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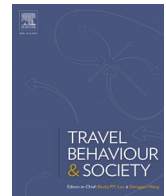
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Moving your electric car for others: Identifying injunctive norms for sharing public charging points

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ABSTRACT

Public charging points are essential for the transition to electric mobility, but there is a lack of knowledge on electric vehicle (EV) drivers' perceptions of explicit social norms regarding the appropriate usage of these shared charging points. Communicating to EV drivers how other EV drivers believe that public charging points should be used could improve the use of charging points and the development of social norm interventions. Hence, we aim to identify the injunctive norms for sharing public charging points from the perspective of EV drivers. We analysed responses from EV drivers to an open survey question about their perception of appropriate social behaviour at public charging points. We coded responses deductively with a set of previously identified prosocial charging behaviours and inductively to identify additional prosocial charging behaviours. Respondents (N = 246) referred to 11 different behaviours. The main injunctive norm is to move a fully or sufficiently charged vehicle from the charging spot after charging. Two less relevant injunctive norms are interpersonal interactions between EV drivers, such as contacting other charging point users about the charging point by sharing contact details and using apps, and charging only when necessary or only charging the necessary energy. Additionally, for these three injunctive norms, we coded details mentioned by respondents, such as motivations and considerations. We recommend that municipal policymakers and charge point operators make the social context of charging at public charging points salient in their communication, facilitate social interaction, and avoid communication on ambiguous behaviours.

1. Introduction

The deployment and use of public charging infrastructure are essential in light of the increasing electric vehicle (EV) sales (International Energy Agency, 2024) as part of the transition to electric mobility. Public charging infrastructure is vital for EV drivers (Anderson et al., 2018), and infrastructure investments are an important part of promoting EV adoption (Ledna et al., 2022). The expansion of public charging infrastructure does not go unnoticed among non-EV drivers (Long et al., 2019) and might be an important aspect in their decision to choose an EV as their next vehicle (Globisch et al., 2019). This is particularly relevant when people rely on on-street parking – and therefore public charging infrastructure – if they want to charge their vehicle (Budnitz et al., 2024).

The transition to EVs requires both technological change, such as public charging infrastructure deployment, and social and behavioural

change (Nelson and Allwood, 2021), such as the adequate use of this infrastructure. Charging an EV at a (public) charging point requires a different strategy than refuelling an internal combustion engine vehicle at a filling station (Sprei and Kempton, 2024). Refuelling an internal combustion engine vehicle is based mostly on monitoring the fuel level and subsequently finding a filling station (Sprei and Kempton, 2024). A similar strategy is unfit for EV charging, as EV charging requires more planning and routine behaviour (Philipsen et al., 2018) by charging at specific locations or based on daily habits (Sprei and Kempton, 2024). Using public charging points, such as those in neighbourhoods, furthermore means sharing them with others and therefore dependence on the behaviour of others (Tamis et al., 2024). Sharing charging points with others requires new behaviour and rules on behaving appropriately. Charging etiquettes prescribe appropriate behaviour at public charging points, such as not parking at a charging point without charging (The Australian Electric Vehicle Association, n.d.), but explicit

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social norms from the perspective of EV drivers have not been identified.

Identifying these social norms is important, because exploratory research has shown that, among EV drivers, shared social norms and rules on how to use public charging infrastructure are desirable and that a lack thereof might inhibit the use of this type of infrastructure (Caperello et al., 2013) and slow the transition to EVs. Information on social norms is particularly important in situations where people do not know how to behave but want to act according to these norms (Lindenberg and Steg, 2007), as this allows people to comply with, or conform to, what is being requested of them (Cialdini and Goldstein, 2004). Communicating social norms provides a cue to the individual on how to behave and reinforces the behaviour's normative goal (Lindenberg and Steg, 2007).

Social norms are considered “rules and standards” that guide an individual's behaviour (Cialdini and Trost, 1998, p. 152). When technology is shared, such as public charging points, the behaviour of others plays an important role. Social norms can signal to users how technology should be used based on a shared understanding of the behaviour by all users. For example, the introduction and use of, and compliance with, rules for a village sharing a solar power system, so that energy usage remained within the system's limits (Jenny et al., 2006, 2007), shows the positive effect of social norms on shared technology use. In contrast, concerning the use of a community-shared battery, potential adopters identified the risk of community members lacking energy because other community members had used too much (Ambrosio-Albalá et al., 2019), highlighting the need for social norms on technology usage when new shared technology is implemented. Therefore, social norms could help people understand how to use new, shared technology effectively when usage depends on the social context.

