

Relationship and predictors of impact, hybrid and intent measures of climate-related behaviour in different lifestyle domains

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Abstract

In this paper, we compare three different measures of climate-related behaviour in the lifestyle domains of mobility, heating, diet and buying clothes (as one consumption domain). The first measure, impact, uses objectifiable data to measure the greenhouse gas emission from the behaviour in these four domains. The second measure, hybrid, combines the objective emissions with statements about the intent of performing climate relevant behaviour. The third measure, intent, measures purely the intention. Results reveal that, depending on the lifestyle domain, associations between impact respectively hybrid measures and intent measures are low. Furthermore, impact measures seem to reflect structural preconditions relevant in a certain lifestyle domain, whereas intent measures are more closely related to psychological conditions. To not overemphasize one or the other aspect and to derive misleading conclusions, researchers should be aware of this fact. To reduce the problematic we suggest to use hybrid measures, which might be able to catch structural aspects as well as psychological ones.

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1. Introduction

Households contribute with a very large share to worldwide GHG-emissions with estimations of shares of 70 to 80 percent of global Greenhouse gas (GHG) emissions, which can be contributed to household consumption (Bruderer Enzler & Diekmann, 2019). Apart from technical and industrial solutions, it therefore is of great importance, that we change our consumption patterns and lifestyle choices to a less climate-impacting way. People seem to be aware of this, so it comes as no surprise, that the number of people who state that they behave pro environmental increases over time in Europe (Telesiene & Gross, 2017). Unfortunately, consumption based (GHG) emissions do not decrease in a similar amount (Eurostat, 2021). The reason for this can be, at least partially, attributed to the fact that it is difficult for individuals to assess the impact of their person behaviour on the climate, so people might have the impression to perform a lot of climate friendly behaviours, but in fact those behaviours have only little effects (Bleys et al., 2018). In the scientific research, this discrepancy is often mirrored by not distinguishing explicitly between impact and intent measures of climate-behaviour. This has far reaching consequences: Usually the aim of research is to identify personal and structural variables which are related to a certain behaviour to allow conclusions on which of these variables should be targeted if a change of behaviour is intended. The underlying premise thereby is that that the triggered behaviour change also has an impact on either the environment or the society. If intent-related research is performed, but treated as impact-related measure, the consequence might be, that implications in terms of impact are derived, that are not valid (Kastner & Matthies, 2014). For this reason, it is important to understand impact- and intent measures of climate-related behaviour, their relationship and their predictors.

1.1 Intent- versus impact related measures

In social sciences, the impact of people's action on climate very often is not measured directly (Bruderer Enzler & Diekmann, 2019). Instead, people are asked how often they perform certain kinds of climate-friendly behaviour (like going by bike, eating less meat, avoiding waste, etc.). The answers then are usually summed up to a score and used as an indicator of climate-friendly behaviour. Some studies also use more abstract variants by not asking for concrete behaviour but for a general assessment of the sustainability of the own behaviour (e.g. "I organize my daily life so as to use as few natural resources as possible" (Moser & Kleinhüchelkotten, 2017)). Variables composed in this way are called intent-oriented environmental behaviour since they strongly reflect the intention of people to act in a certain way, even though the behaviour objectively might have little impact (Paul C. Stern, 2000). Despite their widespread used, these measures have been criticized for the above named aspect of focusing too strongly on behaviour that has only limited influence on the actual environmental impact (Csutora, 2012; Moser & Kleinhüchelkotten, 2017). In reaction to that, a second research strand- impact-oriented behaviour- focusses on the concrete impact certain behaviours (like mode of transportation, eating habits, consumption patterns, etc.) have on GHG-emissions. To do so, usually objective measures, like the energy demand and/or the GHG emissions produced from the production of the equipment needed for a certain behaviour and the behaviour itself are calculated and used (Bird et al., 2019; Moser & Kleinhüchelkotten, 2017).

