Predicting Attitudes towards Cargo Bike-Sharing Systems with Goal-Framing Theory

Jan Zimmermann

S3824985

Department of Psychology, University of Groningen

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Supervisor: Michelle Lohmeyer

Second evaluator: Gabriel Muiños Trujillo

In collaboration with: Louise Eichinger, Antonia Höfer, Manon Prakken, Lara Schmitt, and Joselin Smit.

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Abstract

Global climate temperatures have increased due to human activity and are predicted to rise further, potentially causing disastrous environmental consequences (Gates, 2021, p. 25). This study aims to contribute to the collective effort of reducing CO_2 emissions by helping understand how electric cargo bike-sharing systems, as a sustainable transportation alternative to car use, can be adopted in the city of Groningen. Specifically, we attempt to better understand what influences attitudes towards such systems by applying the goal-framing theory (Lindenberg & Steg, 2007). We conducted a between-subjects experimental design (N=83) comparing attitudes across differing goal-frames, expecting that goal-framed information would lead to higher attitudes. However, opposing initial predictions, the differing goal-frames did not significantly predict our participants' attitudes. Furthermore, we found that attitudes towards cargo bike-sharing systems correlate moderately to intentions, are generally high across goal-frames, and are positively affected by biospheric values. This leads us to believe that implementing electric cargo bike-sharing systems is worthwhile and a viable opportunity to move towards a greener society.

. *Keywords*: Cargo bike-sharing, Goal-Framing Theory, Values, Attitudes, Intentions

Predicting Attitudes towards Cargo Bike-Sharing Systems with Goal-Framing Theory

Climate warming through continuously growing greenhouse gas emissions has become an acutely prevalent problem over the past years and is predicted to become crucial over the coming decades. It is vital to identify and implement effective methods to prevent further or irreversible environmental damage. To do this, a collective effort must be applied, including the unique contributions of the different scientific disciplines to drive innovation and adoption of new solutions related to the fields of construction, energy, agriculture, heating, and transportation (Gates, 2021). In this context, the city of Groningen is considering implementing a green alternative to cars, namely a cargo bike-sharing system. This paper intends to add to the collective efforts as part of the environmental psychology discipline and investigate what practical solutions can contribute to the successful adoption of this upcoming and promising alternative to car use in urban areas. Next, we present an overview of the literature relating to cargo bike-sharing and its potential impact on the environment.

Effects of Cargo Bike-Sharing Systems on the Environment

Cargo bike-sharing systems can reduce greenhouse gas emissions by replacing car trips. Comparing the CO_2 emissions of bikes and cars, it becomes evident that car usage for a single driver is one of the most emission costly means of transportation, while the bike has the lowest CO_2 emissions of all forms of transport investigated (Gardner & Gaegauf, 2014). Consequently, using a bike instead of a car results in the most significant reduction in CO_2 emissions compared to the other modes of transportation mentioned. Although the ecological impact of cargo bike-sharing systems has yet to be explored in more detail, the scientific literature further highlights its potential to contribute to current environmental efforts. For example, a study by Becker and Rudolf (2018) indicates that almost half of the shared cargo bike users would have used their private car if no cargo bike was available. Furthermore, the

researchers report that while 93 percent of participants intend to use a cargo bike again in the future, more than half do not intend to buy or are unsure about purchasing a private cargo bike. This illustrates the potential environmental impact of cargo bike-sharing systems nicely as it becomes evident that people are willing to use shared cargo bikes. Accordingly, the researchers suggest that a cargo bike-sharing system is a promising green alternative to car use (Becker & Rudolf, 2018). In addition to being a green transportation alternative, shared cargo bike systems are of interest to the municipality of Groningen for space-related issues.

Further considerations must examine past attempts to implement bike-sharing. Bike-sharing systems will often require the redistribution of bikes at the end of the day. As such tasks are usually completed with motor vehicles, one must account for the CO_2 emissions caused by the redistribution of the bikes. Studies such as by Fishman et al. (2014) have considered this issue. Cities like London demonstrate the potential risks of implementing a bike-sharing system since an additional 766.000km of vehicle use has been recorded due to the necessity to rebalance bikes. However, the researchers also point out that risks associated with the rebalancing of bikes can be mitigated by achieving higher car substitution rates. That is, the added CO_2 emissions caused by the rebalancing can be overshadowed by the overall CO_2 savings if car substitution is high enough. For this reason, we investigate how cargo bike-sharing can be made more appealing to the public so that its benefits can take full effect by applying the goal-framing theory (Lindenberg & Steg, 2007).

