing facilities, and 1202 answered the survey, which corresponds to a response rate of 18.2%.

Due to missing data, 45 respondents were excluded. Thus, the results of this study are based on the answers of 1157 respondents. The mean age among the respondents used in the study was 26.8 years. Around 51% of the respondents were women and 49% men. Approximately 66% of the respondents were domestic citizens and 33% were not.

3.3. Quantitative Analysis

The constructs used in the regression are presented in Table 2.

Table 2. Variables used in the regression. Valid N =1157.

Variable	Definition	Mean	S.D.
DEPENDENT			
RECYBE	A binary variable indicating the respondents' self-reported recycling behavior. 1 = recycle all of the waste of paper, plastic, glass, and metal. 0 = all other.	0.53	0.499
INDEPENDENT			
ATTITU	A variable indicating the respondents' attitude toward recycling. An index was constructed from five questions.	4.381	0.671
PENORM	A variable indicating the respondents' personal norms toward recycling. An index was constructed from three questions.	2.213	0.743
SONORM	A variable indicating the product of respondents' ideas about the attitudes of friends, neighbors, and family toward recycling and the importance of that for his or her behavior. An index was constructed from six questions.	4.593	2.393
PBCONT	A variable indicating the respondents' perceived behavioral control. An index was constructed from the product of two questions.	7.493	2.053
PCONVE	A variable indicating respondents' perceived convenience with local recycling facilities. An index was constructed from six questions.	5.618	0.8768
AGE	A continuous variable indicating the respondent's age at the time of answering the questionnaire. Min = 20; max = 51.	26.83	3.844
GENDER	A binary variable indicating the respondent's gender. Female = 1; male = 0.	0.510	0.500
NATION	A binary variable indicating whether the respondent is a Swedish citizen or not. Swedish nationality = 1; other = 0.	0.660	0.472

3.4. Qualitative Analysis

The survey also included an open-ended question to enable the identification of possible unforeseen aspects that could be affecting the recycling behavior of respondents. The question (see also Appendix A) was, "Describe the possible problems you experience with sorting your household waste." This means that the respondents could answer freely and also bring up issues already entailed in other parts of the questionnaire, as we were interested in finding possible missing explanatory factors and identifying the relative importance of different perceived barriers to recycling for the residents.

A total of 673 respondents provided open answers about the problems they experience in their homes in relation to waste management and recycling. All answers were transcribed and were coded in a thematic analysis of the material for all 673 excerpts. Six themes were identified and then ordered according to number of occurrences, as this was considered an indication of the importance to the group of young residents in student housing.

4. Results

4.1. Results from the Quantitative Analysis

Direct logistic regression was performed to assess the impact of a number of factors on the likelihood that respondents would recycle all or almost all of their household waste of paper, plastic, glass, and metal. The model contained eight independent variables (ATTITU, PENORM, SONORM, PBCONT, PCONVE, AGE, GENDER, and NATION).

The full model containing all predictors was statistically significant, X^2 (8, N = 1157) = 161.652, $p < 0.001$, indicating that the model was able to distinguish between those who reported the highest amount of recycling and those with less reported recycled household waste. The model as a whole explained between 13% (Cox and Snell R^2) and 17.4%

(Nagelkerke R^2) of the variance in self-reported recycling of household waste behavior and correctly classified 63.8% of cases.

As shown in Table 3, only five of the independent variables made a statistically significant contribution to the model (ATTITU, PENORM, PBCONT, PCONVE, NATION).

Table 3. Logistic regression predicting the likelihood of respondents self-reporting high scores (all or almost all) on their recycling behavior (including paper, plastic, glass, and metal).

