

**Potentials of Electric Cargo-Bike Sharing Systems –  
Goal-Framing, Place Affect and Attitude on Environmental Intention**

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### **Abstract**

Goal-dependent framing influences an individual's environmental attitudes, intentions and behaviours. Indeed, previous research on the goal-framing theory as introduced by Lindenberg and Steg (2007) seems highly relevant in explaining environmental intent and subsequently behaviour. This theory proposes there are three overarching goals that guide an individual's behaviour, namely gain goals, hedonic goals, and normative goals. Moreover, research on place attachment proposes place affect, an individual's emotional bond with a particular place, may also impact environmental attitudes, intentions and behaviours. In this study, we investigate whether differing goal-dependent framing of an electric cargo-bike sharing system in Groningen significantly influences citizens' attitude towards such systems and their intention to use them. We further explore whether place affect moderates the relationship between goal-dependent framing and attitude. We propose normative framing to result in the highest attitude and intention, followed by hedonic framing, and lastly the control frame. We also expect highest attitude scores of participants in the normative condition, especially when their place affect is high. We conducted a between-subjects experiment by manipulating the way electric cargo-bike sharing systems were described in a short text based on goal-dependent framing. Three conditions were created in total: a normative condition, a hedonic condition, and a neutral control condition. Participants were randomly assigned to one of the three conditions. Results have only supported the hypothesis that higher attitude towards electric cargo-bike sharing systems resulted in higher intention to use them. We conclude that attitude has a significant association with intention. Limitations and implications are discussed.

*Keywords:* Goal-Framing Theory, Place Affect, Attitude, Intention

### **Potentials of Electric Cargo-Bike Sharing Systems - Goal Framing, Place Affect and Attitude on Pro-Environmental Intention**

An increase in global human activity over the last few centuries, primarily characterized by the burning of fossil fuels and its subsequent release of CO<sub>2</sub> emissions, has led global temperatures to rise (global warming), and in turn, global meteorological processes to change (climate change). A compelling majority of scientists, scholars and experts around the world agree that climate change forms the most detrimental threat to contemporary societies (IPCC, 2019; Ripple et al., 2019). Some of its consequences are already perceivable, extending beyond the physical environment into every part of human society. They include the extinction of wildlife, an increased frequency and severity of extreme weather events, forceful displacement of millions of people every year, and huge economic costs (IPCC, 2019). Scientists have developed many possible plans and solutions to counter this crisis, and urge governments as well as the public to transform current ways of living towards more sustainability (European Court of Auditors, 2020; IPCC, 2021; Ripple et al., 2019).

Various innovations have been introduced that aim to reduce emissions and counter climate change, particularly in the sector of transport and mobility. These include electric vehicles, advancements in public transport systems, and bike-friendly infrastructure (United Nations, 2021). One such innovation introduced increasingly in the past years are bike sharing systems. That is, a system that allows individuals to utilize bikes without having to deal with responsibilities that come with the ownership of a private bike (Fishman, 2014). In 2004, there were 13 cities with implemented bike sharing systems worldwide. Only 10 years later, 855 cities had implemented such systems. While these innovations mainly target the transport of private individuals, recently similar systems offering *cargo-bikes* have been introduced in countries like Poland, Germany, Austria, and Switzerland (Becker & Rudolph, 2018; Hess & Schubert, 2019; Macioszek et al., 2020). Cargo-bikes include enough space to transport larger goods such as furniture or even children. Recent findings have shown the potential of cargo-bike sharing systems in reducing car use and thereby also emissions (Becker & Rudolph, 2018; Riggs, 2016; Hess & Schubert, 2019). Becker and Rudolph (2018) have found that 45% of cargo-bike users, in the absence of such, would have taken the car instead. Findings on how cargo-bikes could help enforce mode substitution behaviour, the shift from car to bike use, revealed

that 69% of participants have reduced daily car use by around 1-2 trips when cargo-bikes were available (Riggs, 2016). Further research proposes that families with access to cargo-bikes showed an increase in cycling, a decrease in car use and a higher intrinsic motivation to cycle (Bjornara et al., 2019). In his literature review on regular bike sharing systems, Fishman (2014) defines various factors that might facilitate the use of such systems. Next to aspects like convenience, health, and fun, he also suggests environmental benefits to be a motivator for the use of bike sharing systems.

In Groningen, where citizens own 1.5 bikes on average, bikes form a significant mode of transport (Onderzoek en Statistiek Groningen, 2018). Still, cars are used for numerous reasons, but most often for the transportation of various types of cargo. The municipality of Groningen aims towards fairer and more sustainable mobility, particularly through reducing car use while promoting and facilitating alternative forms of mobility (Municipality of Groningen, 2021). In this context, it has mentioned interest in the potential introduction of an electric cargo-bike sharing system (ECBSS) for private use. Here, citizens would be able to access and return electric cargo-bikes at docking stations throughout the city most likely located along urban hubs such as train stations or areas of concentrated commercial activity. An extensive private ECBSS might have an impact on the individual car use and help counter climate change. Food/drinks, children, materials and furniture have been identified to be the main types of goods people transported with a cargo bike (Becker & Rudolph, 2018), further indicating their private need. As previously mentioned, various factors can motivate an individual to use a cargo-bike. In order for a city to implement such systems successfully, it is important to understand how individuals feel towards them and why individuals intend to use said systems.

