

# Getting Started on a Car Diet: Assessing the Behavioural Impacts of an E-Bike Trial in Switzerland

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## Abstract

In summer 2015, the Bike4Car campaign took place in Switzerland. During five months, car owners could try out an electric bike (e-bike) for free for a period of two weeks in exchange for their car keys. The campaign was organized by an environmental non-governmental organisation (NGO) and supported by the Swiss Federal Office of Energy, several cities, as well as bike retailers all over the country. In total, 1854 people participated in the Bike4Car campaign. We surveyed participants who took part in the campaign shortly before and after participating in the free trial. The aim was to study participants' motivation for taking part, their experiences during the trial and to identify whether such a free trial impacts intentions to reduce car use. Out of all participants, 405 individuals completely filled out the first questionnaire and 218 participants completely filled out the second questionnaire. For 90 respondents, both questionnaires are available for a comparative analysis. The most important reasons for participation in the free trial were that people wanted to try out a new means of transportation, followed by the intention to develop a healthier mobility pattern. Some of the participants also intended to use the trial as an opportunity to try out an e-bike before taking a final purchase decision. We found a high willingness among participants to change their mobility patterns after having participated in the free trial (i.e., by using the car less often or by buying an e-bike). However, willingness for a radical change (e.g., selling their car) was only marginal. Furthermore, we asked participants for their habitual associations related to the choice of means of transport for nine selected situations (e.g., picking up somebody from the railway station). When comparing the habitual associations related to the choice of means of transport before and after trying out an e-bike, we found significant shifts: After having participated in the trial, the number of times the car was mentioned significantly dropped while the number of times the e-bike was mentioned significantly increased. This indicates that experiencing the benefits of a car free lifestyle has the potential to at least moderately break mobility habits.

## Introduction

After the accident at the nuclear power plant in Fukushima, Switzerland has decided to implement a new energy strategy. Key goals of this strategy are substantial reduction of per capita energy demand, phasing out of nuclear power production and an increase in production of renewable energy sources (Swiss Federal Council, 2013). The new energy strategy thus requires transitions on the level of households, industry, services and transport in particular: In Switzerland, transport and mobility account for 38% of the total energy demand (Swiss Federal Office of Energy, 2015). Within this category, a large share of energy is used for private cars. Although energy consumption in the mobility sector can be reduced by technical means (i.e., more efficient cars), efficiency gains are often, at least partly, offset by rebound effects (Herring, 2006; Hertwich, 2005). Thus, it is widely acknowledged that environmental targets in the mobility sector can only be achieved by applying a combination of behavioural changes and efficiency strategies (Notter, Meyer, & Althaus, 2013). This

means that while the diffusion of energy efficient technologies represents a key opportunity in reducing energy demand in the transport sector, the potential of measures encouraging individuals to refrain from energy intensive behaviour are as well important in achieving Switzerland's sustainability goals.

However, changing behaviour is a challenge, in particular in a domain such as transport which is characterized by habitualised behaviour. Habitual behaviour such as mobility behaviour is often not only performed regularly, but also in certain stable circumstances (e.g., in certain locations and times, in particular moods, etc.) (Wood et al., 2005). In such a situation, studies have shown that old habits can be disrupted, which lead people to change their behaviour, if changes in their contexts occur or an individual decides to change context (Verplanken, Walker, Davis, & Jurasek, 2008; Wood, Tam, & Witt, 2005). For instance, this could be natural disruptions in life that people undergo through (e.g. transfer to a new university; moving house; see Wood et al., 2005 and Verplanken et al., 2008) or voluntary disruptions in life where people individually decide to change context themselves, e.g. by deciding to voluntarily give up car use. Thus, changing circumstances interrupts habitual behaviour patterns. Furthermore, changing circumstances may also activate new goals. Both mechanisms foster behavioural change (Wood et al., 2005). Verplanken and colleagues (2008) have formulated their discontinuity hypothesis accordingly: It states that "When a context change disrupts individuals' habits, a window opens in which behaviour is more likely to be deliberately considered" (Verplanken et al., 2008, p. 121).