Goal-Framing Theory

This study aims to better understand our participants' attitudes towards cargo bike-sharing systems by implementing the goal-framing theory (Lindenberg & Steg, 2007). The goal-framing theory proposes that the way one acquires and acts upon information depends on an individual's goals. The theory suggests three overarching goals that drive information acquisition and processing the most. Those three goals are namely, 1) normative, 2) hedonic,

and 3) gain goals. Normative goals describe the motivation to act appropriately. Hedonic goals are related to an individual's desire to feel good and experience pleasure. Finally, gain goals are related to the protection and acquisition of goods. One of these primary goals is focal in any given situation, having the most significant influence on information processing. The theory describes the focal goal as the "goal-frame". This paper will focus on the normative and hedonic goal-frames to identify different opportunities to promote environmentally friendly behavior.

Particularly, we question whether pro-environmental behavior can be promoted as the preferred choice of action by appealing to a hedonic goal-frame. We theorize that a hedonic goal-frame will positively affect attitudes to use a cargo bike-sharing system. Consequently, we predict pro-environmental choices to be more favorable to a participant with a hedonic goal-frame when highlighting hedonic aspects of a cargo bike-sharing system. Thus, we propose our first hypothesis in line with the goal-framing theory.

Hypothesis 1. Participants presented with hedonic information are predicted to have a higher attitude towards cargo bike-sharing systems when compared to participants presented with no goal-framed information.

Although we believe the hedonic framing to have a positive effect on attitudes to use cargo bikes, there is reason to believe that such an effect is not long-lasting. For example, hedonic goals may not promote abiding environmental change (de Groot & Steg, 2009). The researchers reason that a hedonic goal-frame would only promote pro-environmental behavior for as long as it is pleasurable. Instead, appealing to normative goals may be more promising to promote longer-lasting environmental behavior change. For this reason, we predict that environmentally friendly behavior can be promoted more effectively by activating a normative goal-frame. That is, by pointing out the environmental benefits of a

cargo bike-sharing system, we predict higher attitudes towards such a system in participants with a normative goal-frame. This leads us to the second hypothesis tested in this paper.

Hypothesis 2. Participants presented with normative information are predicted to show a higher attitude towards cargo bike-sharing when compared to participants presented with hedonic information and no goal-framed information.

Furthermore, Steg et al. (2014a) point out that normative considerations can promote pro-environmental behavior even in the face of gain and hedonic considerations. Strong normative beliefs can work as a "buffer" so that environmentally friendly behavior is practiced even though gain and hedonic goals would suggest another way of acting. The researchers propose that strengthening normative goals is a novel strategy that can result in longer-lasting pro-environmental behavior (Steg et al., 2014a).

Values

Values are described to be guiding principles in an individual's life (Schwartz, 1992, p. 4). According to the researcher, values can differ in importance and express an individual's motivations and goals by influencing the interpretation of behaviors. Keeping this in mind, it seems plausible that values can affect attitudes in a similar manner as the goal-frames. Other studies that have investigated the link between values and environmental attitudes suggest that values do influence an individual's attitudes (Schultz & Zelezny, 1999; Schultz et al., 2005). Thus, it is reasonable to believe that strong biospheric values can support the normative goal-frames effect on our participants' attitudes. Various other studies support the claim that biospheric values provide a stable basis for environmental behavior (de Groot & Steg, 2009; Steg et al., 2014a). Values, in general, are believed to be stable, which makes them an attractive construct to promote long-lasting behavioral change. Furthermore, Steg et al. (2014a) explain that an individuals' values influence goal accessibility. Therefore, we believe that the normative goal-frame is more readily activated and thus more likely to affect

information processing in individuals with strong biospheric values. In light of those findings, we suggest the following hypothesis.

Hypothesis 3. We predict that participants with strong biospheric values presented with normative information will show the highest attitudes towards cargo bike-sharing systems.