### **Goal-Framing Theory**

A useful framework for understanding motivations behind environmental intentions and behaviours is the *goal-framing theory* as introduced by Lindenberg and Steg (2007). This theory proposes there are three overarching goals that guide an individual's behaviour, all of which incorporate and govern many different subgoals. The three goals are *hedonic*, *gain*, and *normative goals*. *Hedonic goals* aim at improving one's current emotional state by seeking pleasure or comfort and avoiding effort or negative feelings. People with hedonic goals are especially sensitive to factors influencing their mood. *Gain goals* aim at guarding and improving one's personal resources such as

money or time. Here, people are mostly influenced by costs and benefits of certain behaviours. Lastly, *normative goals* aim at acting appropriately in a given context. Individuals with normative goals try to perform behaviours they ought to based on their own perceptions of social appropriateness and those of others. Goal-framing theory suggests these goals guide one's cognitive processes and decision-making. Usually, one of these three goals is focal and acts as the goal frame: it dominates and guides what people pay attention to, which information they are processing, what they feel and how they act. While one goal might be dominant, other goals still operate in the background. Depending on the context, *background goals* can be active or inactive, and can contribute to or conflict with the dominant goal frame. For example, an individual with a focal hedonic goal might use a car as their main mode of transport because it is the most comfortable way to get from A to B. However, social norms suggest that sustainable transport modes are much more desirable, thereby activating their normative goal, which is now conflicting with the focal hedonic goal. Which goal is focal, and how strongly the background goals are activated, depend on individual dispositions and the situational context (Lindenberg & Steg, 2007).

Previous literature supports the idea of multiple goals driving (environmental) attitudes, intentions and behaviours (Ajzen, 1991; De Young, 2000; Lindenberg & Steg, 2007; Smith, Haugtvedt, & Petty, 1994; Steg, 2005). Research has further shown that differing goal-dependent framing of environmental information may influence behaviours. For instance, Westin et al. (2020) found that the framing of increasing parking fees, based on the goals developed by Lindenberg & Steg (2007), significantly decreased car-use as compared to not framing the information. Moreover, normative goal frames have been found to form the strongest and most stable basis for environmental behaviours (Lindenberg & Steg, 2007). This is due to the normative nature of environmental behaviours: in most societies, these behaviours are perceived as appropriate and desirable to engage in. Hence, in an environmental context, normative goal frames are predominantly activated by environmental values. For instance, research on energy-use revealed that framing electricity-saving tips environmentally (normative goal) may increase intention and intrinsic motivation to save electricity (Steinhorst & Klöckner, 2017).

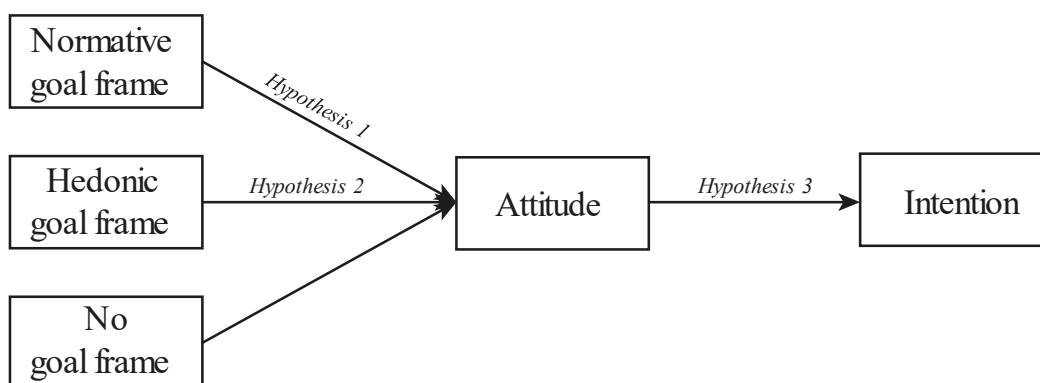
In this study, participants will thereby be presented with one of three descriptions of ECBSSs, differing in the way these systems are framed. Due to the limited scope of this project, we will only compare a normative, hedonic and no goal frame (See Figure 1). A normative frame in the context of cargo-bike sharing might for example emphasize environmental benefits of using said systems, such as reducing CO<sub>2</sub> emissions or contributing to environmental preservation. We expect this frame to result in the highest attitude towards ECBSS. On the other hand, a hedonic frame will highlight emotional and mood-related benefits of using these systems, such as having fun while cycling or the convenience of not having to look for a car park. We expect this frame to result in higher attitude compared to no framing.

### Attitude and Intention

Various theories, such as the theory of planned behaviour, and a vast body of research suggest that attitude is a significant predictor of both intention and its subsequent behaviour (Ajzen, 1991; Webb & Sheeran, 2006). Similarly, intention has been found to be an integral predictor for its subsequent behaviours (Ajzen, 1991; Bamberg & Möser, 2007; Kaiser, Wölfing & Fuhrer, 1999). In this study, we thereby aim to explore the relationship between differing goal-dependent framing, the attitude towards ECBSSs, as well as the intention to use them.

### Figure 1

*Framework based on the Goal-Framing Theory*



**H1:** A normative goal frame will lead to a more positive attitude towards cargo bike sharing systems than a hedonic goal frame or no goal frame.