	B	S.E.	Sig.	Odds Ratio	95% C.I. for Odds Ratio	
					Lower	Upper
ATTITU	0.617	0.112	<0.001 ***	1.853	1.487	2.310
PENORM	0.612	0.118	<0.001 ***	1.844	1.463	2.324
SONORM	−0.006	0.027	0.816	0.994	0.942	1.049
PBCONT	0.182	0.033	<0.001 ***	1.200	1.125	1.280
PCONVE	0.294	0.075	<0.001 ***	1.342	1.158	1.556
AGE	0.027	0.018	0.130	1.028	0.992	1.064
GENDER	−0.255	0.130	0.049	0.775	0.601	0.999
NATION	−0.714	0.186	<0.001 ***	0.490	0.340	0.705
Constant	−7.089	0.866	<0.001	0.001		

Note. The dependent variable is RECYCBEH. The number of observations is 1157. The Cox and Snell R^2 is 0.130; the Nagelkerke R^2 is 0.174. *** = statistically significant at the 0.01 level (2-tailed).

The strongest predictor of student housing residents' recycling of household waste was NATION, recording an inverted odds ratio of 2.041. This indicates that respondents who were citizens of Sweden were two times less likely to report that they recycled all or almost all of their household waste than other nationalities. The odds ratio of ATTITU was 1.853, indicating that student housing residents with strong personal attitudes toward recycling of household waste were almost 1.9 times more likely to report recycling all or almost all of their waste than residents with weaker attitudes toward recycling. The odds ratio of PENORM was 1.844, indicating that respondents with stronger personal norms on recycling behavior were 1.8 times more likely to report that they recycle all or almost all of their household waste than respondents with weaker personal norms on recycling behavior. The variable PCONVE also showed a statistically significant contribution to the model. Here, the odds ratio was 1.342, which indicates that respondents perceiving the waste recycling room as more convenient to use were also more inclined to recycle their waste. Moreover, PBCONT made a statistically significant contribution with an odds ratio of 1.200. This indicates that respondents who expressed that they had higher perceived behavior control were almost 1.2 times more likely to recycle their waste than individuals who reported a lower perceived behavioral control.

4.2. Results from the Qualitative Analysis

We were also interested in exploring whether there were new factors of importance for understanding recycling behavior as well as identifying the relative importance of different perceived barriers for recycling for the residents. In a thematic analysis undertaken by the authors, six main themes were identified. The themes are listed by frequency of appearance in the material. We illustrate these themes with selected quotes from the respondents.

Theme 1: Lack of hygiene/cleanliness in garbage room/full vessels. Many respondents noted that it is not clean enough in the places set aside for waste management. There was an understanding that it is where waste is handled and is thus difficult to keep clean. Food leftovers create problems, as they are messy and smell. In the same way, it was emphasized that large items (often furniture) are placed in areas that were not intended for this (garbage rooms) and block access, and that sorting of household waste can therefore not be carried out. Full containers create problems with cleanliness in recycling. However, this was an irritation directed directly at the landlord, where it was perceived that these problems could easily be remedied through more or larger vessels or by emptying them more often. Some quotes:

> *"It also does not feel like there is any real point in using the garbage room as the containers are almost always already filled with the wrong things."*
>
> (Excerpt 590)

> *"Garbage sorting bins are often overcrowded, which means that you are forced to keep the waste at home longer than you want while waiting for the bins to be emptied."*
>
> (Excerpt 629)

Theme 2: Need for more information on how sorting should take place. Here, we identified two sub-themes: first, how sorting in the room should be carried out, especially for more complex sorting of items with several types of waste, and information on how things that cannot be sorted in one's own home should be handled. Many respondents brought up residents lacking specific information on how composite products should be sorted. They want more detailed information about this in the garbage room or on the landlord's website. This was particularly pronounced among international residents, who believed that this may differ between countries and therefore felt insecure. The uncertainty led to some tenants completely refraining from recycling. The tenants also lacked information on how things that cannot be recycled through their own property's garbage room should be handled. This can apply to batteries, computer parts, and the like. Information about where the nearest recycling center is located is something that was requested. Some quotes:

> *"Not enough detailed information of what goes where. Let's say plastic, but which kind of plastic? And then other things like cleaning up bottles before being recycled, or where to recycle unusable cables or unusable clothes. This detailed information is really needed to be available in the housing, even more for students coming from abroad who are not familiar with recycling. Another information that would be great to have is how and where the recycled materials will end up or be used for."*
>
> (Excerpt 822)