Changing circumstances of car users is the key idea of Bike4Car, a large-scale intervention that took place in Switzerland in summer 2015. In that campaign, car-owners were given the opportunity to try out an e-bike for free in exchange for their car keys for a two week period between May and September. Thus, participants were situated in a new context as they no longer had their car available at their disposal and instead were given the opportunity to try out an alternative mode of transport. The main idea behind this campaign was to enable car owners to experience an attractive alternative mobility option. In particular, it gave them the opportunity to build up confidence and created a positive experience in using other modes of transportation (i.e., cycling an e-bike).

### **Background: The impact of changing contexts on mobility use patterns**

Many studies indicate that changes of contexts support behavioural change (Verplanken et al., 2008; Wood et al., 2005). Such changes of context may be more or less driven by people themselves (e.g., change of workplace, moving to a new residential area, change of family structure), or by external forces (often called disruptions; e.g., natural disasters, strikes, construction sites, new policies). In the following, we give a brief overview of studies investigating behavioural change under changing contexts.

There is strong evidence that disruptions of individuals' daily routines can trigger behavioural changes in mobility patterns (Larcom, Rauch, & Willems, 2015; Marsden & Docherty, 2013). Historic examples show that individuals frequently experience such disruptions and that they are normally able to adapt their behaviours. Even more experiences of such behavioural changes often do not seem to be "as painful or problematic to travellers as is often feared" (Marsden & Docherty, 2013, p. 53). For example, after the hurricane 'Sandy' in New York, several commuter lines had to be closed due to wind and water damages. This situation enhanced new forms of working such as working from home or at desks that were provided by local businesses (Marsden & Docherty, 2013). Also a Japanese study showed that the temporary closure of a highway triggered a change of behaviour in mobility patterns (Fujii, Gärling, & Kitamura, 2001). Besides choosing public transport more often, people also changed their perception about public transport (e.g., travelling time). These examples illustrate that the overall impacts of disruptions are not exclusively negative, but in fact can enable behaviour change (such as timing of commuting and choice of means of transport) and may even trigger social innovation.

While the studies above describe reactions to disruptions by external forces, transport policies may motivate people to change their contexts themselves in order to change mobility patterns. For example, enabling car users to try out alternative modes of transportation has shown to be a promising strategy to break existing mobility patterns. This is due to the fact that habits such as mobility patterns are strongly tied to certain circumstances (Wood et al., 2005). For instance, the results of several controlled field trials suggest that offering a free travel card for public transportation for a limited time can trigger behavioural change in habitual car drivers (Fujii & Kitamura, 2003; Thøgersen & Møller, 2008; Thøgersen, 2009). Fujii and Kitamura (2003), for example, investigated the influence of a one-month free bus ticket offer on car drivers' attitudes toward, habits of, and frequency of car and bus use. They found that the free trial positively influenced attitudes toward bus services and that it increased the frequency of bus use.

The key idea behind these kind of interventions is that habits are characterized by automatic choices through past experiences (Verplanken & Wood, 2006) and that they are closely related to circumstances (Wood et al., 2005). Thus, habits can be broken if circumstances change and an attractive alternative option is provided. A free travel card represents such an attractive alternative. This is the case even though the bus service might have been available before, because it is free of charge and it was given to people directly (i.e., people did not have to spend time buying it, choosing the correct travel card, etc.). By using the free travel card, car drivers may directly experience benefits of public transport and thus, change their perception about it (Thøgersen & Møller, 2008; Thøgersen, 2009). One such field trial was performed in the Greater Copenhagen area (Thøgersen & Møller, 2008; Thøgersen, 2009). Participants in this study received either a free travel card for one month, customized information about public transport, or they were assigned to a control group. Participants receiving a free travel card were more likely to use public transport compared to the control group. Use of public transport decreased slightly after the trial period, but was still higher compared to the control group. Offering customized information only without the benefit of a free travel card, however, did not have a significant effect on use of public transport (Thøgersen, 2009). In another study, Abou-Zeid and colleagues (2012) conducted an experiment with 30 participants in Switzerland to study the effect of a temporary change in the mode of travel to work on travel mode switching. Although none of the participants that were offered a free transportation pass switched to public transportation entirely after completing the experiment, several of them have changed their transportation behaviour by increasing the use of public transportation after the intervention. In addition, a follow up study by Abou-Zeid and Ben-Akiva (2012) conducted a similar experiment in the U.S. with a larger sample of employees from the Massachusetts Institute of Technology (MIT). In contrast to the Swiss study 30% of the MIT participants switched to public transport. The authors concluded that those commuters who gave up car-ownership and switched to public transportation were more conscious about the costs of commuting, and had more positive perceptions and attitudes towards public transportation.