**H2:** A hedonic goal frame will lead to a more positive attitude towards cargo bike sharing systems, than no goal frame.

**H3:** There is a positive association between attitude towards electric cargo-bike sharing systems and the intention to use them.

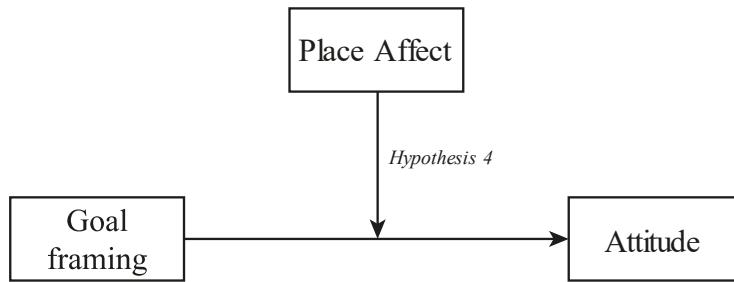
### **Emotions and Place Affect**

Next to goal frames, an impactful factor in explaining environmental attitudes, intentions and behaviours is that of emotion (Pooley & O'Connor, 2000; Ramiksson, Smith, & Weiler, 2012a). For instance, as previously mentioned, hedonic goal frames specifically concern an individual's emotional state and the strive of improving said state. Hedonic values have also been found to impact environmental attitudes, intentions and behaviour (Steg et al., 2014). Further, Nilsson et al. (2014) revealed that different framing effects in interaction with one's value orientation elicit positive or negative emotions that impact one's intention to purchase green energy. Research suggests that, depending on whether a behaviour (and its consequences) might be perceived as pleasant or unpleasant, it can evoke positive or negative emotions, and in turn can act as a barrier or promoter of environmental attitudes and intentions (Taufik & Venhoeven, 2018). Moreover, studies on environmental education have shown it is primarily an individual's feelings and beliefs that determine one's environmental attitudes (Pooley & O'Connor, 2000). Similarly, place attachment acknowledges the importance of emotions in explaining environmental attitudes, intentions and behaviours. Place attachment aims to explain the cognitive, conative and affective bonds people develop with places. The affective bond between a person and a place has been termed *place affect*. The concept of place affect was first explored by Geographer Yi-Fu Tuan in his early work on environmental perceptions, attitudes, and values, who coined the term 'topophilia', directly translated to 'love of place' (1974). Place attachment in general, and specifically place affect, have been found to be of importance in explaining environmental attitudes, intentions and behaviours (Cheung & Hui, 2018; Halpenny, 2006; Halpenny, 2010, Ramiksson, Smith, & Weiler, 2012a; Ramiksson, Smith, & Weiler, 2012b; Ramiksson, Smith, & Weiler, 2013).

Research on the relationship between place attachment, and environmental intentions and behaviours, has produced vastly inconsistent findings. These inconsistencies might lie in the many different conceptualizations of place attachment (Daryanto & Song, 2021). Some scholars defined it as a global construct (Stedman, 2002), while others determined it to be a multidimensional construct



consisting of four components: place dependence, place identity, place social bonding, and place affect (Ramkissoon Smith, & Weiler, 2013; Ramkissoon & Mavondo, 2015). Some studies suggest that higher place attachment (including place affect) might lead to the desire to protect such places and thereby engage in environmental behaviours (Stedman, 2002; Ramkissoon & Mavondo, 2015; Lewicka, 2011). Vaske and Kobrin (2001) found that high place attachment, which they propose develops when a setting increases one's emotional state, might motivate individuals to engage in environmental behaviours such as sorting recyclable trash. Other studies have found a negative link between place attachment and environmental intentions and behaviours. Junot et al. (2018) suggest that higher place attachment might lead to the underestimation of environmental threats and the perception that environmental behaviours are not necessary. Similarly, people who feel like a place already meets their needs might also not see a reason for environmental behaviours (Ramkissoon et al., 2013; Tonge et al., 2015). Nevertheless, in their meta-analysis on the relationship between place attachment and environmental behaviours, Daryanto and Song (2021) suggest most findings propose a positive relationship. However, this positive link might only exist if the benefits of said behaviour for the place are salient (Scannell & Gifford, 2013; Stedman, 2002). In our study this may indicate that a normative frame might make these place-beneficial aspects salient by presenting benefits of ECBSSs that help protect the immediate environment. For instance, a normative frame includes information on how ECBSSs contribute to environmental preservation. If a behaviour is perceived as beneficial for a place, individuals may feel more positively about said behaviour and thus be more likely to engage in it, especially when their place affect is high, as they seek to protect that particular place. In this study, we thereby also explore a possible moderation effect, in which place affect moderates the relationship between goal frames and attitude towards ECBSSs (see Figure 2). This means that the effect of framing on attitude is dependent on the level of place affect. Considering normative goals have been found to most strongly predict environmental behaviours, and because the normative frame presents aspects of engaging in ECBSSs that are beneficial for the place, we expect the effect of normative goal frames on attitude to enhance when place affect is high. We expect this effect to be weaker in the other two conditions, where place-benefits are missing.

**Figure 2***Moderation of Place Affect on Goal-Framing and Attitude*

**H4:** People presented with a normative goal frame will experience a higher attitude towards electric cargo-bike sharing systems than people presented with a hedonic or no frame, especially when their place affect is high.