Leveraging social norms on appropriate shared technology use first requires the identification of these norms. Injunctive norms, as a particular type of social norms, refer to the behaviour of which most other people approve in a given context (Cialdini et al., 1991; Cialdini and Trost, 1998). For instance, a study on solar panel adoption showed that the injunctive norm that adopting solar panels is what relevant peers think respondents should be doing meant the respondents were more likely to invest in solar panels (Curtius et al., 2018). Injunctive norm messages have also been shown effective in sharing workplace charging points, whereby messages were sent to employees with EVs asking them to be considerate of other users and unplug their vehicle after a certain amount of time or once the vehicle had finished charging (Asensio et al., 2022). Highlighting how conforming to an injunctive norm is an opportunity to work towards a shared goal (Sparkman et al., 2021), such as an available charging point for everyone who needs to charge, might strengthen the normative message and highlight the advantage of acting according to this norm. Thus, communication can benefit from injunctive norms (Cialdini, 2003), including communication on the use of shared technology.

Injunctive norms for sharing public charging points must be identified for two reasons: first, with countries aiming to expand their public charging networks (International Energy Agency, 2024), adequate use of this infrastructure requires appropriate behaviour. EV drivers' failure to understand how public charging points should be shared with other users in a broader social context hinders the efficient use of public charging infrastructure. Second, communicating widely shared injunctive norms for sharing public charging points might be particularly relevant for implementing interventions targeting behaviour change regarding charging behaviour by appealing to social norms. In previous studies, social and injunctive norms have been tested and proved effective in encouraging EV drivers to move their vehicles (Asensio et al., 2022; Bornioli et al., 2024), although these norms do not appear to be based on empirical research. Similarly, new business models aimed at making public charging more accessible and affordable and simultaneously involving a broader social context, such as community-financed charging points (Azarova et al., 2020) and community-owned charging points shared with external users (Velkovski et al., 2024), could benefit

from knowing the injunctive norms that favour adequate sharing of these charging points and could be communicated to both members and visitors.

Therefore, we aim to identify the injunctive norms for sharing public charging points from the perspective of EV drivers.¹ To the best of our knowledge, injunctive norms for sharing public charging points have not been established based on empirical research on EV drivers' understanding of desirable behaviour for sharing them. However, research on charging behaviour at public charging points has hinted at the use of moral appeals to encourage EV drivers to vacate charging spots (Soetevent, 2024) and social norms for sharing charging points (Visaria et al., 2022; Wolbertus et al., 2018).

Identifying injunctive norms on charging point sharing allows these norms to be made explicit and subsequently communicated to EV drivers as a behaviour change method to increase charging point availability. For this study, we used a dataset from which we wanted to distil these injunctive norms. To structure our analysis, we used part of Tamis et al.'s (2024) behavioural framework that identified six behaviours, which they dubbed as prosocial charging behaviours: behaviours beneficial for other EV drivers' use of public charging points – such as contacting other EV drivers about the charging point and treating the charging point properly by avoiding damage or misuse. These behaviours can concern interpersonal interactions between charging point users or human–technology interactions between charging point user and their EV or the charging point, highlighting how the opportunity to charge is influenced (Tamis et al., 2024). These six prosocial behaviours illustrate how EV drivers can behave to increase charging point availability (Tamis et al., 2024) and, therefore, provide a suitable framework for identifying injunctive norms for sharing public charging points. However, Tamis et al.'s (2024) study was explorative and based on expert interviews rather than research on EV drivers. We do not know how EV drivers value these behaviours or whether other behaviours might also prove important. We investigate this using data on EV drivers' perception of social behaviour at public charging points.

As we aim to identify the injunctive norms for sharing public charging points, the main research question of this study is:

RQ: What are the injunctive norms for sharing public charging points?

We answer the main research question by addressing three sub-questions:

- How do EV drivers' descriptions of prosocial charging behaviours align with those previously identified?
- What norm-related details are mentioned most in the descriptions of prosocial charging behaviours?
- What new prosocial charging behaviours can be identified?

This paper is structured as follows: in section 2, we explain data collection, sample characteristics, and data analyses. In section 3, we present the results, followed by a discussion of the results and methodology in section 4. We close with the conclusion and policy implications and recommendations in section 5.

¹ In this paper, we use the term *public* charging points to refer to public and semi-public charging infrastructure in neighbourhoods, at workplaces, and various locations where public charging infrastructure is accessible to the public, albeit with some restrictions on use, parking, and/or opening times (Netherlands Enterprise Agency, 2019). In this study, these locations are specified as shopping centres, entertainment venues, sports locations, and health facilities. Since we did not collect data on behaviour relevant to sharing fast chargers, this type of charging infrastructure is not included in this paper.