Attitude and Intention

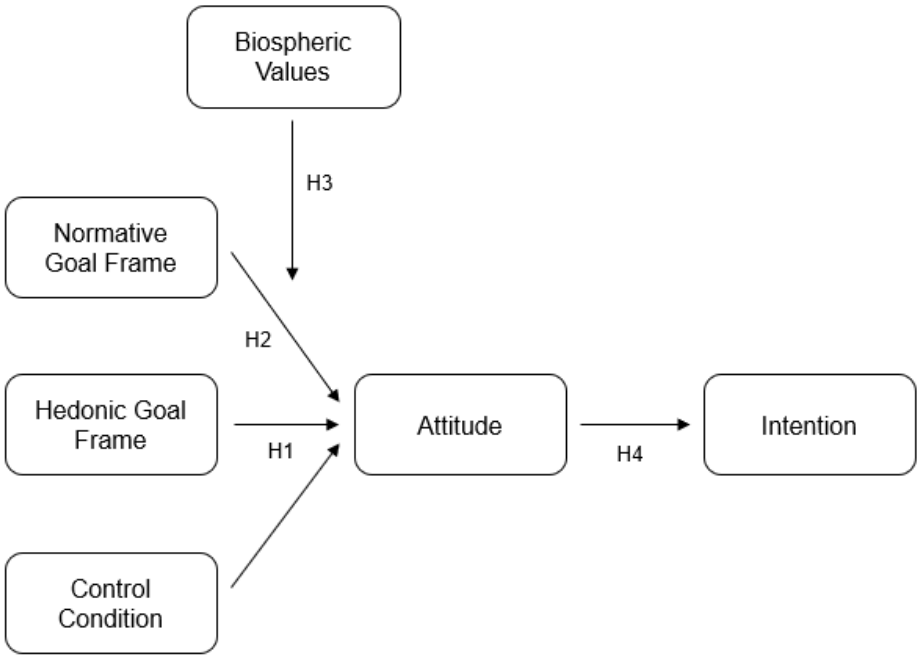
Lastly, we predict that a higher attitude towards cargo bike-sharing systems will increase intentions to use them. The link between attitudes and intentions has been formulated in the theory of planned behavior and has received substantial support since its publication (Ajzen, 1985). Consequently, we expect a correlation between attitudes towards cargo bike-sharing and intentions to use such a system. Further studies have investigated this link in the context of bike-sharing, confirming that attitude appears to be a significant predictor of intentions to use bike-sharing (Li et al., 2021; Yu et al., 2018). This results in our final hypothesis.

Hypothesis 4. We predict a positive correlation between participants attitudes towards cargo bike-sharing and their intentions to use cargo bike-sharing systems.

Testing those hypotheses is part of our effort to answer the **research question**: How do differing goal-frames, based on goal-framing theory, influence participants' attitudes towards cargo bike-sharing systems? The model included in Figure 1 summarizes our research design by illustrating our independent variables as predictors for our participants' attitudes.

Figure 1.

Predicting Attitudes based on Goal-Framing Theory



Methods

Participants

A total of 125 participants took part in this study, of which 83 (66%) were included in the analysis[1] (51 females (61%), 31 males (37%), one non-binary/third gender). Seventy-three and a half percent of the participants were between the ages of 20 to 29 years old, and 53 (63%) participants had at least a bachelor's degree. Furthermore, 36 (43%) participants owned a car or had access to one. In addition, the most represented location in this study was Centrum (36.1% of participants lived here), and the least represented area was Ten Boer (1.2% of participants lived here). Out of 83 valid responses, 43 (52%) were filled out in Dutch, while 40 (48%) answered in English. We further investigated our sample by checking for demographic differences between the three experimental conditions. No significant differences of age ($\chi 2$ (10, N = 83) = 4.24, p = .20), education ($\chi 2$ (10, N = 83) = 8.36, p = .59), gender ($\chi 2$ (4, N = 83) = 4.36, p = .35), and car ownership ($\chi 2$ (4, N = 83) = 5.09, p = .27) were found between the experimental conditions.

[1] the required sample size for our study was (N = 155), as indicated by G*Power.

Research Design

This study was a between-subjects experimental design exploring the effects of differing goal-frames on the attitude towards electric cargo bike-sharing systems. The dependent variable was attitude towards cargo bike-sharing. The independent variables used to predict attitude and intention were 1) Goal-framing condition, 2) Biospheric Values, 3) Hedonic Values, 4) Ecological worldview, 5) Place attachment, and 6) PBC. For a detailed description of how we manipulated the differing goal-framing conditions, we refer to the experimental conditions paragraph of the materials section.

Procedure

Procedure of Recruitment

We approached potential participants in Groningen's city center. We considered participants if their age exceeded 16 years, and if they were actual residents of the city of Groningen. Before participants were referred to the survey, a general introduction to the study was provided. Next, we specified that participation was voluntary, anonymous and that the withdrawal from the study was possible at any moment. Participants were invited to participate by scanning a QR code that led to the corresponding survey, which allowed participants to fill out the questionnaire at any given time. The QR code was printed on a flyer, then handed out to pedestrians (see Figure A1). The survey was provided in Dutch and English. Only participants that indicated proficient knowledge of either language were considered in the data analysis. During our data collection, new COVID-19 measures were introduced by the Dutch government. Due to those unique circumstances, we changed our data collection method to recruiting participants online. To do so, we uploaded an updated flyer version (see Figure A2) to social media. To ensure that participants were 16 years or older and lived in Groningen, we added questions to check for those criteria to the survey. Ultimately, this resulted in a convenience sample for our study. We will discuss the

implications of this approach in more detail in the discussion. The ethics committee approved this study and the changes to the data collection process mentioned above.