### Method

#### Participants

An a priori power analysis using the program G\*Power 3.1.9.4 was conducted for a one-way, fixed effects ANOVA, with a medium effect size ( $f = .25$ ) and an alpha level of .05. Results showed a total sample size of 159 was required to achieve a power of .80. Due to limited time constraints and social contact restrictions caused by the coronavirus pandemic, our sample was somewhat smaller. A total of 125 participants were recruited, of which 83 were included in the analysis<sup>1</sup>. Roughly 73% of the participants were between the ages of 20 to 29 years old and 63.9 % of participants held at least a bachelor degree. Furthermore, 43.4 % of participants owned a car or had access to one. In addition, the location that was most represented in this study was Centrum, (36.1% of participants live here), and the least represented location was Ten Boer (1.2% of participants live here). Chi-square tests of independence between experimental condition and five demographic variables were run. Results showed no significant association between experimental condition and gender ( $X^2(4) = 4.36, p = .359$ ), age ( $X^2(10) = 13.447, p = .200$ ), education ( $X^2(10) = 8.364, p = .593$ ), location of residence, ( $X^2(14) = 10.519, p = .723$ ), and car ownership ( $X^2(4) = 5.093, p = .278$ ).

<sup>1</sup>The participants that were excluded from the analysis either did not give consent, did not finish the survey, or did not answer the attention check correctly.

### **Research Design and Procedure**

This study was a between-subjects experimental design exploring the effects of differing *goal framing* on the *attitude* and *intention* to use an ECBSS in Groningen. We manipulated *goal frames* in such a way that each participant was randomly assigned to one of three conditions. Conditions differed in the way in which ECBSSs were framed in a short text presented during the survey. Participants were assigned to either a normative, hedonic, or control condition.

Participants were only considered if their age exceeded 16 years and they resided in the city of Groningen. Before participants were referred to the survey, a general introduction to the study was provided. Next, we specified participation was voluntary, anonymous and that the withdrawal from the study was possible at any moment. Prior to receiving the manipulation, participants were asked to report on general demographics, including gender, age, and level of education. Then, participants reported on their personal values, place attachment, and ecological worldview. Next, the manipulation followed, after which participants reported their scores on both attitude and intention, as well as their perceived behavioural control. Participants were then asked further demographic questions about their location of residence and travel behavior. Lastly, participants were presented with a debrief explaining the purpose of the study and the condition they were assigned to.

Sampling was initially done by approaching potential participants in Groningen's city centre and handing out informational flyers to draw a random sample from our population of interest (see Appendix A). Participants were invited by scanning a QR code on the flyer leading to the corresponding survey, allowing participants to fill out the questionnaire at any given time. The survey was provided in two languages, both Dutch and English. Only participants that have indicated proficient knowledge of either language were considered during the data analysis. Furthermore, we communicated an estimated time of 10 to 15 minutes it takes to fill out the survey.

During our data collection, new COVID-19 measures were introduced by the Dutch government. Due to those new circumstances, we changed our data collection method to recruiting participants online. The survey was shared on various social media platforms, including Facebook, Instagram, and Whatsapp, using an iterated digital version of the flyer previously used (See Appendix

B). Ultimately, this resulted in a convenience sample for our study. We will discuss the implications for the data analysis of this approach in more detail in the discussion.

This study, along with all the changes made in the data collection process, was approved by the Ethics Committee of the University of Groningen.

## **Materials**

### ***Description of Stimulus Materials***

Our dependent variable goal framing was manipulated so that each participant was assigned to one of three conditions. Manipulation was done by presenting participants with one of three short texts describing ECBSSs along with a photo of a cargo-bike. Each text was characterized by a specific goal frame as defined in our framework, all of which highlight different goal-dependent benefits of ECBSSs. In the control condition, participants were presented with a text that explained cargo bikes and their respective sharing systems in a neutral way, merely describing them as an alternative way of transporting goods. In the hedonic condition, participants were presented with the same general text, along with a passage highlighting mood- and emotion-related benefits, including words such as ‘convenient’, ‘comfortable’ and ‘time-efficient’. In the normative condition, along with the general text, participants were presented with a text passage that emphasized environmental benefits, using phrases such as the ‘reducing CO<sub>2</sub> emissions and noise pollution’, or ‘contributing to environmental preservation’.

### ***Description of Questionnaires***

Due to the collaborative nature of this research project with other Bachelor students, the questionnaire included various scales that were irrelevant for the purpose of this particular paper. The measurements relevant to answer the hypotheses of this study will be explained in the following.

**Place Affect.** To measure *place affect*, participants were asked to rate their emotional sentiments towards a particular place, a scale designed by Halpenny (2010). Place affect ( $\alpha = .78$ ,  $M = 22.06$ ,  $SD = 4.26$ ), consisting of 6 items, was measured using a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. The scale included items such as “I feel strong, positive feelings for Groningen” and “I am attached to Groningen”. With item 6 “I would feel sad if Groningen changes its current physical layout” we added a new item aiming to specifically measure citizen’s

feelings towards changes in the city layout. Place affect was seen as a stable construct within a person and thereby measured before the manipulation within the questionnaire.