2. Methodology and data

2.1. Collection and design of original data

For this study, we used a dataset with results from a survey as a secondary data source. The respective owner granted access to the original dataset; the owner used the data from the survey in a conference paper and a journal article (Helmus et al., 2020; Helmus and Wolbertus, 2023). The original survey was created using Qualtrics and distributed via various online social media channels. It consisted of (a maximum of) 30 substantive questions and was available in both Dutch and English. Responses were collected between 24 February 2020 and 18 March 2020. A short informed consent form was included, and respondents had to agree to participate before filling in the survey.²

Eight variables from the original dataset were used to create a new dataset for this study. A description of each variable, the data content for each variable, and the purpose of each variable for this study are described in Table 1. The first four variables contain information on the type of survey response, such as respondent ID and user language. The next four variables contain data from survey questions. The data from the main survey question (variable 8, survey question 4 in Table 1) were used to answer the main research question of this study: *What are the injunctive norms for sharing public charging points?* The data from this survey question – an open question where respondents could enter text to indicate what they consider social charging behaviour – have not been reported in any other publication. The Dutch and English versions of the four survey questions are presented in Table A.1 in Appendix A.

2.2. Sample size, inclusion criteria, and characteristics

The original dataset consisted of 508 responses. Five criteria were used to filter the responses: response ID (criterion 1), type of response (criterion 2), type of vehicle (criterion 3), the content of the answer (criterion 4), and use of charging infrastructure (criterion 5).

For criterion 1, responses had to have a unique response ID. No double response IDs were identified. For criterion 2, responses had to be filled in by respondents and were not allowed to be survey previews filled in by researchers. This resulted in 11 preview responses filtered from the dataset. For criterion 3, responses had to state whether a battery EV or a plug-in hybrid EV was driven. Sixteen responses were excluded: ten responses indicated not driving an EV, and six responses did not provide information on the type of vehicle driven.

For criterion 4, the response had to contain an answer to the survey question about social charging behaviour that would be suitable for analysis. We included only answers describing or referring to behaviour, as we aim to identify injunctive norms that signal an action perspective. We excluded illegible answers (e.g., a string of random characters) or unclear answers, such as answers not reflecting on social charging behaviour but elaborating on other topics (e.g., an answer explaining that the respondent does not charge at public charging points) or answers not describing or referring to behaviour (e.g., an answer describing social charging behaviour as a novel concept) relevant for sharing a public charging point. We also excluded unspecific answers such as answers describing social charging behaviour as respecting other EV drivers' charging needs, because it is unclear what behaviour attains this goal. As we aim to identify injunctive norms for prosocial behaviour, we also excluded answers that described only antisocial charging behaviour but did not specify whether the respondent disapproved of this antisocial charging behaviour. For this criterion, 165 responses did not provide an answer to the survey question about social charging behaviour. Four responses provided an illegible answer, six answers did not reflect on social charging behaviour, 32 answers did not describe or

Table 1
Description of variables and content from the original dataset.

Variable in the new dataset	Description of variable as imported from the original dataset	Data content	Purpose for this study
1	Response ID	Generated string of numbers and letters	Inclusion criteria 1: response ID is unique
2	Recorded data	Day-month-year and hour-minute-second format	Indicate the timeframe of data collection
3	Status response type	One of two options: 1) Survey preview 2) IP address	Inclusion criteria 2: the status response type is IP address (signalling a response from a respondent)
4	User language	One of two options: 1) EN 2) NL	Description of sample
5	Survey question 1: the type of vehicle driven by the respondent	One of four options: 1) Battery electric vehicle 2) Plug-in hybrid electric vehicle 3) No electric vehicle 4) No answer [survey not filled in further]	<ul style="list-style-type: none"> Inclusion criteria 3: the respondent drives a battery electric vehicle or a plug-in hybrid electric vehicle Description of sample
6	Survey question 2: the distribution of charging sessions per type of charging point	A percentage between 0 and 100% per type of charging point (sum of all four options should be 100%): 1) Public charging point 2) Fast charger/supercharger 3) Semi-public charging point 4) Private charging point	<ul style="list-style-type: none"> Inclusion criteria 5: the respondent charges at public charging points, and information on the location of public charging points used is provided Description of sample
7	Survey question 3: length of charging session per type of public charging location	One or more of the following answer options: For each of the following public charging stations: 1) Short 0–4 h 2) Medium 5–8 h 3) Long 9–16 h 4) More than 17 h 5) N/A 6) No answer [question not mandatory] 1) Home 2) Work/office 3) Shopping centres/entertainment venues 4) Visiting others 5) Sports location or health facilities 6) Sports location or health facilities	<ul style="list-style-type: none"> Inclusion criteria 5: the respondent charges at public charging points, and information on the location of public charging points used is provided Description of sample
8	Survey question 4: survey question on social charging behaviour	Text entry	<ul style="list-style-type: none"> Inclusion criteria 4: the question is answered, describing behaviour relevant for sharing the charging point Data for the research questions