> *"I am not sure I know where to throw away some of the packages, for example if hard plastics go together with soft plastics. I may also need more education in terms of what specific plastic are not recyclable, as I am trying to recycle all, but maybe some should not be added in the mix. I am also not sure about the recycling of some cosmetics such as razor-blades for example, that are a mix of plastic and metal."*
>
> (Excerpt 663)

Theme 3: The area in tenants' own apartments. Many tenants raised the issue of sorting waste in their student apartment or student room. In all cases, it was space that was the problem, but as a result of this, problems with hygiene were also mentioned. At the same time, it was clear that this can be linked to convenience. Several answers indicated that the respondents felt that the distance to the waste room is so long that they rarely go there and therefore have large amounts of waste in their apartments. Some quotes:

> *"Lack of space, you do not want to have the garbage that you sort, but the space under the sink is not enough to have all the garbage there."*
>
> (Excerpt 501)

> *"There is also no real place in the apartment to sort all their rubbish properly, so I have taken a cupboard that can be a shared cleaning scrubber and rubbish sorting."*
>
> (Excerpt 530)

Theme 4: Other tenants' poor knowledge of how sorting should be done and others' poor morals. Not unexpectedly, many pointed out that others make mistakes. It was noted that waste is incorrectly sorted, and in several cases, residents stated that they have told neighbors to sort better or have themselves tried to correct the incorrect sorting by moving material between containers. However, this was perceived as unpleasant and, in some

cases, instead led to the respondent giving up, i.e., feeling that there is no point in recycling when others make mistakes. Recycling becomes an "all or nothing" activity. A quote:

> *"The only problem is the annoying attitude some people have of throwing garbage everywhere, making the recycle stations look like garbage dumps."*
>
> (Excerpt 700)

Theme 5: Distance to recycling facilities. Tenants stated that it is too far from their apartment or room to the recycling facilities. Some stated that they would like to recycle more but that they instead put all household waste unsorted in the nearest public waste-basket. This rather radical solution is often combined with great annoyance that sorting of food waste is not offered. The act is in protest, a protest that does not reach the landlord and, moreover, also contributes to a worsening environment, even though the resident expressed that recycling is important (attitude). It is more common that, due to perceived distances, recycling is not carried out as often as desired and that waste is stored in the tenant's own home. As a result, there are large total quantities, and the resident has to make several trips to dispose of all the accumulated waste. This is usually done once a week. One quote:

> *"The recycling bins are too far away from my apartment, and I have no time to go back and forth many times with more than one bag. On the other hand, the common waste is just near the bus stop, so everything is conveniently delivered to that bin on my way out."*
>
> (Excerpt 678)

Theme 6: Deficiencies in safety/security. When it comes to safety and security, there were some testimonials about situations in which tenants felt threatened or uncomfortable in connection with the recycling of household waste. This applied to lighting that does not work or lighting that automatically shuts off too quickly, so the respondent needs to be worried about getting stuck in the dark, and lighting that is sparse. This also applied, in some cases, to the risk of encountering animals such as insects and rats. However, what was mentioned by relatively many and that we feel is important to highlight is the anxiety of encountering someone unauthorized (non-resident) who has entered the garbage room to look for something to sell or somewhere to sleep. Fear of personal injury was stated as a reason to choose to let in unauthorized persons. Those who had experienced this avoid using the recycling premises and thus sort their waste to a lesser extent than they would in a safe environment. The security issue therefore becomes important for the likelihood of adopting a behavior desired by that individual (to recycle more). Some quotes:

> *"Homeless people sneak into the garbage room to sleep there or look around in the garbage. Even if you sympathize with their desperate situation, it feels uncomfortable that unauthorized people can enter. My partner and I therefore always go and recycle together. I want to avoid a physical confrontation and do not want to jeopardize my own safety."*
>
> (Excerpt 364)

> *"A lot of the times there are bulky huge furniture or other wooden things left behind. Not just once I had to move some of them myself to be able to reach the various containers to be able to dispose of my recyclables. It does not feel safe, as I could easily injure myself in the process . . . "*
>
> (Excerpt 860)

5. Discussion

The first aim of the study was to investigate known factors affecting residents' choice to recycle all or almost all household waste. The regression illustrated in the results section (Section 4.1) indicates that five individual variables uniquely contributed to the explanation

of recycling behavior. The eight hypotheses formulated in the literature were tested, and the findings related to the hypotheses are illustrated in Table 4.