### **Key figures of the Bike4Car 2015 campaign**

Most of the few studies available in this field focus on the impact of a temporary free public transportation ticket on the immediate and long-term use of public transportation. However, there exist other alternative modes of transport that can be the focus of an intervention study. The Bike4Car campaign in Switzerland did just that. Its aim was to better understand whether a free trial of an e-bike may change car owners' attitudes toward different modes of transport, as well as their habits and frequency of car use. An e-bike (electric bicycle) is a bicycle with an integrated electric motor to support cycling. During the campaign, e-bikes with different maximum speeds were available (from around 25 km/h up to 45 km/h). The campaign focused on e-bikes and not on regular bikes because in Switzerland, regular bikes are much more common compared to e-bikes. In 2010, 70% of households owned at least one regular bike while 2% of households owned an e-bike (BFS /

ARE, 2012) It was expected that car drivers would rather be motivated to give away their car keys to try out something new (an e-bike) than trying out something they already know.

The Bike4Car campaign took place from May to September 2015 in Switzerland. Car-owners were given a free e-bike for the period of two weeks in exchange for their car keys. After being piloted in several Swiss cities for some years now, showing promising results, the financial support by the Swiss government, has allowed a considerable upscaling in 2015. Bike4Car2015 was carried out in a collaborative process between the Swiss NGO myblueplanet, 32 Swiss cities and communities (in particular those who were awarded with the European Energy Award), local bicycle retailers, one large chain of outdoor and sports shops, and a professional communication agency.

In addition, the campaign was accompanied by different marketing activities specifically targeted at car owners (e.g., posters, advertising films, advertisement at petrol stations). The Bike4Car website [bike4car.ch](http://bike4car.ch) was visited by more than 100'000 people. Furthermore, more than 45 media articles were written about the campaign (Witschi, 2015). On the local level, the involved communities performed different activities to motivate participation (e.g., participation of local celebrities, such as politicians or athletes).

In total, 1854 people participated in the campaign. A majority of participants came from the German-speaking part of Switzerland ( $n = 1484$ ), 331 participants came from the French-speaking part of Switzerland and 39 participants came from the Italian-speaking part (Witschi, 2015). After trying out the e-bike, participants had the opportunity to buy the bike for a reduced price. This led to around 15% of participants ( $n = 271$ ) buying an e-bike directly after the trial (EnergieSchweiz, 2015).

## Study goals and hypothesis

The aim of our study was to accompany the campaign by applying a social scientific research approach. By surveying participants who took part in the free trial shortly before and shortly after the campaign, the major objective of this accompanying research project was to generate know-how of the effectiveness of such car-diet campaigns. In particular, we aimed to identify participants' motivations to participate, their experiences during the trial and whether such a free trial impacts on participants' intentions to reduce car use in the future. Based on the literature (Fujii & Kitamura, 2003; Thøgersen & Møller, 2008; Thøgersen, 2009; Verplanken et al., 2008; Wood et al., 2005), we hypothesized that after trying out the e-bike, a change in participants' habitual associations between typical mobility-related situations and means of transport would occur. More concretely, we expected that after the e-bike trial, participants would show weaker associations between such typical mobility-related situations and car use and stronger associations with alternative means of transport.