² The Ethical Review Board of the Eindhoven University of Technology provided permission for the secondary data analysis.

refer to behaviour, and nine responses answered the question in terms of antisocial charging behaviour.

For criterion 5, we included responses that confirmed the use of public charging infrastructure by indicating in survey question 2 that they charged at (semi-)public charging points, and in survey question 3 specified the type of location where they charged publicly. We excluded any responses that did not provide information on the location where the public charging infrastructure was used, as we could therefore not verify whether these respondents had experience of sharing charging points.³ We filtered out eight responses that did not provide any information on the location where public charging points were used and seven responses that, based on the combination of answers, indicated that the respondents likely charged only at private charging points.

A total of 250 responses were included in the analysis of the main survey question about social charging behaviour. Per criterion 5, all respondents in the sample used public charging points for some of their charging needs, such as charging at public venues (e.g., sports or health facilities, shopping centres), at a workplace, or in the neighbourhood.⁴

2.3. Analyses

To identify the injunctive norms for sharing public charging points from the perspective of EV drivers, we analysed EV drivers' answers to the open-ended question about their understanding of social charging behaviour at public charging points. As the output concerned text, we applied qualitative data analysis. The length of the answers given by respondents differed, from several words to a few sentences. We coded each part of the respondent's answer; hence, one respondent's answer could refer to multiple behaviours. This approach means that a respondent who referred to multiple behaviours contributed more dataset entries than a respondent who referred to only one behaviour. EV drivers might consider multiple behaviours relevant for injunctive norms and might differ in their understanding of which behaviours are important for sharing public charging points, for instance, based on their charging habits or local charging pressure. Therefore, each mention of a behaviour was treated equally; no weight was given to the mention of a behaviour based on, for instance, the number of behaviours mentioned in the answer, how elaborate the behaviour's description was, or in what order behaviours were noted. Data were analysed using Excel. Excel's flexibility in display options allowed for the qualitative data analysis of the text entries, while also providing the ability to quantify these and other data (Meyer and Avery, 2009), such as counting the number of times specific details were mentioned for a particular behaviour. Parts of answers referring to private or fast charging infrastructure or measures to influence charging behaviour (e.g., valet services or fines) were not coded. Eleven respondents (4.4%) referred to themselves and/or their own behaviour. These answers were included on the assumption that these respondents might find their own behaviour exemplary.

We first coded answers deductively (Bingham, 2023), ascribing each (part of the) answer to one of the six prosocial charging behaviours identified by Tamis et al. (Tamis et al., 2024): (1) contacting other EV drivers about the charging point, (2) charging only when necessary or only charging the necessary energy, (3) moving a vehicle from the charging spot after charging or within a specific time after charging,⁵ (4) treating the charging point properly by avoiding damage or misuse, (5) reporting damage to, or malfunctioning of, the charging point, and (6) requesting a new public charging point. For behaviour 3, moving a vehicle from the charging spot after charging, we included answers that

referred to unplugging a vehicle but did not explicitly refer to moving the vehicle and answers that disapproved of parking a vehicle at the charging point or leaving it parked after charging. Any answers, or parts of answers, not fitting within these six behaviours were assigned to a separate category for inductive analysis.

After each answer was assigned to one of the six behaviours, we inductively coded the details mentioned in the answers. We did so by reviewing and comparing the answers within each behaviour to identify common codes (Bingham, 2023), such as motivations and

Table 2
Six prosocial charging behaviours, the type of details coded per behaviour, and the categories per type of detail.