Those two research strands in the past have developed rather independent from each other (Bruderer Enzler & Diekmann, 2019) and, while typically the aim of both strands was to identify predictors of either intent- or impact related behaviour, the results are very different:

Intent-related behaviours have been proven in the past to be associated especially with psychological variables like pro environmental identity (Li et al., 2019; Moser & Kleinhüchelkotten, 2017), perceived behavioural control (Li et al., 2019), environmental concerns (Bruderer Enzler & Diekmann, 2019), or the new psychological paradigm (Gatersleben et al., 2014), but also, to a smaller degree, with

sociodemographic variables like income (Bruderer Enzler & Diekmann, 2019). Influence on impact on the other hand is dominated by income (Bruderer Enzler & Diekmann, 2019; Chuvieco et al., 2021; Moser & Kleinhüchelkotten, 2017), but also by age (Chuvieco et al., 2021) and job position (Chuvieco et al., 2021) and to a smaller degree by psychological variables like environmental concerns (Bruderer Enzler & Diekmann, 2019).

But it seems not only likely, that the associations of these variables with either impact or intent differ, it seems also likely that for different domains different variables have different influences.

In general the existing literature suggests the conclusion, that impact related measures are associated more strongly with sociodemographic variables, indicating that the impact someone has with his or her behaviour relies strongly on the structural conditions associated with a certain lifestyle. Intent on the other hand seems more strongly related with psychological variables, indicating that the intent reflects more strongly someone's personality and existing cultures.

Both aspects have practical implications and are therefore well worth to be investigated. However, to avoid wrong derivations, the relationship between them needs to be understood.

This is until now not yet done: Although prior research points to the fact that intent and impact is not correlated very strong (Moser & Kleinhüchelkotten, 2017), the concrete strength of the relationship is usually not investigated. Furthermore, it has not been studied explicitly so far, if the association between impact and intent changes its strength in dependency of the domain under investigation (e.g. mobility, certain consumption domains, energy use, etc.). It is very likely that the strength is different, because different domains are different strongly under disposition of the individual person. Heating for example is strongly influenced by structural conditions like building structure or heating system, which can, if at all, not easily be changed by the individual person. Therefore, the influence of the individual person is limited and therefore association between impact and intent might be smaller. For other lifestyle-domains, for example diet, a change is considerable stronger in the agency of the individual and the difference between intent and impact therefore should be smaller.

Another question arouses if it might be beneficial to combine impact and intent behaviour measures towards a hybrid variant, which can possibly cover advantages of both variants.

1.2 Research questions and hypothesis

Building on these theoretical considerations, we want to answer the following research-questions:

1. How strong is the association between impact- hybrid- and intent measures of climate-related behaviour?
 - Hypothesis 1: The correlation between impact and hybrid measures is only small to medium, whereas the hybrid variant has a medium association with both other measures.
 - Hypothesis 2: The correlation between impact and intent differs for different lifestyle domains in dependence from the agency of the individual: In domains where the agency is higher (e.g. diet, consumption of everyday objects), the correlation between impact and intent is also higher than in domains where structural conditions play a more dominant role.
2. What variables predict either impact- hybrid- or intent measures?
 - Hypothesis 3: Sociodemographic variables stronger predict impact measures, whereas psychological variables better predict intent measures. Both types are associated with hybrid variables.

2. Methods

2.1 Respondents

The questionnaires were distributed from February to May 2020 to students in their final high school year (12th or 13th year of formal education), aged 17 to 21 years. The survey was implemented in 24 vocational or general secondary schools in urban and rural locations in the Austrian provinces of Styria and Tyrol. Students completed an online questionnaire in the classroom during school hours, using the school's computers or their own electronic devices. A researcher was present on-site for oversight and clarification. Because of school closures in the Covid-19 national lockdown starting in mid-March 2020, however, data collection had to shift to an entirely online survey: Teachers distributed an email invitation to the online survey and up to two reminders to their respective students who completed the questionnaire as a homeschooling exercise.

Out of N=502 valid respondents in total, n=501 answered the questions about buying clothes and dietary habits, 442 about mobility and 272 about heating systems and habits. Table A.1 gives the sample composition by gender, age and education of parents.