Procedure of Questionnaire

Participants who started the survey were first asked to provide informed consent by confirming that their age was 16 years or above, that the consequences for participation have been understood, and the information about the study read carefully. Next, we asked participants about demographics relevant to the study. Specifically, we were interested in age, gender, and education. Following, participants answered multiple-choice questions about the importance of different values in their lives, their place attachment, and their ecological worldview in the respective order. Then, each participant was randomly assigned to one of the three experimental conditions (i.e., biospheric-, hedonic-, and no value framing). Our participants were not informed about the other two conditions to ensure that participants were not influenced by information related to the other goal-frames. After introducing the scenarios, participants were asked to answer a manipulation check. Next, participants were asked to indicate their attitudes and intentions to use a cargo bike-sharing system. Perceived Behavioral Control (PBC) was the last construct measured in our study. Furthermore, we checked whether participants were paying attention while measuring PBC by asking them to choose the ‘strongly disagree’ option. Lastly, a debrief was presented to allow participants to understand the aim of this study better and explain why information from the other conditions was initially withheld. After finishing the questionnaire, the collected data was sent to a secure database to undergo statistical analysis to understand trends within the data.

Materials

Scales

Since the scales measuring ecological worldview, place attachment, and PBC, as mentioned in the procedure, are only of importance for the individual hypotheses of other

bachelor students, we will exclusively focus on the relevant scales used for this paper in the following section.

Values. We measured our participants' hedonic and biospheric values with a nine-point Likert scale ranging from -1 (opposed to my values) to 7 (of supreme importance), as developed by Steg et al. (2014b). Items that measure egoistic and altruistic values were also included following the original scale. Overall, the value scale consisted of 16 items, measuring four main value constructs. We measured biospheric values with four items in a reliable manner (α= .82, *M* = 4.5, *SD* = 1.4). Specifically, to measure biospheric values, participants were asked to indicate how important it is to them to 1) Protect the environment, 2) Prevent pollution, 3) Have unity with nature and, 4) Respect the earth. Similarly, hedonic values were reliably measured across three items (α= .83, *M* = 4.8, *SD* = 1.4). Participants were asked to rate how important it is to 1) Experience pleasure, 2) Enjoy life, and 3) Be self-indulgent.

Experimental Conditions. The experimental conditions in our study differed between the informational scenarios on electric cargo bike-sharing. The framing of the different scenarios was done according to the overarching goals identified by the goal-framing theory by Lindenberg and Steg (2007), namely 1) normative frame, 2) hedonic frame, and 3) no frame as a control, a neutrally phrased description of cargo bike-sharing systems. Participants in the normative condition received the same information as participants in the control condition with additional biospheric elements, including information on reduced emissions and the protection of nature. Participants in the hedonic frame condition also received the same information as participants in the control condition. However, additional information focused on pleasure- and comfort-related aspects of cargo bike-sharing systems, such as having fun outside and not having to look for a parking spot (see Appendix B for a full depiction of the different scenarios).

Manipulation Check. A manipulation check was implemented by asking our participants about the information they were just presented with in the scenarios. Specifically, participants were asked about the main benefits of cargo bike-sharing mentioned in the scenario. For example, the correct answer for participants in the control condition was "Transporting goods." Participants assigned to the hedonic goal-frame condition answered the manipulation check correctly if they selected "Fun, convenience, time-efficiency and transporting goods." Lastly, participants in the normative framing condition answered the manipulation check correctly if "Reducing CO_2 emissions, environmental preservation and transporting goods" was selected. We decided not to exclude participants that answered the manipulation check incorrectly.

Attitude. To measure attitudes towards cargo bike-sharing, we used a validated five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) with a total of four items (Fishbein & Ajzen, 1975). Participants were asked whether they think implementing a cargo bike-sharing system is a good idea. The reliability analysis indicated that the attitude scale was internally consistent (α=.88, M = 3.8, SD = 0.8).

Intention. A validated 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), developed by Fishman et al. (2020), was used to measure our participants' intentions to use cargo bike-sharing systems. The scale consisted of two items, asking participants how likely they were to use a shared cargo bike system. The scale was internally consistent (α=.71, M = 3.4, SD = 1.1).

Statistical Analysis

To process the data and perform the statistical analyses, we used IBM SPSS Statistics, version 28. We conducted a Kruskal-Wallis test to answer our first two hypotheses since the normality assumption was violated as indicated by the Shapiro-Wilk test. To test our third hypothesis, we conducted a moderation analysis to test the influence of biospheric values on

the association between the normative goal-frame and attitudes towards cargo bike-sharing. Finally, to test the last hypothesis, we conducted a correlation analysis between the variables of attitude and intention. Since the normality assumption was violated, Spearman's correlation coefficient was used.

Results

Manipulation Check

Firstly, we conducted a chi-square test of independence to identify significant differences in manipulation levels between our groups. The chi-square test yielded a significant result, with $\chi 2$ (4, N = 83) = 32.3, p < .001. Thus, we conclude that there are significant differences in the levels of manipulation between our conditions and consequently that the manipulation has been successful, as also visible in Table 1.

Table 1.