Behaviours from (Tamis et al., 2024)	Type of details	Categories per type of detail
1. Contacting other EV drivers about the charging point	Method of contact between EV drivers	a. Smartphone apps b. Sharing contact details c. Other references
	State of charge	a. Reference to battery percentage
2. Charging only when necessary or only charging the necessary energy	Motivations and considerations	a. <i>Motivation:</i> for other charging point users b. <i>Consideration:</i> distance to (charging facilities at) the next location c. <i>Consideration:</i> availability of the charging infrastructure d. <i>Consideration:</i> other considerations
	Reference to charging session	a. An explicit reference to a fully charged vehicle b. A reference to a finished but not necessarily fully charged vehicle c. An explicit reference to a vehicle that is not fully charged yet d. Other or no reference to a charging session (e.g., reference to parking)
	Motivations, considerations, or prompts (other than a full battery)	a. <i>Motivation:</i> for other charging point users b. <i>Consideration:</i> availability of charging point c. <i>Prompt:</i> based on knowledge of charging times d. <i>Prompt:</i> at the request of others
	Timeframe for moving a vehicle	a. Within half an hour or less b. Within one hour c. Within two hours d. Within three hours e. Within four to eight hours f. Within twelve hours g. Within 24 h
3. Moving a vehicle from the charging spot after charging or within a specific time after charging	Exceptions for moving a vehicle	a. Reference to moving only during daytime b. During the night c. Other exceptions
	N/A	N/A
4. Treating the charging point properly by avoiding damage or misuse	N/A	N/A
5. Reporting damage to, or malfunctioning of, the charging point	N/A	N/A
6. Requesting a new public charging point	N/A	N/A

Source: Tamis et al. (2024).

³ As explained in the introduction, this excludes fast charging points.

⁴ Note that, as the data do not show how frequently respondents charge their vehicles at specific public charging points, we cannot make inferences about absolute charging times.

⁵ Henceforth, we refer to this behaviour as: moving a vehicle from the charging spot after charging.

considerations for the behaviour. Table 2 provides an overview of the details coded per answer. For behaviour 1, contacting other EV drivers about the charging point, we specified whether the answer referred to (a) the usage of smartphone apps, (b) sharing contact details, or (c) another or unclear reference. For behaviour 2, charging only when necessary or only charging the necessary energy, we first coded whether an answer referred to a specific percentage of the battery. We then also coded any mentioned motivations and considerations for charging only when necessary or only charging the necessary energy. For behaviour 3, we specified whether the answer (a) explicitly referred to a fully charged vehicle by using the words “full” (Dutch: vol) or “fully charged” (Dutch: volgeladen), (b) referred to a vehicle that had finished charging but did not explicitly state whether the vehicle was fully charged,⁶ (c) explicitly referred to a vehicle that was not fully charged, or (d) did not refer to a charging session but, for instance, referred to occupying the charging point. We also coded any mentioned motivations, considerations, or prompts for moving the vehicle, a specific timeframe for moving the vehicle, and any exceptions for moving the vehicle. Note that, in a few cases, respondents referred to the same behaviour more than once but highlighted different aspects. Thus, one respondent could refer to multiple categories per type of detail (e.g., using a smartphone app to contact colleagues with EVs and also leaving a note with contact details for neighbours).

Answers, or parts of answers, not fitting within the six prosocial charging behaviours were coded inductively (Bingham, 2023). We first explored topics shared among answers to get a better overview of the data. Each answer was ascribed to only one topic, with five topics emerging from the data: (1) plug-in hybrid EVs, (2) internal combustion engine vehicles, (3) parking of EVs, (4) providing a time indication of some sort to others, and (5) miscellaneous behaviours with no directly identifiable common theme. Respondents’ answers served as open codes. We then compared the open codes within each topic to formulate one or more behaviours. Subsequently, where applicable, overarching behaviours were formulated to combine behaviours that appeared similar. For instance, the behaviour “providing a time indication to others” is based on two behaviours emerging from the open codes: signalling to others when charging is finished or when the EV will be moved from the charging point.

In this phase of the analysis, we filtered out answers, or parts of answers, referring to behaviour that respondents considered social but would not increase other EV drivers’ opportunities to charge and therefore did not align with the definition of prosocial charging behaviour by Tamis et al. (Tamis et al., 2024). These behaviours were charging based on grid conditions (e.g., bidirectional charging or charging during off-peak hours), staying parked at the charging point after charging (e.g., when parking pressure is high), and charging whenever a charging point is available. The results in the next section are based on 246 responses.

3. Results

3.1. Sample characteristics

Answers to the survey question about social charging behaviour were given mainly in Dutch (n = 193, 78.46%), with some in English (n = 53, 21.54%). See Table B.1 in Appendix B for the distribution of answers per language. Sixty respondents (24.39%) referred to multiple behaviours in their answers. Only a few responses (n = 14, 5.69%) came from plug-in hybrid EV drivers; all other responses were from battery EV drivers (n = 232, 94.31%). Thus, almost all respondents relied fully on charging to use their vehicle.