2.2 Procedure and materials

Lifestyle domains

To test the hypotheses, four behavioural domains were chosen: mobility, diet, heating and buying clothes. Mobility, diet and heating were chosen because they are the three individual lifestyle domains having the highest impact on our GHG emissions (whereby heating stands as a proxy for behaviour at home) (Bird et al., 2019). Buying clothes was added as a proxy for different consumption domains. Furthermore, it can be assumed that the agency about these lifestyle domains is higher for diet and buying clothes than for mobility and heating so that this also allows a comparison with regards to the hypothesis.

Mobility

Impact questions regarding mobility consist of frequency of routes to four types of activities (education, obligations, hobbies and undertakings), average length of route to this activities and share of different modes of transportations. Questions about intent consists of two questions about frequency of being picked up and frequency of organising carpools.

Heating

Impact questions consist of questions about the size of the apartment or house person lives in, the number of people living in this house, question about the heating material and average room temperature. Intent related questions consist of ventilation behaviour in winter, frequency of turning off the heating during night, frequency of dressing warmer instead of heating more and frequency of closing doors to save the warmth.

Diet

Regarding dietary habits we asked for frequency of eating meat, frequency of eating seasonal food, frequency of eating organic food and frequency of avoiding packaging waste.

Buying clothes

In the domain of buying clothes, we asked for the frequency of buying new clothes, the frequency of buying used clothes and the frequency of repairing clothes.

Sociodemography

In terms of sociodemographic variables we asked for sex, job position of parents in 10 job categories, education of father and mother in 8 categories and we furthermore created a dichotomous variable of the residential area of the participants (urban or rural) according to the location of the school.

Psychological variables

Based on the value-beliefs-norm theory (Paul C Stern et al., 1999), which has been proven to be influential for explaining climate-relevant behaviour (see for example Lind et al., 2015), we use the psychological constructs of self efficacy, social norms, personal norms and environmental values as predictors for the behaviour. For all constructs, we use a score of 3 to 4 questions from standardized questionnaires.

2.3 Calculation of scores and impact, hybrid and intention variables

Sociodemography and psychological variables

Job Position was ranked according to the average income for the respective position in Austria (Statistik Austria, 2021). Then the mean of the score for father and mother was used. Retired parents were excluded from the analysis. Education was ranked according to duration of training and the higher score either from father or mother was used as the proxy for education of parental home. For psychological variables mean of the scores of either three or four associated questions were used. Missing values were replaced by mean of other questions.

Composition of the impact variables

Mobility

Impact: For the impact measure average kilometre of using a certain mode of transportation was derived from the specifications of the participants. This value then was multiplied with a specific average emission factor for this mode of transportation (Bird et al., 2019), whereby for public transport emissions for metro travellers were excluded since in none of the cities under investigation a metro exists. For car transport the assumption is, that there are the Austrian average number of car passengers per car of 1.54. The resulting monthly mobility emission then was multiplied by 12 to get a proximal value for the year.

Hybrid: The calculation of the hybrid variant was identical with the impact variant, except for car transport. For car transport we used the answers on the questions “frequency of getting picked up” and “frequency of building car pools” to adjust the assumed average number of passengers for every car kilometre. If people say they are “always” getting picked up, we assumed a 30 percent higher average number of passengers than for people who say that they never get picked up. Furthermore, we assume that if someone says he or she always organises car pools, that the number of passengers is 4 for every kilometre.

Intent: For calculating of intent, we composed the mean of the two questions of frequency of getting picked up and frequency of building car pools.

Heating

Impact: For the impact calculation of heating the basis of the calculation is the energy demand in mega joule per square meter for certain types of houses (single-family home; semi-detached home, terraced house and apartment house) (Austrian Energy Agency, 2015). This value is multiplied with the specific emission factor per mega joule for the relevant type of heating systems derived from the GEMIS database (IINAS, 2021). Then the result is multiplied by the living area of the home of the participant and divided by the number of persons living in the house.

Hybrid: Again, the calculation of the hybrid measure is similar to the impact measure, except that the basic energy demand for the type of house is adjusted according to the behaviour of the respondent. If he or she says that he or she leaves the window tilted all the time, we assume a 5 percent higher energy demand for every square meter. Furthermore, we adapt the energy demand according to the preferred room temperature: We assume that 21 degrees is a neutral room temperature and add 6 percent of energy demand for every degree above 21 the participants indicated or subtracted 6 percent for every degree lower indicated. This adjusted energy demand for one square meter was then multiplied with heating emissions as described above.