## Method

### Procedure

The campaign was accompanied by researchers to investigate experiences of users and intention to change mobility-related behaviour patterns after participating in the campaign. As one part of the evaluation, participants in the campaign were asked to fill in two questionnaires, one before the trial and one after returning the e-bike.

Most participants of the Bike4Car campaign signed up online. Only a few participants registered with a local bicycle store. Before being handed over the free e-bike for a trial period, the participants that registered online were sent a link to the first online questionnaire, requesting their participation in the survey. Reminders were sent by email to those that did not respond. After the free trial period, participants were sent another invitation to participate in the follow-up survey containing

a link to the second questionnaire. Again, reminders were sent by email in order to increase participation rate. Both invitations and the reminders were sent out by the NGO myblueplanet. As an incentive for participation, all respondents took part in a lottery of attractive, e-bike- or bike-related prizes that were sponsored by the partners of the campaign.

## Sample

Participants chose between a German, French, or Italian version of the questionnaire. Due to the low number of Italian-speaking participants in the campaign, the following analyses include only responses by German and French speaking ones. In total, 449 people started to fill out the first questionnaire, and 405 completed it. This corresponds to a dropout-rate of about 10%. Of the respondents of the first questionnaire, 83% choose the German version of the survey, while 17% chose the French one. As for the second questionnaire, 254 participants started to fill it out, while 218 completed it, which corresponds to a dropout-rate of around 14%. In the second questionnaire, the share of French-speaking respondents was slightly higher (22%) than in the first one. After matching the data of both datasets, it showed that 90 participants completed both questionnaires. In the following analyses, only complete questionnaires were considered, and no distinction was made between the French and German responses.

Table 1 provides an overview of the sample characteristics. Interestingly, more males participated than did females, and the sample has a higher level of education than the general Swiss population (Swiss Federal Statistical Office, 2013). Comparing the samples for both questionnaires indicates that both samples are comparable regarding the described characteristics. Table 1 also shows that around 45% of participants live in a household that owns one car whereas around half of the respondents live in a household that owns two or even more cars. This is an indication that the campaign does in fact reach individuals with a high potential for car use reduction.

**Table 1.** Sample characteristics

Variable	Questionnaire 1 (N = 405)	Questionnaire 2 (N = 218)	Swiss population statistics
Gender	65% male, 35% female	67% male, 33% female	49% males, 51% females (Swiss Federal Statistical Office, 2016b)
Age	M = 43.1, SD = 10.8 years	M = 43.1, SD = 10.2 years	M = 41.9 years (Swiss Federal Statistical Office, 2016b)
No of cars in household	45%: 1 car, 45% 2 cars; 10%: 3 or more cars	47%: 1 car, 43% 2 cars; 10%: 3 or more cars	49%: 1 car, 30% two or more cars, 21% no car (BFS / ARE, 2012)
Household size	2.9 people	3.1 people	2.25 people (Swiss Federal Statistical Office, 2016a)
Level of education	56% university degree, 29% vocational training	59% university degree, 26% vocational training	18% university degree, 44% vocational training (Swiss Federal Statistical Office, 2013)

## Measures

**Motivation for participating in the campaign (questionnaire 1).** Participants were given a list of different reasons for participating in the campaign. These included health benefits, protection of the environment, trying out new means of transport, trying out a car-free lifestyle, saving money and acting as a role-model for others. Participants rated the importance of each reason on a six-point-

Likert scale, ranging from 1 = not at all important to 6 = very important (see Table 2 for a detailed list of items).

**Car use routines (questionnaire 1 and 2).** To test our hypothesis, both questionnaires included the response frequency (RF) measure developed by Verplanken and colleagues (1994), and also used by Thøgersen and Møller (2008), in order to identify car use habits. We confronted participants with nine different mobility-related situations, which we adapted slightly from those used by Thøgersen and Møller (2008) in order to fit the Swiss context. They included: picking up somebody from the railway station; visiting a friend in the next city; visiting the mountains with friends for one day; commuting to work; doing sports; going for a walk in the forest; going shopping in the next supermarket; and going to the next post office. For each situation, participants were asked about the first travel mode that came to their mind when thinking about this particular situation. They were given several options, including car, motorcycle, train, bus/tram, bicycle, e-bike, or walking by foot. For each participant, the number times he or she chose a particular option was then used as a measure for that person’s habitual choice of a particular mode of transportation. Hence, these sum scores ranged between 0 and 9 for each mode of transportation.