**Attitude.** To measure the variable *attitude*, we used a validated scale that was designed by Fishbein and Ajzen (1975). This attitude scale ( $\alpha = .88$ ,  $M = 15.39$ ,  $SD = 3.33$ ) included items such as “Using a cargo-bike sharing system is a good idea” and “In my opinion, it would be desirable to use a cargo-bike sharing system”. Participants reported their scores on a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree.

**Intention.** *Intention* towards cargo-bike sharing was measured by a validated intention scale of Fishman et al. (2020). The two questions in this intention scale ( $\alpha = .72$ ,  $M = 6.83$ ,  $SD = 2.20$ ) were “How likely are you to use a cargo-bike sharing system in the future?” and “How likely are you to recommend the use of cargo-bike sharing system to your friends or family?”. Participants responded to this on a five-point Likert scale ranging from 1) very unlikely to (5) very likely.

**Manipulation Check.** As a *manipulation check* we asked participants to identify which main benefits of ECBSSs were mentioned in their survey (Table 1). We decided not to exclude those who answered the incorrectly, and merely used it to gain insight into whether our manipulation worked.

**Table 1**

*Manipulation check*

	No frame	Hedonic frame	Normative frame
Transporting goods	13	7	3
Fun, convenience, time-efficiency and transporting goods	7	16	2
Reducing CO2 emissions, environmental preservation and transporting goods	6	7	22
Total	26	30	27

**Statistical analysis**

To process the data and to perform the statistical analyses, we used IBM SPSS Statistics, version 28.0.0.0 (190).

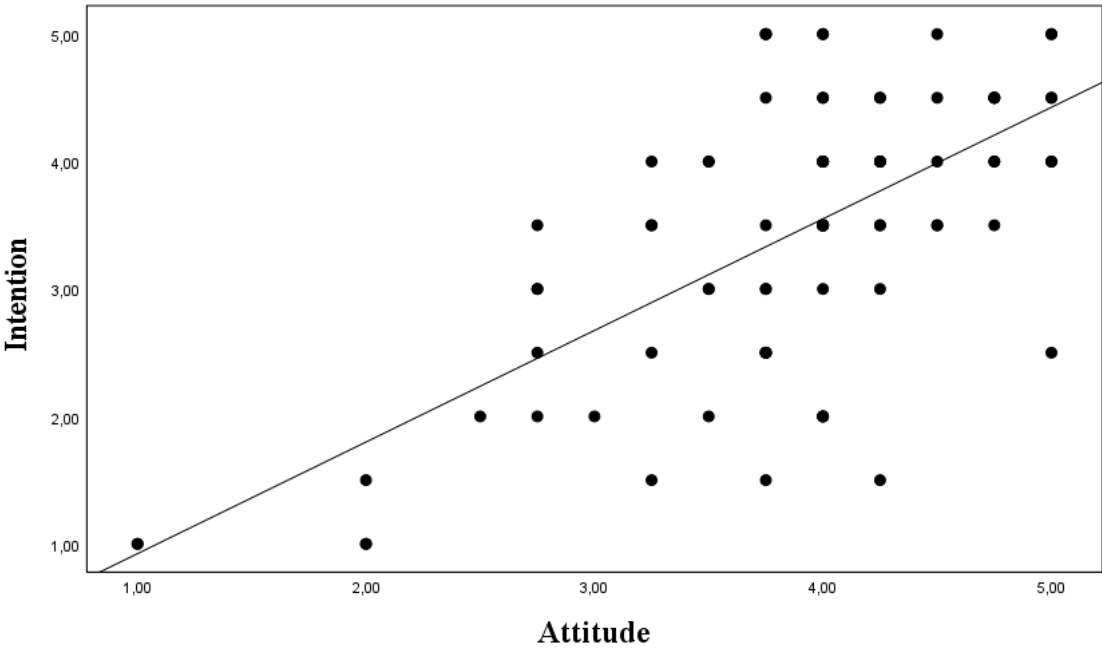
To ensure that the analysis can be executed, we checked whether the assumptions for an ANOVA analysis were met. Results from our Shapiro-Wilk test showed a significant p-value at an alpha level of .01 for the dependent variable *attitude* within the normative condition ( $W(27) = .820, p < .001$ ), meaning the distribution in this group significantly differs from normality.

As the assumption of normality is not met, a nonparametric test is needed. Thus, a Kruskal-Wallis test with planned contrasts is conducted to test H1 and H2.

Next, a correlation analysis is used to examine the relationship between attitude towards and intention to use ECBSSs (H3). As the assumption of normality was not met, we looked at the non-parametric Spearman's rank correlation. We plotted the variables attitude and intention against each other on a scatter plot, which showed there is indeed a monotonic relationship between the two variables (see Figure 3).

**Figure 3**

*Scatterplot showing the relation between attitude and intention*



To explore a possible moderating effect of place affect on the relationship between goal framing and attitude, a hierarchical multiple regression analysis is conducted. To do this, the framing condition variable is transformed into two dummy variables that define group membership noted as X1 and X2 (See Table 2). Using such coding for a multicategorical variable allows us to assess whether the differences in attitude between group pairs are significantly dependent on place affect. More specifically, we test differences between control and hedonic condition on one hand, as well as control and normative condition on the other. In step one, attitude is regressed on both framing condition in the form of X1 and X2, and place affect respectively. In step two, the interaction term between each framing condition and place affect is added to the model. Multiple regression analysis assumes a normal distribution of the dependent variable attitude across conditions. Normality tests have already revealed a violation of normality in the normative condition. The results from this analysis thereby have to be interpreted with caution.