Manipulation Check across experimental Conditions

Manipulation Check	Control Condition	Hedonic Frame	Biospheric Frame	Total
Transporting goods	13	7	3	23
Fun, convenience, time-efficiency and transporting goods	7	16	2	25
Reducing CO_2 emissions, environmental preservation and transporting goods	6	7	22	35
Total	26	30	27	83

Assumption Checks

We investigated whether the required assumptions were met before conducting an analysis of variance (ANOVA) with planned contrasts. The Shapiro-Wilk test of normality indicated that the distribution of scores of the attitude variable significantly differed from a normal distribution, given W (83) = .89, p < .001. Therefore, we concluded that the normality

assumption was not met. We stopped the further investigation of the ANOVA assumptions and chose the Kruskal-Wallis test as a nonparametric alternative.

Kruskal-Wallis

A Kruskal-Wallis test was conducted to test whether the distribution of attitude scores is the same across categories of conditions. The test results indicated no significant differences between the groups, given H (2) = 0.08, p = .95. Thus, we found no evidence supporting our first hypothesis since the results do not indicate that hedonically phrased information significantly affected our participants' attitudes. Similarly, no support was found for our second hypothesis that normative phrased information would significantly predict our participants' attitudes. As no differences between the groups were identified, we stopped further investigations of the contrasts between groups.

Moderating Effect of Biospheric Values to Predict Attitudes

Next, we were interested in biospheric values' effect on the association between the normative goal-frame and our participants' attitudes. Specifically, we wanted to understand biospheric values as a moderating variable better. We predicted that higher biospheric values would lead to higher attitudes towards cargo bike-sharing in participants assigned to the normative goal-frame condition. To investigate the moderating effect of biospheric values, we allowed for an interaction effect between the normative goal-framing condition and biospheric values as our independent variables in a linear regression model. As shown in Table 2, model one, including the main effects of the normative goal-frame and biospheric values, did not significantly explain the amount of variance on the dependent variable. Similarly, model two, which included the two main effects and the interaction effect, did not significantly explain the variance on the dependent variable.

Table 2.

R-Square Change

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.254	.064	.041	.814	.064	2.75	2	80	.070
2	.285	.081	.046	.812	.017	1.45	1	79	.232

In line with those findings, we did not observe a significant R-square change going from model one to model two. We further investigated the workings of the two models displayed above by taking a closer look at the coefficients table, as shown in Table 3.

Table 3.

Regression Coefficients for Predicting Attitudes

Model		B	SE	β	t	Sig.
1	(Constant)	3.176	.306		10.364	<.001
	Normative Goal-Frame	.008	.191	.004	.040	.968
	Bio Values	.147	.063	.254	2.346	.021
2	(Constant)	3.426	.369		9.279	<.001
	Normative Goal-Frame	-.707	.623	-.401	-1.135	.260
	Bio Values	.092	.077	.160	1.197	.235
	Values*Goal Frame	.158	.131	.433	1.205	.232

It became apparent that biospheric values seem to have a significant main effect on the dependent variable while the normative goal-frame appears to be an insignificant predictor. Furthermore, the interaction between the normative goal-frame and biospheric values appeared insignificant. Our data suggest that biospheric values do not act as a moderator in explaining attitudes towards cargo bike-sharing but instead directly predict our participants' attitudes without considering the active goal-frames effect.

Correlation between Attitude and Intention

Before investigating the correlation between our partacipants’attitudes towards a shared cargo bike system and their intentions to use such systems, we took a closer look at

the required assumptions. As already mentioned, the normality assumption for the attitude variable was not met. The same is true for the intention variable, given that the Shapiro-Wilk test yielded a significant result with W (83) = .93, p < .001. Furthermore, we examined the scatterplot of attitude by intention, which gave reason to assume that the linearity assumption was met. It also provided further insight into the homoscedasticity assumption, which appeared not to be met according to the visual inspection of the scatterplot. Given that the normality and homoscedasticity assumptions were not met, we conducted a nonparametric correlation analysis by investigating Spearman's rho. The Spearman's correlation indicated a moderate association between our participants' attitudes and intentions towards cargo bike-sharing given r (81) = .576, p < .001. Thus, we conclude that by looking at our participants' attitudes towards cargo bike-sharing, we can get a moderately good idea of our participants' intentions to use cargo bike-sharing systems. Thus, we conclude that the data support our last hypothesis, predicting a significant correlation between attitudes and intentions.

Discussion

The current study aimed to better our understanding of how environmentally friendly behavior can be best promoted by applying the goal-framing theory to predict attitudes towards cargo bike-sharing systems. Specifically, we investigated the research question: How do differing goal-frames, based on goal-framing theory, influence participants' attitudes towards using a shared cargo bike system? Overall, we tested four different hypotheses to answer this research question. Firstly, we predicted that the hedonic goal-frame condition would lead to higher attitudes toward cargo bike-sharing when compared to the control condition. Next, we predicted that the normative goal-frame would lead to higher attitudes towards cargo bike-sharing when compared to the hedonic and the control group. Further, we explored whether a match between the normative goal-frame and biospheric values would lead to the highest attitudes observed in our sample. Lastly, we took a closer look at the

relationship between attitudes and intentions, predicting a positive correlation. In what follows, we will revisit and discuss the hypothesis we tested in our efforts to answer the research question.