**Intentions to change mobility use patterns in the future (questionnaire 2).** In the second questionnaire, participants were asked how serious their intention was to i) buy an e-bike, ii) use their car less and iii) sell their car in the near future. Participants responded on a 6-point-Likert-scale from 1 = not at all to 6 = very much (see Table 4 for items).

**Activities and experiences during the e-bike trial (questionnaire 2).** In the second questionnaire, participants were asked which activities they used the e-bike for, by choosing from a list containing the following activities: commuting to work, shopping, travelling to a leisure activity such as sports, trips alone, and trips with friends. Also they were asked if and in which situations they have been experiencing difficulties without having a car. Furthermore, they were confronted with nine statements about their experiences with e-bikes during the trial phase. These statements referred to health-related and environmental issues, amongst others. Participants responded to those questions on a 6-point-Likert-scale ranging from 1 = I do not agree at all to 6 = I agree completely (see Table 5 for items).

## Results

### Motivation for participating in the campaign

Table 2 displays the motivations indicated by participants of the first questionnaire. The most important reason for participating in the campaign was to try out a new means of transport, followed by health and fitness related issues. Third, many people stated that they wanted to take the opportunity to try out an e-bike before taking a final purchase decision.

**Table 2.** Relevance of different motivations for participants’ decision to take part in Bike4Car.

<b>Items</b>	<b><i>M</i></b>	<b><i>SD</i></b>
I would like to try out a new means of transport	5.18	1.07
I would like to improve my health condition	4.63	1.31
I would like to try out an e-bike before purchasing one	4.55	1.37
I would like to make a contribution to climate protection	4.40	1.39

I would like to try out a car-free daily routine	4.38	1.42
I would like to reduce my stress level	3.54	1.58
I would like to be a role model to other people	3.31	1.66
I would like to save money	2.97	1.49
I would like to ride the e-bike together with other people	2.84	1.63

Note: Scale from 1 (not at all important) to 6 (very important).  $N = 405$ .

## Car use routines

To evaluate car use routines, we only analysed the data by those participants that filled in both the first and the second questionnaire ( $n = 90$ ). Table 3 displays the calculated mean sum scores for the different means of transport for both questionnaires. On average, the car was the means of transport chosen for most of the situations, followed by the bicycle and the train. For each mean of transport, a paired sample t-test was carried out to test whether any difference occurred between the responses of the first and the second questionnaire. When comparing the habitual associations related to the choice of means of transport before and after trying out an e-bike, we found significant shifts in responses: After having participated in the trial, the number of times the car was mentioned by the participants significantly dropped,  $t(89) = -2.47, p < .01$ , one-tailed. At the same time, the number of times the e-bike was mentioned significantly increased in contrast to before taking part in the trial,  $t(89) = 1.85, p < .05$ , one-tailed. Although this effect is statistically significant, it is important to note that effect sizes are rather small. These results support our hypothesis and indicate that trying out an e-bike has the potential to at least moderately break mobility habits.

**Table 3.** Test of differences in mean sum scores for means of transport between both questionnaires.

Sum score	First questionnaire	Second questionnaire	$t$	Effect size $r$
Car	$M = 4.34, SD = 1.90$	$M = 4.00, SD = 1.98$	-2.47**	0.25
bicycle	$M = 1.69, SD = 1.56$	$M = 1.76, SD = 1.60$	0.48	0.05
Train	$M = 0.97, SD = 1.90$	$M = 1.07, SD = 0.93$	1.32	0.14
By foot	$M = 1.21, SD = 1.02$	$M = 1.19, SD = 1.04$	-0.20	0.02
e-bike	$M = 0.28, SD = 0.85$	$M = 0.56, SD = 1.24$	1.85*	0.19
Bus / tram	$M = 0.19, SD = 0.49$	$M = 0.18, SD = 0.49$	-0.22	0.02
Motorcycle	$M = 0.17, SD = 0.52$	$M = 0.16, SD = 0.50$	-0.28	0.03

Note: Results are based on paired sample t-tests. \*\*  $p < .01$ , \*  $p < .05$  (one-tailed).  $N = 90$ .