Intent: The intent was calculated as the mean of the questions of ventilation behaviour in winter, frequency of turning off the heating during night, frequency of dressing warmer instead of heating more and frequency of closing doors to save the warmth.

Diet

Impact: For diet we had no possibility to calculate a pure impact related measure, since this would have required a detailed analysis of all the substances people eat.

Hybrid: Base for the calculation are the GHG emissions, calculated with the help of the GEMIS database (IINAS, 2021) of a purely vegetarian diet and of a diet including a maximum of meat. Someone who states to never eat meat gets the lower GHG emission base, someone who states to eat always the higher and someone who states to eat sometimes meat gets a value in between. This value then is adapted according to statements about frequency of buying organic food (reduction of emissions of 22 percent if “always”), eating seasonal (reduction of 13 percent if “always”) eating regional (reduction of emissions of food transport if “always”) and avoiding of plastic packaging (subtraction of emissions from packaging if “always”).

Intention: The intention measure was created by building the mean of the variables frequency of eating meat, frequency of eating seasonal food, frequency of eating organic food and frequency of avoiding packaging waste.

Buying clothes

Impact: For buying clothes we had no possibility to calculate a pure impact related measure, since this would have required a detailed analysis of the amount and type of clothes people buy during one year.

Hybrid: Base for the calculation is the average consumption of clothes per year in Austria multiplied with the average GHG-emissions for 1kg of processed cotton. This value is used if someone states to buy “sometimes” new clothes. If someone states to “always” buy new clothes, the emission factor is increased by 50 percent and if someone states he or she “never” buys new clothes, the factor is decreased by 50 percent. The resulting value is corrected by frequency of buying used clothes (assumed extension of lifetime of clothes of one year and according reduction of GHG emissions per year if “always” is stated) and frequency of repairing clothes (assumed extension of lifetime of clothes of two years and according reduction of emissions if “always” is stated) (Bird et al., 2019).

Intention: The intention measure was created by building the mean of the variables frequency of buying new clothes (reversed); frequency of buying used clothes and frequency of repairing clothes

2.4 Statistical Analysis

To analyse the relationship between impact, hybrid and intent measure, first of all two-sided Pearson correlation analysis was performed for every investigated domain. Significance level was set to $p=0.05$ (significant) and $p=0.01$ (high significant).

Then we used two-block multilinear hierarchical regression models to predict either the pure GHG-footprint, the hybrid footprint or the intention score. In the first block, we included sociodemographic variables, in the second step psychological variables. Our focus thereby is on the model change (and explanatory power) when adding the second hierarchy, as indicated by the R² change.

3 Results

3.1 Associations between impact, hybrid and intent measures in the same domain

First, we compare correlation between the different forms of calculation.

Tab 1: Pearson correlation between different measures of climate-related behaviour in the 4 different domains (lower intent score= more climate-friendly behaviour):

<i>Behaviour</i>	<i>PCC impact-hybrid</i>	<i>PCC impact-intent</i>	<i>PCC hybrid-intent</i>
<i>Mobility</i>	.928** (N=442)	.107* (N=443)	.210** (N=442)
<i>Heating</i>	.985** (N=272)	- .067 (N=339)	- .058 (N=272)
<i>Diet</i>	----	---	.246** (N=501)
<i>Buying Clothes</i>	---	---	.876** (N=501)

* $P < .05$; ** $p < .01$

Starting with mobility, there is a strong correlation between the impact and the hybrid measure. On the other hand, between hybrid and intent and between impact and intent there is only a small, although significant, correlation. So, results for the impact and hybrid measure are very similar, whereas the intent of a person to act climate-friendly in the domain of mobility reduces the actual GHG impact in this domain only to a small amount.

The situation for heating is similar: There is a very strong correlation between impact and hybrid no correlation between intent and the other two variables. Again results for impact and hybrid are very similar (nearly identical) whereas an association between the intent to save heating energy and the actual impact from heating is non-existent.