**Table 2**

*Coding system of framing conditions*

Framing Condition	X1	X2
Control	0	0
Hedonic	1	0
Normative	0	1

## Results

To assess whether there were significant differences in the responses to our manipulation check across the conditions, a chi-square test was run. Results were significant at alpha level 0.01, thereby indicating that manipulation was successful,  $X^2(4) = 32.30, p = <.001$ . However, not all participants were able to answer this question correctly (See Table 1). Possible reasons for this will be explored in the discussion section.

To test our hypotheses H1 and H2, a Kruskal-Wallis test was conducted. Results were insignificant,  $H(2) = .09$ ,  $p = .957$ , indicating that in our data, there is no difference in attitude scores across the experimental conditions. Thus, it was not necessary to further check for planned contrasts.

Spearman's rank correlation analysis revealed that attitude and intention are significantly related to each other ( $r(83) = .58$ ,  $p < .001$ ). This supports our hypothesis that the higher an individual's attitude is towards ECBSSs, the higher their intention to use said systems.

A hierarchical multiple regression was run to explore a possible moderation of place affect on the relationship between goal framing and attitude. In step one, a significant main effect was found for place affect ( $b = .38$ ,  $t(79) = 3.06$ ,  $p = .003$ ), but not for hedonic (X1:  $b = .18$ ,  $t(79) = .83$ ,  $p = .411$ ) or normative framing (X2:  $b = .09$ ,  $t = .40$ ,  $p = .688$ ). The overall model, however, accounted for a significant amount of variance ( $R^2 = .11$ ,  $F(3, 79) = 3.20$ ,  $p = .028$ ). Variables were centered using the PROCESS extension developed by Andrew F. Hayes, and interaction terms between each framing variable and place affect were added in Model 2. Results show that neither the interaction between hedonic framing and place affect ( $b = -.14$ ,  $t(77) = -.38$ ,  $p = .708$ ), nor the interaction between normative framing and place affect ( $b = .06$ ,  $t(77) = .16$ ,  $p = .873$ ), as well as the overall model, added any significant explanatory power in predicting attitude towards ECBSSs ( $\Delta R^2 = .01$ ,  $\Delta F(5, 77) = .26$ ,  $p = .770$ , See Table 3). In other words, there is no moderation of place affect on the relationship between goal framing and attitude.

**Table 3**

*Model Summary*<sup>a</sup>

Model	R	R <sup>2</sup>	Adj. R <sup>2</sup>	Std. Error	Change Statistics				
					R <sup>2</sup> Change	F Change	df1	df2	Sig. F Change
1	.33 <sup>b</sup>	.110	.08	.80	.11	3.20	3	79	.028
2	.34 <sup>c</sup>	.114	.06	.81	.01	.26	2	77	.770

a. Dependent Variable: Attitude

b. Predictors: X1, X2, Place Affect

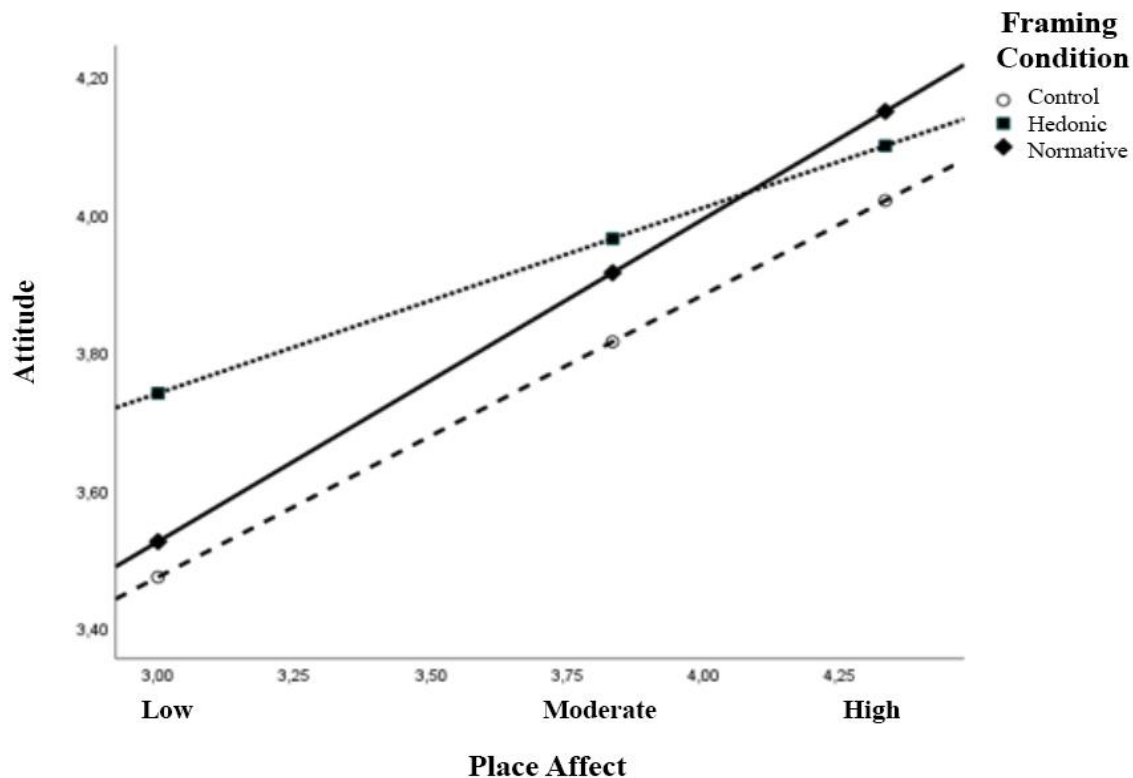
c. Predictors: X1, X2, Place Affect, X1 x Place Affect, X2 x Place Affect