⁶ On the basis of other information provided in the answer, we refrained from making assumptions about whether the vehicle should be fully charged.

3.2. Identifying injunctive norms

The main research question of this article is: *What are the injunctive norms for sharing public charging points?* The results show that the main injunctive norm is to move a vehicle from the charging spot once sufficiently or fully charged. They also reveal two other less relevant injunctive norms: communicating in various ways with other EV drivers about the use of the charging point, and charging only when necessary or only charging the necessary energy based on various considerations. In the following sections, we answer the three sub-questions. We first present how respondents’ descriptions of prosocial charging behaviours align with Tamis et al.’s (2024) findings on prosocial charging behaviour. We then describe the context given by respondents to the prosocial charging behaviours. We close the results section by presenting the new prosocial charging behaviours mentioned by respondents.

3.2.1. References to previously identified behaviours

Table 3 shows the number and percentage of respondents referring to one of the six prosocial charging behaviours, and whether the behaviour is categorised as a human–technology (HT) or an interpersonal (IP) interaction (Tamis et al., 2024). Regarding RQa, *How do EV drivers’ descriptions of prosocial charging behaviours align with those previously identified?*, respondents (n = 208, 84.55%) referred most to moving a vehicle from the charging spot after charging or within a specific time after charging (behaviour 3), followed by contacting other EV drivers about the charging point (behaviour 1) (n = 37, 15.04%) and charging only when necessary or only charging the necessary energy (behaviour 2) (n = 36, 14.63%). Only one respondent referred to treating the charging point properly (behaviour 4). No respondents referred to reporting damage to a charging point (behaviour 5) or requesting a new public charging point (behaviour 6) as prosocial charging behaviour.

3.2.2. Details of prosocial charging behaviours

Answering RQb, *What norm-related details are mentioned most in the descriptions of prosocial charging behaviours?* helped us to contextualise the injunctive norms. Here, we present the most mentioned details for behaviours 1–3. See Table C.1 in Appendix C for a complete overview of the results for all the coded details.

Sharing contact details by leaving notes and using mobile phone applications were the two most mentioned ways to contact other EV drivers about the use of the charging point. Twenty-eight of 37 respondents (75.68%) referred to sharing contact details; 26 respondents referred to leaving a note with their phone number or other contact details so that other users could contact them – for instance, to ask whether the owner could move their vehicle so that they could charge. Twelve respondents (32.43%) referred to the usage of apps; seven respondents referred to the usage of WhatsApp. Examples included WhatsApp groups with local or regular charging point users, such as co-workers with EVs. Four respondents referred to dedicated apps designed to communicate with other charging point users, and two respondents

Table 3
The distribution of answers per prosocial charging behaviour.

Prosocial charging behaviour	N	%	HT/ IP
1. Contacting other EV drivers about the charging point	37	15.04	IP
2. Charging only when necessary or only charging the necessary energy	36	14.63	HT
3. Moving a vehicle from the charging spot after charging or within a specific time after charging	208	84.55	HT
4. Treating the charging point properly by avoiding damage or misuse	1	0.41	HT
5. Reporting damage to, or malfunctioning of, the charging point	0	0	HT
6. Requesting a new public charging point	0	0	HT

Source: Tamis et al. (2024).

did not specify the apps used.

Diverse considerations were mentioned for charging only when necessary or only charging the necessary energy. Six (16.67%) of the 36 respondents referred to charging only when necessary or only charging the necessary energy by considering the next trip that was required to be made and the charging facilities at that location: for instance, not charging if there was enough energy to reach the next location with a charging point or charging only the energy required to reach the next location with a charging point. Five respondents (13.89%) referred to the availability of charging infrastructure: for instance, charging only when necessary or only charging the necessary energy when the availability of charging points was low or when charging points were in high demand. Three respondents (8.33%) mentioned other considerations: two respondents mentioned whether or not they needed the parking spot as a consideration to charge their vehicle, and one respondent mentioned the length of the visit to the location where the charging point was located as a consideration, i.e., not charging during short visits. As a motivation, two respondents (5.56%) referred to charging only when necessary or only charging the necessary energy so that other users could use the charging point.