For diet, where only a hybrid and a intent variable is available, there exist a small correlation between these two: People with the intent to eat more climate-friendly, have on average little less GHG-emissions from eating.

For the domain of buying clothes, a strong correlation can be observed: People who state to intent to behave climate-friendly in this domain, also have on average less GHG-emissions in this domain.

3.2 Sociodemographic and psychological predictors of impact, hybrid and intent measures of climate-related behaviour in four lifestyle domains

In the next step, the influence of sociodemographic as well as psychological variables is observed. For this purpose, hierarchical regression models are constructed with the respective behaviour measure as dependent variable, sociodemographic variables in the first bloc of the hierarchical model and psychological variables in the second bloc. The main interest thereby lies on the improvement of the models because of the inclusion of the variables.

Beginning with mobility (Table 1), the pure impact model shows, that especially sociodemographic variables are relevant predictors (most notably living in a city versus countryside), explaining around 16 percent of observed variance. Psychological variables do not lead to further variance explanation. In the hybrid model, there is a similar development, with sex gaining relevance, (women have a smaller GHG hybrid impact) and location as less relevant. Furthermore, self-efficacy becomes relevant: people who believe that they can make a difference, have a smaller hybrid GHG impact. For the intent model, the sociodemographic variables have no relevant impact. Psychological variables can improve this model (although explained variance remains low). To sum it up, sociodemographic variables are more relevant to explain impact, psychological variables for explaining intent. For the hybrid model, sociodemographic as well as psychological variables play a role.

Explained variance for the impact as well as the hybrid model is (nearly) zero regarding heating (Table 2), with only a small influence of location (people from the countryside have a smaller impact). The included variables cannot explain the differences between the participants regarding their heating impact. For the intent model, there is an influence of the psychological variables: Higher personal norms as well as higher self-efficacy are associated with a higher intent to behave climate-friendly in the domain of heating.

Table 1: Hierarchical regression models between sociodemographic variables (1st bloc), psychological variables (2nd bloc) and three different measures of mobility behaviour (higher intent score= more climate-friendly behaviour):

<i>Model</i>	Variables	<i>Impact</i>		<i>Hybrid</i>		<i>Intent</i>	
		Block 1 β	Block 2 β	Block 1 β	Block 2 β	Block 1 β	Block 2 β
<i>Block 1</i>	Sex	-.172**	-.151	-.296**	-.313**	-.029	-.074
	Education	-.110*	-.098	-.228*	-.196 ⁺	.022	-.041
	Job position	.06	.059	.151	.165	.034	.040
	Location	.323**	.324**	.175*	.159 ⁺	-.020	-.021
<i>Block 2</i>	Self-Efficacy		-.023		-.226 ⁺		.037
	Personal Norms		-.037		.072		.129 ⁺
	Social Norms		.015		-.094		.077
	Environmental Values		-.073		.083		.115
		Corr R ² = .16	Corr. R ² = .16	Corr R ² =.11	Corr R ² =.16	Corr. R ² =.00	Corr R ² = .07

* P < .05; ** p < .01

Table 2: Hierarchical regression models between sociodemographic variables (1st bloc), psychological variables (2nd bloc) and three different measures of heating behaviour (higher intent score= more climate-friendly behaviour):

<i>Model</i>	Variables	<i>Impact</i>		<i>Hybrid</i>		<i>Intent</i>	
		Block 1 β	Block 2 β	Block 1 β	Block 2 β	Block 1 β	Block 2 β
<i>Block 1</i>	Sex	.026	.026	-.001	-.004	.122**	.074
	Education	.043	.042	.015	.025	.108*	.040
	Job position	.057	.058	.034	.038	-.037	-.026
	Location	-.113*	-.118*	-.108 ⁺	-.114 ⁺	.044	.031
<i>Block 2</i>	Self-Efficacy		-.009		-.052		.122 ⁺
	Personal Norms		.057		.058		.228**
	Social Norms		-.018		-.035		-.012
	Environmental Values		-.021		.010		.078
		Corr R ² = .01	Corr. R ² = .02	Corr R ² =.00	Corr R ² =.00	Corr. R ² =.02	Corr R ² = .14