## Intentions to change mobility use patterns in the future and experiences during the trial

In the second questionnaire, participants indicated their intentions to change mobility-related behaviours in the future. Table 4 displays that participants reported quite a high intention to buy an e-bike and to drive their car less in the future. However, participants did not indicate that they were willing to opt for radical changes such as selling the car.

**Table 4.** Participants' intention to change mobility behaviour in the future.

Items	$M$	$SD$
How serious is your intention to buy an e-bike due to the e-bike trial?	4.40	1.45
How serious is your intention to drive your car less due to the e-bike trial?	4.05	1.33
How serious is your intention to sell your car due to the e-bike trial?	1.93	1.29

Note: Scale from 1 (not at all) to 6 (very much).  $N = 212$ .

## Activities and experiences during the e-bike trial

In the second questionnaire, participants indicated the activities they used the e-bike for. The activity mentioned most often was commuting (84%,  $n = 183$ ), 39% ( $n = 84$ ) used it for shopping, 32% ( $n = 69$ ) used it for travelling to a leisure activity, such as sports, and 28% ( $n = 62$ ) used it for leisure trips alone or with friends (19%,  $n = 41$ ). About half of the participants ( $n = 111$ ) stated that not having access to a car was never difficult during the trial period. The other half of the participants, have encountered challenges in the following situations: transporting groceries (32%,  $n = 69$ ), rainy weather (21%,  $n = 46$ ), transporting children (13%,  $n = 29$ ), trips to remote areas (13%,  $n = 28$ ), and weekend trips (10%,  $n = 21$ ). Participants also provided some general experiences of their trial period. Table 5 summarizes the respective results. Participants mostly agreed to the statement that riding an e-bike is fun and that they received positive feedback from friends and family because they participated in the campaign.

**Table 5.** Participants' experiences during the e-bike trial.

Items	<i>M</i>	<i>SD</i>
Riding an e-bike is fun.	4.90	0.75
I got positive feedback from friends because I participated.	4.18	1.13
I feel like I made a contribution to environmental protection.	4.06	1.18
I feel healthier and fitter after the trial.	3.85	1.29
I did not miss my car during the trial.	3.48	1.36
I feel like a role model because I participated.	3.29	1.44
My daily routine was more complicated during the trial.	3.05	1.31
My daily routine was easier during the trial.	2.95	1.18
Not having a car for 14 days was difficult.	2.82	1.36

Note: Scale from 1 (I do not agree at all) to 6 (I do agree completely).  $N = 209-212$ .

## Relationship between intention to change behaviour and experiences gained

As a next step, three multiple linear regression analyses were performed to better understand the relationship between intention to change behaviour and participants' experiences gained during the trial. Table 6 displays the following patterns regarding intentions to reduce car use and intentions for selling the car in the future: Those participants that felt healthier and fitter after the trial were more likely to intend to drive the car less often in the future. In addition, those participants that received positive feedback from friends for participating in the campaign were also more likely to show intentions to reduce car use in the future. In a similar vein, the intention to sell one's car was positively related to the reception of positive feedback from friends. In contrast, unsurprisingly, participants who experienced difficulties during the trial while not having their car were less likely to indicate that they were intending to sell their car.

In line with that, participants' intention to buy an e-bike was higher if they perceived riding an e-bike as fun and if they felt healthier and fitter after the trial. Intention to buy an e-bike was smaller if participants perceived their daily routine without a car as more complicated as when being able to rely on their car.

Interestingly, neither the feeling to have contributed to environmental protection or to have acted as a role model was significantly related to intentions to change mobility behaviour. It seems that health-related issues, positive experiences regarding daily routines without a car, fun as well as social feedback are much more important factors to trigger behaviour change.