Main Results

To test our first hypothesis, we conducted a Kruskal-Wallis test to compare the attitude scores across the three different conditions. Given that no differences between attitude scores were found, we did not investigate contrasts between the groups further and concluded that no evidence supporting our hypothesis was found.

In light of these findings, we also observe no evidence supporting our second hypothesis. Again, the Kruskal-Wallis test did not find a significant difference between the groups. The normative, hedonic, and control condition did not predict our participants' attitudes differently. Thus, we conclude that no evidence supporting our second hypothesis was found.

To test our third hypothesis, we conducted a moderation analysis. Specifically, we introduced biospheric values as a moderator variable to better understand the workings of the normative goal-frame in predicting our participants' attitudes. As shown in Table 3, we found a significant main effect of biospheric values. However, the main effect of the normative goal-frame was insignificant. Furthermore, the interaction between biospheric values and normative goal-frame was insignificant. This means that we can significantly predict our participants' attitudes by observing their biospheric values, given the significant main effect of biospheric values. On the other hand, our data suggest that the normative goal-frame has no significant influence on our participants' attitudes, as indicated by the insignificant main effect. Even when considering the workings of the normative goal-frame on different levels of biospheric values, no accurate predictions of attitudes can be made. In other words, our data suggest that the predictive power of the normative goal frame does not improve by

considering the different levels of biospheric values, as indicated by the insignificant interaction effect. These findings contradict our initial belief that biospheric values would strengthen the normative goal-frame and lead to higher attitudes towards cargo bike-sharing.

In order to test our last hypothesis, we investigated the Spearman's correlation coefficient between our participants' attitudes and intentions. The significant result of the correlation analysis is in line with the existing body of literature. As discussed in the introduction, other papers have also found a significant link between attitudes and intentions towards bike-sharing (Li et al., 2021; Yu et al., 2018). Our study provides further support for those findings. Thus, we conclude that attitudes are a reliable predictor of intention in the context of cargo bike-sharing.

Discussion of Findings

In the following section, we will explore possible explanations for the insignificant results of the first three hypotheses. We entertain ideas such as 1) the normative frame scenario did not contain information related to what our participants believed to be appropriate, 2) attitudes towards cargo bike-sharing are not influenced by concerns regarding what is appropriate and hedonically appealing, 3) the manipulation of our experimental conditions was not strong enough, and 4) sample related issues.

Firstly, a possible explanation for the insignificant predictive power of the normative goal-frame is that the scenario did not contain information related to what our participants believed to be appropriate, thus irrelevant to an active normative goal-frame. Therefore, it is possible that the information provided to participants in the normative goal-frame was not relevant and consequently had no effect on attitudes. Specifically, this could have resulted in the insignificant main effect of the normative goal-frame condition and the following insignificant interaction effect, as reported by the third hypothesis. Following that same logic, in the context of testing the first two hypotheses, the hedonic goal-frame condition must have

also provided information unrelated to what participants evaluated as hedonically appealing, as no changes in attitude were observed.

Similarly, it is possible that attitudes towards cargo bike-sharing are not influenced by concerns regarding what is appropriate or hedonically appealing. This could explain why no differences between the groups were found and why the main effect of the normative goal-frame and the following interaction effect was insignificant.

While this is a valid explanation of our results, it directly contradicts the predictions of the goal-framing theory. Therefore, we further explore other factors that could have influenced our study's findings. For example, we believe that it is likely that our manipulation was not strong enough. Therefore, we possibly had no accurate indication of what goal-frame was active in each of our participants, regardless of their assigned group. This reasoning directly contradicts our manipulation's significant findings, suggesting that the manipulation did work. Furthermore, other studies with similar study designs (written scenarios based on goal-frames) have found significant results, indicating that manipulation through differing scenarios has been successful (Westin et al., 2020). Despite those findings, we will further argue why our manipulation might have been unsuccessful and what other reasons could have caused our insignificant results.