Table 4. Test of the hypotheses.

Number	Hypotheses	Result
H_1	Respondents' attitudes toward recycling of household waste are positively affecting their recycling behavior.	Confirmed
H_2	Respondents' personal norms toward recycling of household waste are positively affecting their recycling behavior.	Confirmed
H_3	Respondents´ perception of social norms toward recycling of household waste is positively affecting their recycling behavior.	Rejected
H_4	Respondents´ perceived behavioral control is positively affecting their recycling behavior.	Confirmed
H_5	Respondents´ perceived convenience of recycling of household waste is positively affecting their recycling behavior.	Confirmed
H_6	Younger respondents are more likely to self-report a high level of recycling of household waste.	Rejected
H_7	Female respondents are more inclined to self-report a high level of recycling of household waste.	Rejected
H_8	Swedish citizens are more likely to self-report a high level of recycling of household waste.	Rejected

These findings are in line with earlier research [26,37,43], and we will discuss each of the tested variables separately.

An unexpected finding in this study was the role of nationality as the strongest predictor of intent to recycle. Previous studies have shown that students are less likely to recycle compared to long-time residents in an area [52]. This would suggest that non-Swedes—presumably having spent less time in Sweden than Swedes—could have had a lower intent to recycle since they would be unfamiliar with routines, recycling points, and local practices. That the non-Swedes in our study were more inclined to recycle indicates that information and knowledge about recycling in the investigated student housing is sufficient and that it was the internal attitudes and motives that were at play here. From an international perspective, personal norms concerning recycling might be stronger in countries other than Sweden, norms that international students bring with them.

As most previous studies have shown, the role of favorable personal attitudes and norms is crucial for predicting the intention to recycle. Perhaps this strong inner belief, linked to what is right and wrong, can be understood as students having a higher level of moral reasoning than non-students [53]. Regardless of why this is the case, these attitudes and norms were positive toward recycling, and this is very encouraging, as we examined students, a group that most likely will develop or has already developed habits that will enable them to continue to recycle even after they leave their student housing. This, of course, requires recycling facilities to be made available in all residential housing complexes, not only student housing. If habits and norms are created and breaking them causes feelings of guilt and shame, it is the responsibility of all housing actors to ensure that residents can continue to contribute to the recycling of their household waste [54].

Our quantitative analysis did not find that social norms, or the expectations others have of us, were significant. This lack of significance of social norms was also observed in other studies [25], which suggests that the social bonds between students can be weaker than for other groups. This could, in part, explain our results, since it is possible that the students in our study lived alone or away from home, and that the role of social norms decreased as a result.

Behavioral control was found to be significant, indicating that our respondents perceived that they were capable of carrying out recycling despite the shortcomings identified in the qualitative results.

The role of ease or convenience was also found to be significant in our study. This is in accordance with other studies that confirmed that students are perhaps more inclined to walk to a recycling bin even if it causes them extra work [43]. In our study, the tested index of convenience included respondents' perception of layout, cleanliness, and security in the recycling room as well as the importance of these traits. These factors can be of use for housing managers who wish to increase the level of recycling.