When visualizing the data, the graphs might indicate a possible tendency towards an existing moderation (See Figure 4). Participants in the normative condition with high place affect reported the highest attitudes. Those in other conditions, who had the same high place affect, reported lower attitudes.

**Figure 4**

*Attitude across Low, Moderate and High Place Affect and Framing Condition*



*Note.* Low, moderate and high place affect were defined by values at the 14<sup>th</sup> (3,00), 50<sup>th</sup> (3.83), and 84<sup>th</sup> (4.33) percentile.

### Discussion

In this study we examined whether the attitude towards and intention to use an ECBSS were influenced by the way in which these systems were framed in a short text presented to participants. We tested four hypotheses in total. Results from our statistical analysis have only supported our third hypothesis in which we found a positive correlation between attitude and intention. This is in line with the extensive body of research on this relation. In his review on the theory of planned behaviour, Ajzen (1991) stated that “intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes toward the behavior” (p.179). Similarly, Kaiser et al. (1999) have found

attitudes to be a powerful factor in explaining ecological behaviour. The way in which individuals think and feel towards ECBSSs significantly influences one's intention to use them.

Our data does not indicate a significant association between differing goal frames and attitude. Much of the previous literature on this matter, however, suggests otherwise. Generally, goal-dependent framing of environmental information has been shown to significantly influence environmental intentions and behaviours as compared to no framing (Steinhorst & Klöckner, 2017; Westin et al., 2020). Moreover, specifically normative goal frames have been found to significantly predict environmental behaviours, as for instance proposed by Schwartz (1977) in his NAM (Eriksson et al., 2006; Lindenberg & Steg, 2007). Thøgersen (1999) found that normative concerns were significantly related to one's intention to choose environment-friendly packaging. Similarly, an extension of the NAM, the value-belief-norm theory of environmentalism, emphasizes normative concerns in explaining environmental attitudes, intentions, and behaviours (Stern et al., 1999). A possible reason for the insignificant effect of normative framing in this study might be that normative goals may be less successful in explaining behaviours involving high costs. Some research suggests behaviours that are costly in terms of time, effort, money, or convenience, especially behaviours aimed to reduce energy use, may be influenced less strongly by normative goals (Abrahmse & Steg, 2009; Steg & Nordlund, 2019).

Previous findings have also demonstrated emotions and moods to be of particular importance in explaining environmental behaviours. Individuals seem to be more likely to engage in environmental acts when they derive positive feelings from them (Pelletier et al., 1998). Goal-framing theory has identified emotional concerns, in form of the hedonic goal, to have a significant effect on attitudes and behaviours (Lindenberg & Steg, 2007). Contrary to previous literature, our data does not indicate a significant association between hedonic framing and attitude. A possible explanation may be that car-use itself is strongly linked to affect. Nilsson & Küller (2000) found people with a strong emotional attachment to car-use not only drive more frequently, but are also more likely to evaluate policies designed to reduce car-use less favourably. Other findings revealed individuals who drive frequently will evaluate the emotional values of car-use more positively than the emotional values of public transportation (Steg, 2005).

It is possible that adopting an ECBSS, a type of public transportation aimed to reduce energy use, specifically car use, is a behaviour that is simply too costly. Individuals may feel they are missing out on too many benefits of the current behaviour (car use) while taking on more costs of the new behaviour (cargo-bike use). This may also indicate that gain goals as proposed in the goal-framing theory, is important to consider in this context.

It is also possible that differing goal frames simply do not influence an individual's attitude towards and intention to use an ECBSS. This, however, would not support previous research in this field, most of which have revealed a significant influence of goal framing on environmental attitude, intentions and behaviours (Lindenberg & Steg, 2007).

Our findings did not reveal a significant moderation of place affect on the relationship between framing and attitude, and thus do not support hypothesis 4. Since our results from hypotheses 1 and 2 revealed no significant association between framing condition and attitude, there was no relationship that could be moderated by a third variable in the first place. Possible reasons for our insignificant results are further explained in the next section (See Limitations).

Results did, however, propose place affect alone to significantly predict attitude. Considering its significant main effect in model 1 of the hierarchical regression, and as can be seen in Figure 4 (although insignificant): higher place affect resulted in higher attitudes across all conditions, indicating it may play an interesting role in explaining and promoting environmental attitudes. This would support the majority of research findings, although highly inconsistent, suggesting higher levels of place affect to result in higher levels of environmental attitudes, intentions, and behaviours (Cheung & Hui, 2018; Halpenny, 2010, Ramiksoon, Smith, & Weiler, 2012; Ramiksoon, Smith, & Weiler, 2013a; Ramiksoon, Smith, & Weiler, 2012b). Considering the influential role of general affect, place affect might offer an interesting additional dimension of emotion in explaining environmental attitudes, intentions and behaviours, one that is directly tied to the physical environment.