* P < .05; ** p < .01

Table 3: Hierarchical regression models between sociodemographic variables (1st bloc), psychological variables (2nd bloc) and two different measures of dietary behaviour (higher intent score= more climate-friendly behaviour):

Model	Variables	Hybrid		Intent	
		Block 1 β	Block 2 β	Block 1 β	Block 2 β
Block 1	Sex	-.334**	-.269**	.009	-.023
	Education	-.201**	-.074+	.043	-.072
	Job position	-.012	-.023	.154**	.146**
	Location	.055	.062+	.065	.078
Block 2	Self-Efficacy		-.244**		.071
	Personal Norms		-.260**		.120+
	Social Norms		-.086+		.287**
	Environmental Values		-.089*		-.022
		Corr R ² =.15	Corr R ² =.44	Corr. R ² =.02	Corr R ² = .17

* P < .05; ** p< .01

For diet, only a hybrid and an intent variant are calculated (Table 3). For hybrid, there is an influence of sociodemographic variables as well as of psychological variables: Women and people from higher educated households produce less GHG through their diet. Furthermore, all four psychological variables show, at least in tendency, an influence (people with higher self-efficacy, higher social norms, higher environmental values and higher social norms produce less GHG from their diet). All in all the included variables can explain 44 percent of the occurring variance. The situation is different for the intent model: The model with only the sociodemographic variables cannot explain observed variance, whereas the inclusion of psychological variables improve the model significantly. Especially people who sense a higher social climate norm have a higher intent to choose a more climate friendly diet.

Table 4: Hierarchical regression models between sociodemographic variables (1st bloc), psychological variables (2nd bloc) and two different measures of buying clothes (higher intent score= more climate-friendly behaviour):

Model	Variables	Hybrid		Intent	
		Block 1 β	Block 2 β	Block 1 β	Block 2 β
Block 1	Sex	.038	.064	.121**	.088+
	Education	-.258**	-.228**	.284**	.228**
	Job position	.116*	.108*	-.115*	-.109*
	Location	.086+	.093+	-.114*	-.119*
Block 2	Self-Efficacy		-.094		.115+
	Personal Norms		-.090		.122+
	Social Norms		.038		.020
	Environmental Values		-.069		.062
		Corr R ² =.06	Corr R ² =.09	Corr. R ² =.10	Corr R ² = .16

* P < .05; ** p< .01

For buying clothes (Table 4), the model for the hybrid measure can only explain around 9 percent of occurring variance, whereby the sociodemographic variables are more influential: Participants from higher educated parents have a smaller GHG impact from buying clothes, whereas participants with parents in higher job positions have a higher impact. This result is nearly mirrored in the intent

measure, whereby additionally to parents' education and job position also location plays a role: participants from the countryside have a less climate friendly behaviour.

4. Discussion

The aim of this paper was to compare different measures of climate-related behaviour on four lifestyle domains, namely mobility, heating, diet, and buying clothes. The measures were generated by either calculating GHG emissions of certain behaviours from measurable (and more objective) figures (kilometres travelled with a certain mean of transportation, living space, etc.) which is called an impact measure. Impact measures were only composed for two of the four lifestyle domains (mobility and heating), because of a lack of sufficient objective data for the other two domains (diet and buying of clothes). In the second variant, we combined those objective measures with (more subjective) statement about the intent of behaving climate-friendly (e.g. increasing number of passengers when using the car, using an energy saving ventilation strategy in winter). This variant is called hybrid measure and was composed for all four consumption domains. The third variant consists purely of (subjective) statements regarding climate-relevant behaviour and is called intent measure. This measure was also composed for all four domains.