**Table 6.** Multiple linear regression analyses on intentions to change behaviour.

	Drive less adjusted R <sup>2</sup> = .21			Sell car adjusted R <sup>2</sup> = .11			Buy e-bike adjusted R <sup>2</sup> = .15		
	B	SE B	β	B	SE B	β	B	SE B	β
(Constant)	2.14	0.69		1.42	0.70		3.00	0.79	
Riding an e-bike is fun.	-0.15	0.13	-0.08	-0.15	0.13	-0.09	0.44	0.15	0.23**
Not having a car for 14 days was difficult.	-0.12	0.08	-0.12	-0.18	0.08	-0.19*	-0.11	0.09	-0.10
I feel healthier and fitter after the trial.	0.22	0.08	0.21**	0.09	0.08	0.09	0.28	0.09	0.24**
My daily routine was easier during the trial.	0.16	0.09	0.14	0.03	0.09	0.03	-0.26	0.10	-0.21*
My daily routine was more complicated during the trial.	-0.01	0.08	-0.01	-0.03	0.08	-0.03	-0.30	0.09	-0.27**
I got positive feedback from friends because I participated.	0.35	0.09	0.30***	0.27	0.09	0.24**	0.17	0.10	0.13
I did not miss my car during the trial.	-0.03	0.07	-0.03	0.12	0.07	0.13	-0.12	0.08	-0.11
I feel like a role model because I participated.	-0.07	0.07	-0.07	0.02	0.07	0.02	-0.07	0.08	-0.07
I feel like I made a contribution to environmental protection.	1.47	0.09	0.13	-0.06	0.09	-0.06	0.02	0.10	0.01

Note: *N* = 209.

## Discussion

### Summary of results

The main goal of this study was to identify participants' motivations to participate in the campaign, their experiences during the trial and whether such a free trial impacts on participants' intentions to reduce car use in the future. By surveying participants before and after the trial we could demonstrate that trying out an e-bike has the potential to at least moderately break mobility habits: After the trial, participants showed weaker associations between typical mobility situations and car use, and stronger associations between such situations and using an e-bike. Although effects are small, our results indicate that trying out new means of transport represents an opportunity to break mobility habits and provide participants with new perspectives on alternative means of transport. As such, our results are in line with other studies that looked at the effect of interventions for public transport on mobility patterns (Abou-Zeid & Ben-Akiva, 2012; Fujii & Kitamura, 2003; Thøgersen & Møller, 2008; Thøgersen, 2009). Furthermore, participants' willingness for a radical change in mobility patterns seems rather low (only a few participants were willing to sell their car in the near future). However, participants reported a rather high willingness to reduce car use and to buy an e-bike after the trial. Our study indicates that health-related reasons and positive social feedback from friends and family are important triggers for such changes of behaviour.

### Limitations of the study

While the study offers interesting insights into the impacts of a real-world intervention on intention to change mobility patterns, it is essential to acknowledge the limitations of this study.

First, not all participants that took part in the campaign responded to the survey. Therefore, conclusions drawn from this study might not be representative of all participants of the Bike4Car campaign. At this moment, it is not possible to identify whether any significant differences in

demographic and other criteria exist between those participants that have filled in the questionnaire(s) and those that have participated in the campaign but did not reply to the survey(s). In order to be able to address this issue, at least some basic information on demographic factors from all participants should be collected in a future campaign. Another avenue would be to motivate more participants to respond to the survey(s) in the future. This could be achieved by integrating the questionnaire into the application process.

Second, the campaign itself includes a self-selection bias, as only people who were interested in trying out new mobility patterns and experiencing a car-free lifestyle for a limited amount of time participated. Thus, our findings may not be generalizable to Swiss car owners in general but may at most be generalizable to those car owners that are open towards alternative means of transport.

Third, the second questionnaire was administered right after participation in the campaign; hence only short-term impacts of the campaign can be assessed. This drawback will be resolved by sending another questionnaire to the Bike4Car campaign participants in spring 2016, hence half a year after completion of the campaign. This will allow measuring more long-term effects of the intervention.