The qualitative analysis of problems perceived by the residents in student housing provided six themes, and we also considered their resemblance to the factors already identified by earlier research and, therefore, already tested in the quantitative part of the study. We noted that five of these themes could be considered identical or very similar to the factors defined by earlier research and tested by the present study. However, we would like to point out some important differences. Themes 1, 5, and 6 focused on the perceived convenience of local recycling facilities. The order of these themes illustrates the frequencies with which the respondents brought them up as being problematic and affecting their recycling behavior. The most mentioned problem was lack of cleanliness, whereas safety was mentioned fewer times and layout not mentioned at all by the tenants. This could indicate that the factor of perceived convenience [39–44], consisting of the three aspects of layout, cleanliness, and security, which were studied in the regression, would be better studied as separate concepts. This is therefore a recommendation for future research. Theme 3 concerned the possibilities of recycling related to one's own student apartment or student room. We considered this to be focusing on the same issues as the factor of convenience, even though this was not part of what was studied in the research upon which the factors tested in our model were formed. Based on the qualitative part of the study, we therefore recommend a narrow focus on the individual possibilities to recycle household waste. Investigating this in detail would contribute to new knowledge on the importance of convenience for recycling behavior. Theme 4 could be considered to focus on social norms, as the respondents expressed their views on their neighbors. The factor of social norms tested in our model was, in line with earlier research, constructed as the individuals' perception of the idea of others and the importance of what others think of them [22–24]. This factor was not found to uniquely contribute to the explanation of recycling behavior. However, the ideas on the behavior of others have not, to our knowledge, been tested in relation to recycling behavior. The results of our qualitative analysis indicate that when neighbors did not sort their waste in accordance with recommendations for how it should be done, this affected the respondents by increasing the likelihood that they would not sort their own household waste. We recommend this to be an area for further exploration in research. Theme 2 concerned the importance of information, and this theme entailed a lot of different aspects of information on recycling: information on how to separate waste, information on how to recycle waste that is not to be left in the garbage room, and information on what would become of the separated waste. The importance of information for recycling behavior was investigated earlier [50], but was not included in the factors tested by the model presented in Section 2. As our thematic analysis shows that information was considered by tenants to be the second most important problem hindering recycling of household waste, we also recommend further investigations of this. This would be a relatively easy way to positively affect recycling habits, and experimental studies are needed to test the effect of different interventions. This is, however, outside the scope of this article.

It is relevant to briefly discuss some limitations of this study. Firstly, data were collected from students during the second wave of the COVID-19 pandemic in Sweden. Consequently, it is possible that the results were affected by this specific situation, and that the significance of social norms and convenience reflected this situation. However, it is also possible that the results present current perceptions of the young generation.

Therefore, it is essential to continue collecting data in order to gain better understanding of the evolution of attitudes and perceptions of the younger generation. Secondly, the study presents self-reported measures of pro-environmental behavior, which the authors were unable to corroborate with actual recycling values. The objectivity of self-reported data has been discussed within the research community, in which positive variation between objective and self-reported measures has been highlighted, as have bias and the complexity of data collection [42,51].

6. Conclusions

The aim of this study was to explore factors promoting the recycling behavior of students. First, relying on previous research, we formulated eight hypotheses and tested the relevance of these factors identified as affecting behavioral choices. Secondly, we explored qualitative data to identify any new factors that could influence recycling behavior.

In line with previous research, we found that four of the hypotheses were confirmed: the residents' attitudes to recycling, their personal norms, the experience of personal control, and convenience, suggesting that these factors are important for the individual's self-reported recycling of household waste. We also saw some differences between the international residents and those who were of Swedish nationality in that the international students were more inclined to recycle their household waste.

With a thematic analysis of the answers to an open question in the survey, we also investigated the young tenants' own ideas on problems interfering with their intention to recycle. Six themes were identified and listed in order of reported frequency. We can conclude that most of the findings from the qualitative part of this study were in line with earlier literature and, therefore, among factors tested in the model. However, the importance of other tenants for respondents' recycling behavior was not in line with the tested factor of social norms. This factor, defined in earlier research, did not uniquely contribute to the model and, therefore, to the explanation of recycling behavior. We would like to point to a possible explanation found in the qualitative material: that the perceived incorrect behavior of other tenants might instead be negatively affecting recycling behavior.

Besides its importance for research in confirming or rejecting earlier findings and thereby contributing to knowledge on drivers for sustainability, the results here are important to take into practical consideration when designing recycling campaigns or programs encouraging environmental behavior change.