In a first step, we correlated the different measures for one domain. What we found is a high correlation between the impact and the hybrid measure, but a low, or no correlation between the impact and hybrid measure and the impact measure. The only exception is buying clothes where the correlation between the hybrid and the intent measure is high. The high correlation between impact and hybrid measures is not really surprising and most certainly due to the fact that for the hybrid measures the impact builds the base, which then is corrected with the behaviour statements (but these corrections are in relation relatively small). What is more interesting is the low correlation between impact/hybrid and intent. In general this is something which has also been already recognized by other researchers (see for example (Bleys et al., 2018; Moser & Kleinhüchelkotten, 2017)). What is new is that we can identify considerable variation in the amount of correlation in dependence from the lifestyle domain in question: Whereas the correlation for buying clothes is high, we can observe only a small correlation for diet and (even smaller) for mobility and no correlation at all for heating. Several explanations are possible for this variation. First of all it seems, that the agency of the participants may play an important role. Since we are talking about young adults we can assume, that they have a relatively high agency over buying clothes, a smaller agency over dietary habits (especially if they are still living at home) and mobility (especially if they have not yet a driving licence) and very small agency over heating. This amount of agency fits with the amount of correlation between intent and impact. The more agency participants have, the more intent and actual impact seem to correspond. Another explanation is, that structural prerequisites shape the relationship between intent and impact: Some lifestyle domains require considerable less material structure than others. Buying clothes for example, with the option of buying online, can now be easily done at home. Heating on the other side is heavily determined by structural conditions like the available heating system and the size of the space that needs to be heated. Therefore, it is also possible that intents to behave in a more climate-friendly way is hampered by the structural conditions at the living places which minimises the relationship between intent and achieved impact. Both ideas are further discussed below, but a first conclusion we can draw from this research is, that, for understanding and evaluating the relationship between impact and intent, we need to take also into account the domain we are talking about.

To even better understand the relationship between impact and intent, we performed in the next step a series of regression analysis to investigate the variables, which influence either impact or intent with some interesting results:

Starting with mobility, we see the sociodemographic variables as relevant for explaining the impact and, to a lesser degree, for explaining the hybrid variance, whereas the psychological variables play no role. This backs up the thesis about structural relevance for GHG impact, especially since the location (arguably the variable most strongly connected to structural conditions) is the most impactful for the impact measure. For the intent measure on the other hand, we did not find any remarkable connection at all (and explained variance is very low). A conclusion we potentially can draw from this result is that if we want to reduce society's GHG emissions in the mobility sector, we should not primarily aim at changing the intents (and therefore the minds) of people, but to better adapt the mobility structure.

Looking at the results of heating, first of all it can be observed, that the explained variance, apart from the intent model with inclusion of sociodemographic and psychological variables, is nearly zero. This is especially surprising since someone would expect at least an influence of job position (higher income is correlated with more living space, which requires the heating of more space). One explanation for this might be that there are two overlapping processes active: People with higher job positions (and therefore higher income) on average have more living space (small but highly significant correlation of 0.19 between personal space and job position of parents). But they also have more often heating systems with less GHG emissions (in our sample heat pumps for example, despite being used rarely, are only found in the higher job categories, whereas "only" 12 percent use oil-heating in the highest third in comparison to 16 percent in the lower job positions). Secondly, some important variables might be missing here. For heating especially building characteristics (like age of the building, renovation status, insulation) are important and not included in this analysis (since we assumed that very often young adults might not know these characteristics and therefore left them out). For the intent models we see no influence of sociodemographic characteristics (as expected), but of psychological aspects, especially personal norms. People with high personal norms are more willing to minimise their comfort in favour of the climate, although this renunciation seem not necessarily be connected to a remarkable decrease of emissions (at least not if impact is measured without including further building characteristics). This points into the direction that people need to become better aware of what aspects of their lifestyle choices are more relevant for their climate-impact.

For diet, we observed that the hybrid model is predicted by sociodemographic variables, but even more by psychological variables, whereas for the intent measure mainly psychological predictors can explain the influence. First of all this supports the already mentioned conclusion, that diet is far less determined by structural aspects than heating or mobility, emphasizing the influence of personal attitudes. It is also remarkable, that the intent model is the only measure, which is predicted by social norms. Eating, an action very often performed in social settings, seems to be strongly influenced by the people surrounding someone, even more in our specific target population where peer groups play an important role. So, other than for the first two lifestyle domains, in the domain of diet supporting the ongoing cultural change towards more sustainable eating habits might be an instrument to significantly reduce impacts.