Fourth, the second questionnaire only measured intentions for behaviour change during the campaign and not actual behaviour. In the future, the e-bikes could be equipped with distance trackers. This would allow measuring how many kilometres participants drove during the trial period.

Fifth, the summer season probably had a big positive impact on the success of the intervention. Probably, it would have been much more difficult to motivate people to give away their car keys during cold and rainy or snowy winter months. This points again to the importance of context when an intervention takes place. Again, a follow-up study will show if behavioural changes have remained during the winter months or if people switched back to their old mobility habits.

## **Recommendations for further developing the intervention**

From our perspective, the Bike4Car campaign represents an interesting intervention, because it targets those individuals where a large potential for substantial energy savings in mobility can be identified, namely those that have at least one car and often two or more at their disposal. In particular for households that own two cars, an e-bike might be an interesting option to substitute the second car.

Based on the results from our survey, we see the following potentials to improve campaigns like Bike4Car. First, the results have shown that one major reason for participating in the campaign and for changing behavioural patterns are health- and fitness-related reasons. Reasons related to environmental protection were only of minor importance. People seemed much more motivated by solid multiple benefits of e-bikes such positive impacts on health and fitness. These multiple benefits should be stressed in a future campaign. In order to increase participation rate, fitness clubs as well as sports magazines could be won as partners to motivate their members and readers to participate.

In addition to that, our analyses indicate that social feedback is an important trigger of change of behaviour. This is not surprising as social norms are important drivers for energy-saving behaviour (Schultz, Khazian, & Zaleski, 2008; e.g., Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). This effect could be used to further strengthen participation in the campaign and supporting behaviour change. One idea could be to consider formal social groups such as sports clubs for participation (Moser, Blumer, Seidl, Carabias-Hütter, & Furrer, 2015). Similarly, teams in the workplace might be a promising starting point, as many participants used the e-bike for commuting. Employers are, for example, successfully targeted by another intervention in Switzerland that promotes biking to work (Bike to Work, 2013). Another approach would be to motivate participants to invite a friend for participation or to share their experiences on social media platforms, or to make public commitments to change their behaviour after the trial.

Finally, results indicate that participants encountered challenges, for example for transporting groceries or children, or during times of rainy weather. Offering the possibility to use an e-cargo-bike for transports might represent an interesting option, or combining Bike4Car with coupons for home delivery services (Schnider & Segmüller, 2015). In addition to that, a limited number of free or discounted vouchers for local taxis, as well as discounts on weather-protecting clothes could be offered to participants to encounter difficulties caused by rainy weather.

## **Opportunities for research and practice of accompanying research on real-world interventions**

From our perspective, this kind of accompanying research offers multiple benefits both for research and for practice. For practice, on the one hand, a systematic evaluation of an intervention helps to better understand the impacts of an intervention and to further developing it. For research, on the other hand, such campaigns offer unique opportunities to test the impacts of real-world interventions in the field. For both purposes, a field experiment represents a promising setting. Ideally, researchers collaborate closely together with practitioners already in the developmental phase of the intervention. Such a collaborative process allows that local experiential knowledge can be combined with scientific knowledge about behaviour-change interventions to develop interventions that fit local contexts, are locally accepted and have a high impact.

## **Conclusions**

Our study indicates that changing contexts indeed can trigger intentions to change mobility behaviour. While this result is in line with research studying the impacts of free travel cards (Fujii & Kitamura, 2003; Thøgersen & Møller, 2008; Thøgersen, 2009), our study shows that this effect also holds when trying out new means of transport. Thus, getting on a car-diet while trying out an e-bike has the potential to break mobility patterns. For motivating more sustainable behaviour in mobility – which represents a complementary strategy to more efficient means of transport – stressing ecological benefits of e-bikes will probably not suffice. A more promising strategy to motivate behavioural change is to emphasize the multiple benefits of using an e-bike such as fun as well as improved health condition and fitness.

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