What can we thus make of this knowledge when it comes to concrete recommendations to property management companies? First, we can state that residents living in student housing have a clear desire to be able to recycle their household waste and that they would probably do so to a greater extent if they did not experience different types of obstacles. For landlords, it is about making it easier for tenants to increase the degree of recycling. It seems that different types of information that facilitate the sorting of more complex packaging combined with specific measures to deal with the reported perceived difficulties are possible. More vessels and more frequent emptying are, of course, another means where physically possible and economically defensible. However, we assume here that property managers have considered the number of vessels and emptying in relation to actual recycling. At the same time, increased capacity to receive waste for recycling can contribute to increased recycling, as it gives signals that not everything that it is possible to recycle actually ends up in the intended containers. We also want to point out the aspect of expanding the residents' opportunities for waste sorting and the convenience of doing so. To live with a host who works actively toward increasing recycling in society can also have a high signaling value.

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Conflicts of Interest: The authors declare no conflict of interest.

Ethical Considerations: All respondents were asked for consent and informed of the purpose of the data collection in advance of the survey. No personal information was collected that would fall under Swedish law for ethical vetting and, therefore, no ethical approval was sought from the Swedish Ethical Review Authority (2003:460).

Appendix A. Survey

1. Please indicate the name of your student housing property.
2. Recycling is . . .
    a. Necessary
    b. Satisfying
    c. Useful
    d. Likeable
    e. Reasonable
3. Indicate how you perceive recycling household waste.
    a. For me, recycling household waste is a very difficult task.
    b. Recycling household waste is not up to me.
4. Please describe any problems you may have to recycle your household waste. (OPEN QUESTION)
5. Indicate what others expect of you:
    a. My friends expect me to recycle household materials.
    b. My neighbors expect me to recycle household materials.
    c. My family expects me to recycle household materials.
6. Please indicate what will affect your willingness to recycle household waste:
    a. My friends' pressure on me as a reason for me to recycle is . . .
    b. My neighbors' pressure on me as a reason for me to recycle is . . .
    c. My family's pressure on me as a reason for me to recycle is . . .
7. Please indicate your thoughts on recycling.
    a. I feel a strong personal obligation to recycle a large proportion of my households' recyclables.
    b. I would feel guilty if I did not regularly recycle my households' recyclables.
    c. I am willing to make great effort to recycle household materials on a regular basis (adapted from original).
8. Here are some questions about the availability of the recycling room/waste disposal station in the student housing property where you live.
    a. The recycling room/waste disposal station I use has a layout that makes it easy to find where different types of waste should be put.
    b. It is important to me that the recycling room/waste disposal station I use have a layout that makes it easy to find where different types of waste should be put.
    c. The recycling room/waste disposal station I use is mostly clean.

d. It is important to me that the recycling room/waste disposal station I use be mostly clean.
e. The recycling room/waste disposal station I use feels safe to use.
f. It is important to me that the recycling room/waste disposal station I use feel safe to use.

9. Please indicate by ordering (1–4, where 1 is the best motivator) what kind of information would make you recycle more:
   a. General information on the idea of recycling—on why it is needed.
   b. Specific information on where to put different types of waste at your student housing recycling room/waste disposal station.
   c. General information on what will happen with the collected waste after it is picked up from the recycling room/waste disposal station.
   d. Specific information on the contribution—in terms of recycling—made by the collective of residents at you student housing.
10. Please indicate your amount of recycling during the last two weeks.
   a. During the last two weeks: How much of your paper and cardboard waste did you separate and dispose of so that it could be recycled?
   b. During the last two weeks: How much of your glass waste did you sort and dispose of so that it could be recycled?
   c. During the last two weeks: How much of your metal waste did you sort and dispose of so that it could be recycled?
   d. During the last two weeks: How much of your plastic waste did you sort and dispose of so that it could be recycled?
11. Please indicate gender.
   a. Female/Male/Other
12. Please indicate your year of birth.
13. Please indicate your nationality.
14. Indicate your main area of study/work (only one).
   a. Natural science and technology
   b. Social sciences
   c. Human sciences
15. If you want, please indicate your field of study, work, or research more specifically. (OPEN QUESTION)

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