The last domain under investigation is buying clothes where we can observe a small influence of sociodemographic characteristics and an even smaller of psychological variables on the hybrid model as well as for the intent model (whereby explained variance is higher for intent). Thereby education in parental home seem to play an especially important role. So despite being also only minor dependent on structural conditions and being a cultural phenomenon, personal attitude seem to play a minor role than for diet. The reason for this might be that, other than for diet where more sustainable eating habits might be seen as beneficial in all social classes, consuming clothes sustainable might only be relevant in certain young adults peer group contexts (Stanes, 2018). This

explanation is also supported by the influence of parental education: It might be that young adults from better educated parenthoods more often feel associated to youth cultures where buying sustainable is relevant. A further reduction of society's impact from buying clothes might therefore be achieved by convincing more social classes that buying sustainable is something desirable for them.

All in all from this research we can derive several conclusions, in terms of content as well as in terms of methodology:

In terms of content the results suggest, that structural variables, often under low agency of individual persons, play an important role in some lifestyle domains like energy use at home or mobility and might even undermine individual efforts to reduce the own GHG emissions. In these domains emphasise should be given to improve the structural conditions necessary to reduce emissions. In other domains with less structural influence, like dietary habits and buying of clothes, individual factors, like norms play a more dominant role and should be targeted in interventions.

Methodologically we observed that associations between different measures, as well as influential factors, vary to a great degree between different domains. These domains therefor should always be carefully considered and general indexes or measures of climate-related behaviour might lead to distorted results. Furthermore, the results showed clearly, that the association between impact and intent measures seem to be low in most domains. These measures seem to catch different aspects of climate-related behaviour: Whereas impact measures seem to more strongly reflect structural preconditions in a certain lifestyle-domain, intent measures seem to reflect more strongly certain psychological mind-sets. Both aspects are certainly relevant and important for understanding climate-related lifestyles, but researchers should keep this background in mind when interpreting their research results and be aware that impact measures might overemphasize structural aspects, whereas intent measures overemphasize psychological aspects.

To reduce this problematic we introduced the creation of a hybrid measure, which is grounded in the impact measure but then is adapted on the base of intent. With this approach, we hope to be able to consider structural aspects as well as psychological aspects by still using only one measure.

5. Limitations and outlook

The research results are inflicted with some limitations. First of all, explained R^2 is rather low in most of the models under investigation, indicating that relevant predictors are not taken into consideration. Therefore, more research, including also other variables like additional psychological characteristics and structural variables like building features and further mobility aspects is needed. Furthermore, one can argue, if the chosen mobility-intent variables, building car pools and getting picked up, map the whole spectrum of mobility intents. On the other hand, they were chosen since they are strongly tailored to the life circumstances of our specific sample and therefore might be a good choice. To add, this analysis needs to be extended to other lifestyle domains (e.g. electricity use, other consumption domains, leisure time) to provide a more complete picture. What also seems to be worth to investigate is the association of the measures with political intent and behaviour. It cannot be ruled out that, despite having only a small association with impact, climate-intent affects political actions, which in turn might lead to a change of structural conditions, thereby indirectly influencing impact.

All in all this research provided some interesting new insides into the association and predictors of climate-related behaviour in different lifestyle domains with practical relevant implications.

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Appendix

Table A.1. Sample composition.

	Female	Age (years)						Education of parents			
		16	17	18	19	20	21	Comp.	Voc.	Sec.	High
Mobility (N=442)	49.4	0.2	28.3	45.0	22.8	3.1	0.5	3.8	23.6	18.1	41.7
Heating (N=272)	43.4	0.4	22.1	46.3	26.1	4.9	0.4	3.4	28.5	31.1	37.1
Diet (N=501)	48.1	0.2	27.6	46.5	22.1	3.0	0.6	4.2	23.7	31.5	40.6
Buying Clothes (N=501)	48.1	0.2	27.6	46.5	22.1	3.0	0.6	4.2	23.7	31.5	40.6

Table gives relative frequencies in percent. Education of parents: highest educational level attained by either parent. Comp. = Compulsory education; Voc. = Vocational education; Sec. = Secondary school (with school-leaving exam); High = Higher education (university-level).