### **Limitations**

A possible explanation for our insignificant results might lie in the limitations of this study. Firstly, our final sample was much smaller than what the power analysis suggested. It is possible that there were simply not enough people for an effect to be significant. Moreover, our sampling was done

by means of convenience sampling. The sample thereby was not random and did not represent the population of interest. For example, nearly three quarters of the total sample were between the ages 20 and 29. Moreover, 48.2 % filled out our survey in English, indicating that approximately half of the participants were non-native residents. Previous literature suggests that both age and length of residency may be an important factor in the forming of place attachment, such that older age and longer residence tend to result in higher place attachment (Hunter, 1974; Kasarda & Janowitz, 1974; Riger, & Lavrakas, 1981). Considering this sample is predominately younger and internationals live in the city for a shorter period than local residents, this may result in lower place attachment, and in turn diminish the effect place affect may have on the relationship between goal framing and attitude.

Another possible reason our results do not support hypothesis H1, H2 and H4 might lie in the manipulation of our dependent variable. It is possible that our manipulation was simply not strong enough for an effect to occur. In the survey, we specifically added a manipulation check serving as our assessment on whether manipulation was successful. However, in retrospect it is clear that this check was more of an attention check than an actual manipulation check. Participants were only asked which main benefits were noted in the text they had been assigned to, who then could choose between three answer options, each of which corresponded to one of the three experimental conditions. A better way to check the manipulation could be to simply ask participants '*In your opinion, what are the main benefits of electric cargo-bike sharing systems?*'. The answer options are then provided in a longer list, with only one benefit defining one answer option, and the ability to select more than one answer option. Prior to that, exclusion criteria need to be set in order to determine when manipulation is defined to have been successful. Due to attention being checked rather than manipulation, we can thereby also not be sure whether our manipulation has actually worked as shown by our chi-square test, indicating manipulation has possibly been unsuccessful.

### **Implications and Future Directions**

As mentioned before, behaviours aimed at the reduction of energy use may be too costly for normative or hedonic goals to be dominant. This, however, might indicate gain goals to be of particular importance in explaining environmental behaviours. Future research should investigate the role of gain goals in explaining intention to use an ECBSS.

Due to a number of people responding incorrectly towards the manipulation check, this may indicate that manipulation needs to be much stronger to be effective. For example, instead of letting users only read one of three texts about ECBSSs, one could also provide them with a video. The additional visual and auditory stimulation might engage people more strongly, their attention might be higher and the manipulation could thereby be stronger as well. Moreover, considering our manipulation check measured attention, it is possible that manipulation was actually unsuccessful, which may explain our insignificant findings.

Our results support the notion that place affect may play an important role in explaining environmental attitudes. Previous literature on place attachment, however, used vastly inconsistent conceptualizations and measurements. Our study suggests a more consistent and universal model of place attachment, so that its effects on environmental behaviour can be further clarified and investigated.

For policy making or communication to the public, results suggest it might be helpful to not only increase positive emotions towards using ECBSSs (attitude), but also towards the place in which these systems are implemented (place affect), when trying to facilitate a societal shift towards more sustainable transportation.

## **Conclusion**

On a final note, the findings of this study support a significant association between one's attitude towards an electric cargo-bike sharing system and their intention to use such systems. Differing goal frames have not been found to significantly influence participants' attitude scores, the reason for which might lie in this study's limitations. Further investigation on this relationship is required to gain a clearer picture. Finally, place affect may play an interesting role in explaining environmental attitudes, such that people are more likely to use electric cargo-bike sharing systems when they hold strong, positive feelings for the particular place. Results imply the potential of increasing positive feelings towards the systems as well as towards the place when facilitating the use of sustainable forms of mobility.

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## Appendix A

*Flyer for in-person sampling*



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**BACHELOR THESIS STUDY**

**ABOUT CARGO BIKE-SHARING SYSTEMS**

**Your opinion on cargo  
 bike-sharing systems in  
 Groningen matters to us!**

**Are you fluent in  
 English or Dutch  
 and have 10-15  
 minutes to spare?**

**We highly appreciate your  
 time and effort to  
 participate!**

**Scan me to participate!**



or go to:



[https://rug.eu.qualtrics.com/jfe/form/SV\\_4J9iHL07HhEGAdg](https://rug.eu.qualtrics.com/jfe/form/SV_4J9iHL07HhEGAdg)

## Appendix B

*Flyer for online sampling*



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 groningen

**BACHELOR THESIS STUDY****ABOUT CARGO BIKE-SHARING SYSTEMS**

Are you 16 years  
 old or older?

Do you speak  
 English or Dutch  
 and have 10-15  
 minutes to spare?

Do you live in the city  
 of Groningen?

Then we are interested in your  
 opinion on the implementation of  
 cargo bike-sharing systems in  
 Groningen.



[Click here to participate](#)

We highly appreciate your time and effort to  
 participate!

## Appendix C

### *Experimental Text Conditions*

#### **Control Condition**

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 Condition**

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.

#### **Biospheric Condition**

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.

*Photo presented along all Experimental Text Conditions*