Strengths and Limitations

Manipulation Check

Although the chi-square test of independence indicated that our manipulation had worked successfully, we have reason to believe that the significant results do not display the strength of manipulation entirely accurately. As shown in Table 1, the normative manipulation seems to have worked best, given that 81% answered correctly. In contrast, only 46% of participants in the hedonic group and 50% of participants in the control condition have answered the manipulation check correctly. We believe that this tendency

could have occurred because the value and ecological worldview scales were introduced to the participants before they were presented with the different scenarios and following manipulation check. Specifically, we asked participants about their biospheric values and ecological worldview at the very beginning of the survey. This could have led participants to anticipate the environmental benefits of implementing a cargo bike-sharing system or even to an active normative goal-frame. In an attempt to take the focus of environmental concerns, we included more items to measure other values as well, namely egoistic and altruistic. However, we conclude that our study design could have potentially influenced the manipulation of our participants and consequently affected the following analysis of the data. For example, we raise the question of whether the insignificant interaction effect between goal-frame and biospheric values was observed because of an unsuccessful manipulation or because biospheric values actually have no moderating effect on the inspected association. We believe that conclusions about biospheric values as an insignificant moderator should be interpreted with the possibility in mind that the failed manipulation is the actual cause for this.

Insufficient Sample Size

Furthermore, we consider the effects of our sample size on the data analysis. As mentioned in the procedure section, the required sample size for our study was not met. After we excluded all the participants who failed the attention check or did not finish the survey, we were left with a sample that did not reach the required power needed for our study design. This is important to consider, as a lower statistical power can cause increased probabilities of a false negative result (Button et al., 2013). Furthermore, the researchers point out that lower power can cause a decreased likelihood of detecting a true positive effect. Based on this information, we regard the inferences about our hypothesis with caution. This also applies to

the significant results observed in our study, given the decreased possibilities of observing a true effect.

Convenience Sample

Furthermore, we were required to change our sampling method due to new governmental regulations regarding COVID-19. Instead of approaching pedestrians, we posted links to our survey on social media platforms. Ultimately, this resulted in a convenience sample which becomes apparent when investigating our sample demographics. Most of our participants were between the ages of 20 and 29 (73.5%), and 44.6% had obtained a bachelor's degree, similar to the bachelor students' demographics in charge of data collection. This could have potentially influenced our results, if our young and highly educated sample significantly differs from the general population. Future exploratory analysis could investigate whether our sampling method has potentially affected our results by investigating participants' response patterns from different age and education groups. For now, we conclude that any inferences based on our sample should only be applied with caution to the general population.

Validated Scales

A considerable strength of our study was that we used validated scales to measure important constructs such as values, attitudes, and intentions. This becomes evident when considering the internal consistency of those scales, as reported in the materials section. Consequently, we conclude that our study adds to the existing body of literature by providing further evidence for the reliability of those scales. Thus, we confidently assume a reliable measurement of our constructs.

Practical Implications and Future Directions

Although the analysis of our first three hypotheses did not yield significant results, we still found a significant correlation between our participants' attitudes and intentions towards

cargo bike-sharing systems. Indeed, predicting attitudes and intentions with goal-frames and corresponding values was unsuccessful, yet discovering that attitudes correlate with intentions is valuable information, especially when considering that attitudes towards cargo bike-sharing were high in all three experimental groups. This means that participants are likely to have positive attitudes towards cargo bike-sharing in general and that they are likely to use such systems once implemented. This also has implications for the other hypotheses tested in this paper. For example, given that attitudes are generally high, it might not be as important to understand how attitudes can be improved in more detail. This is not to say that exploring attitudes in more detail is of no value, especially considering the risks of such statements in regard to our statistical power, but instead that exploring other aspects of cargo bike-sharing might turn out to be more fruitful. For example, future research could look into how long-lasting positive attitudes towards cargo bike-sharing are and whether the differing goal frames affect this. Steg et al. (2014b) suggest that hedonic values negatively affect environmental attitudes and behaviors. Thus, investigating how environmental options can be made more hedonically appealing seems to be a promising path for future exploration. Furthermore, to better understand the effects of the framing conditions on the dependent variables, future studies should avoid measuring constructs important to one of the goal-frames before the actual manipulation.

Conclusion

Everything considered, the underlying complexity of the processes to better understand attitudes and intentions towards environmentally sustainable behavior become apparent. Predicting attitudes and intentions towards cargo bike-sharing is not a straightforward process that can be easily explained. Many factors, numerous beyond the scope of this paper, seem to play a role in explaining attitudes towards cargo bike-sharing. In this study, we explored the role of biospheric values in promoting environmental behavior.

Furthermore, considering that attitudes are generally high and seem to predict intentions moderately well, we conclude that the implementation of cargo bike-sharing systems is worth considering at the least and a viable opportunity to move society towards a sustainable future.