Most respondents referred to moving a fully or sufficiently charged vehicle from the charging point, providing a clear context to the main injunctive norm. Eighty-eight respondents (42.31%) specifically referred to moving a fully charged vehicle from the charging point and 105 respondents (50.48%) to moving a charged vehicle (state of charge unknown) from the charging point. As a motivation, 28 respondents (13.46%) mentioned moving the vehicle to make room for another user. As a consideration for moving their vehicle, 12 respondents (5.77%) mentioned charging infrastructure availability, such as moving the vehicle when all charging points were occupied but did not explicitly refer to other EV drivers in their answer. The timeframe most referred to ($n = 14$, 6.73%) for moving a vehicle from the charging point after charging was within an hour or less. A notable exception for moving a vehicle from the charging point was doing so at night: 26 respondents (12.5%) referred to leaving the vehicle connected at night or not moving the vehicle at night, and 15 respondents (7.21%) referred to moving a vehicle during daytime or before nightfall.

3.2.3. New prosocial charging behaviours

Regarding RQc, *What new prosocial charging behaviours can be identified?*, we identified seven new prosocial charging behaviours: three miscellaneous behaviours, and one behaviour each for EV parking, internal combustion engine vehicles, plug-in hybrid EVs, and providing a time indication of some sort to others. Twenty-nine respondents (11.79% of the total sample of $N = 246$) provided answers leading to these behaviours. Considering this small sample size, these answers are an exploration into new prosocial charging behaviours, but cannot be generalised as broadly shared injunctive norms. Table 4 provides an overview of these seven inductively coded behaviours per topic and shows the number and percentage of respondents (based on $n = 29$) referring to one of the seven behaviours. Following Tamis et al.'s (Tamis et al., 2024) categorisation of behaviours, we also distinguish between human–technology (HT) and interpersonal (IP) interactions to show how these behaviours influence the opportunity for other EV drivers to charge their vehicles.

Providing a time indication to other charging point users (*behaviour 7*) was the most mentioned new prosocial charging behaviour ($n = 11$, 37.93%). This behaviour can be viewed as a specific way to contact other EV drivers about the charging point (behaviour 1). This behaviour concerned two variants, which have not been mentioned by Tamis and colleagues (Tamis et al., 2024): communicating when charging was going to be finished or when the EV would be moved from the charging point. A helpful tool described by some respondents was a charging or parking disc with a time indication. Communicating when charging is finished does not have to mean that the respondent also moves the vehicle. Instead, it could mean that the respondent is open to receiving

Table 4
New prosocial charging behaviours.

Topic	Prosocial charging behaviour	N	%	HT/IP
Providing a time indication of some sort to others	Providing a time indication to other charging point users to signal when charging is finished or when the EV will be moved from the charging point	11	37.93	IP
Plug-in hybrid electric vehicles	Not charging plug-in hybrid electric vehicles at the charging point (or when few charging points are available or often occupied)	6	20.69	HT
Internal combustion engine vehicles	Not parking a non-EV at the charging point	6	20.69	HT
EV parking	Parking neatly not to obstruct other vehicles	4	13.79	HT
Miscellaneous	Unplugging, or allowing others to unplug, a vehicle that has finished charging so another vehicle can charge	3	10.34	HT
	Charging to 100% during specific times (e.g., at night or when few others want to charge)	2	6.90	HT
	Not using vehicle settings to charge and park longer at the charging point	1	3.45	HT

requests from others if they have contact details. Communicating when the EV will be moved signals that the respondent wants to make the charging point available for others.

4. Discussion

4.1. Injunctive norms of prosocial charging behaviour

This article aimed to identify the injunctive norms for sharing public charging points from the perspective of EV drivers. Communicating these norms informs EV drivers of the appropriate behaviour and could aid in efficient charging point use. Therefore, the main research question of this article was: *What are the injunctive norms for sharing public charging points?* We identified three distinctive injunctive norms. First, EV drivers compellingly want EV drivers to move their vehicles away from the charging point: moving a vehicle from the charging spot after charging is the first and main injunctive norm and should concern a fully or sufficiently charged vehicle. This finding is supported by other studies on charging behaviour at public charging points (Budnitz, 2024; Caperello et al., 2013; Helmus and Wolbertus, 2023; Soetevent, 2024), and particularly on communicating social and injunctive norms to influence charging behaviour (Asensio et al., 2022; Bornioli et al., 2024), showing that moving the vehicle from the charging spot after charging is a key behaviour to increase the availability of the charging point. Similarly, in a large survey study amongst Dutch EV drivers, 69% of respondents charging at public charging points reported moving their vehicle as soon as possible after charging at such charging points (Wolterman et al., 2024). In the same study, 81% of respondents stated that a vehicle needs to be moved either immediately or within two hours after charging (Wolterman et al., 2024), providing a specific timeframe for the injunctive norm, which we could not identify with our data.