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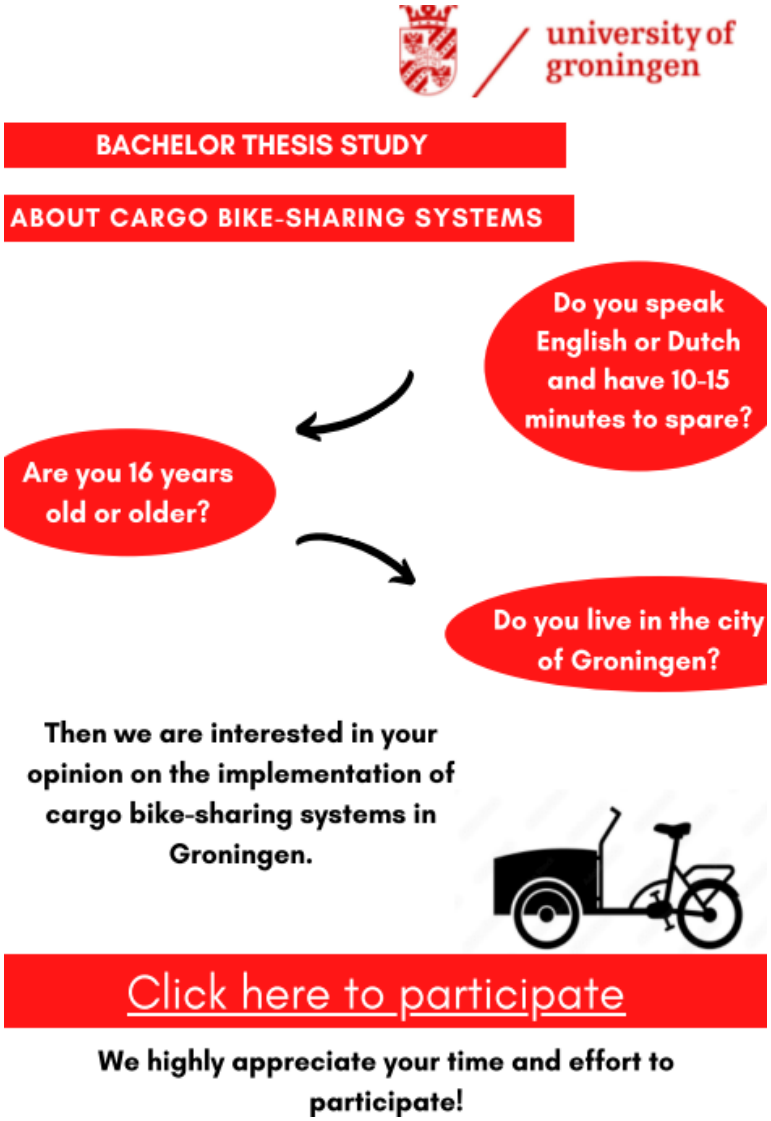
Appendix A

Figure A1

Handout for Data Collection

Figure A2

Online Version of Handout for Data Collection



Appendix B

Control Scenario

Have you ever heard of cargo bikes (bakfietsen/Lastenräder) before? A cargo bike has an area big enough to fit and transport large goods. This cargo area, often in the form of a box or flat platform, can be located in the front or back of the bike. Cargo bikes are used for various purposes such as transporting furniture, groceries, or even children. The municipality of Groningen is considering introducing a cargo bike-sharing system for electric cargo bikes with various docking stations located at hotspots throughout the city. At said stations, electric cargo bikes will be available to the locals, while those not in use will remain there to charge.

Hedonic Scenario

Have you ever heard of cargo bikes (bakfietsen/Lastenräder) before? A cargo bike has an area big enough to fit and transport large goods. This cargo area, often in the form of a box or flat platform, can be located in the front or back of the bike. Cargo bikes are used for various purposes such as transporting furniture, groceries, or even children. The municipality of Groningen is considering introducing a cargo bike-sharing system for electric cargo bikes with various docking stations located at hotspots throughout the city. At said stations, electric cargo bikes will be available to the locals, while those not in use will remain there to charge.

In addition, using a cargo bike can be fun: you get to spend time outside with friends and family while comfortably taking various goods along with you, such as food and drinks for a picnic. Cargo bike-sharing systems present a convenient and flexible type of transport, as you do not need to look for a parking spot for your car in the usually busy city center. Also, electronic cargo bikes allow for comfortable and time-efficient trips.

Normative Scenario

Have you ever heard of cargo bikes (bakfietsen/Lastenräder) before? A cargo bike has an area big enough to fit and transport large goods. This cargo area, often in the form of a box or flat platform, can be located in the front or back of the bike. Cargo bikes are used for various purposes such as transporting furniture, groceries, or even children. The municipality of Groningen is considering introducing a cargo bike-sharing system for electric cargo bikes with various docking stations located at hotspots throughout the city. At said stations, electric cargo bikes will be available to the locals, while those not in use will remain there to charge.

In addition, using a cargo bike is a more sustainable way of transportation: Cargo bike-sharing systems help decrease car use and traffic congestion and thereby help reduce CO2 emissions and air-, and noise pollution. A possible decrease in car use through these sharing systems allows for more green spaces and biodiversity in the future. Thus, using such systems can actively contribute to environmental preservation and restoration.