Second, EV drivers value interpersonal interactions: contact between EV drivers about the use of the public charging point is the second injunctive norm. This injunctive norm concerns two behaviours: mutual communication about the charging point, for instance, through apps, or one-sided communication, such as leaving notes with contact details or with a time indication of when a vehicle will be moved from the charging point. Other studies have confirmed that interpersonal

interactions are relevant for making rules to share workplace charging infrastructure (Caperello et al., 2013; TyreeHageman et al., 2014).

Third, EV drivers consider charging only when necessary or only charging the necessary energy for sharing public charging points important, with this behaviour reflecting the third injunctive norm. This injunctive norm was based on several different considerations, reflecting the various individual preferences for charging amongst EV drivers based on charging habits and the use of other charging infrastructure, such as fast charging points. This also highlights a subjective element: while EV drivers might agree on charging based on necessity, how this necessity is understood might differ per individual EV driver.

Regarding RQa, *How do EV drivers' descriptions of prosocial charging behaviours align with those previously identified?*, the results show that the vast majority of respondents' answers align with three of the six prosocial behaviours identified by Tamis et al. (2024), resulting in the three injunctive norms presented above. The results do not show support for injunctive norms based on the other three prosocial behaviours identified by Tamis et al. (2024): treating the charging point properly by avoiding damage or misuse, reporting damage to, or malfunctioning of, the charging point, and requesting a new public charging point. These behaviours might be considered requirements for a functioning public charging infrastructure, and therefore not relevant for using that charging infrastructure in a broader social context.

Regarding RQb, *What norm-related details are mentioned most in the descriptions of prosocial charging behaviours?*, details were coded for the three injunctive norms identified in this study to provide additional context to each norm. The more specific the injunctive norm is, the better EV drivers know how to act according to this norm. First, contact with other EV drivers about the charging point could primarily be achieved by sharing contact details, mostly by leaving a note and, to a lesser extent, through mobile phone applications. Sharing contact details invites others to contact the EV driver when necessary, whereas using apps already allows for mutual interaction. Second, motivations and considerations for charging only when necessary or only charging the necessary energy were diverse and concerned the distance to the next location with charging infrastructure, the charging infrastructure availability, whether they required the parking space, the length of the visit to the location of the charging infrastructure, and making room for other users. The necessity for charging, as well as the consideration behind the behaviour, are subjective and can differ per individual. This depends largely on vehicle use, which our study cannot identify. Third, moving a vehicle from the charging spot after charging related to a sufficiently or fully charged vehicle. A motivation was moving the vehicle for others, and a consideration was moving the vehicle based on the availability of charging infrastructure. Specific timeframes for moving the vehicle were primarily during the day as opposed to the night and within one hour or less after finishing charging. These results indicate that respondents appreciate short connection times at moments when multiple EV drivers might want to plug in their vehicles.

Regarding RQc, *What new prosocial charging behaviours can be identified?*, we identified seven other prosocial charging behaviours. We highlight four aspects of these behaviours. First, not charging plug-in hybrid EVs at the charging point, not parking a non-EV at the charging point, and not using vehicle settings to charge and park longer at the charging point are framed negatively, signalling disapproval of behaviours that do not promote charging point sharing. Second, not parking a non-EV at the charging point, parking neatly not to obstruct other vehicles, and not using vehicle settings to charge and park longer at the charging point are opposites of the antisocial charging behaviours identified by Tamis et al. (2024). This furthermore shows that some behaviours can have a prosocial and an antisocial component. Third, providing a time indication to other charging point users to signal when charging is finished or when the EV will be moved from the charging point, not charging plug-in hybrid electric vehicles at the charging point, and charging to 100% during specific times, have, to the best of our knowledge, not been mentioned in previous research as social

behaviours for sharing public charging points. Unplugging, or allowing others to unplug, a vehicle that has finished charging so another vehicle can charge, has been previously observed in practice at the workplace (Caperello et al., 2013). Fourth, providing a time indication to other charging point users to signal when charging is finished or when the EV will be moved from the charging point is the only new behaviour consisting of an interpersonal rather than a human–technology interaction aimed at communicating information to other charging point users. This finding signals the perceived importance of communicating about charging behaviour to other charging point users. None of the seven new prosocial charging behaviours were mentioned as often as moving a vehicle from the charging spot after charging, contacting other EV drivers about the charging point, and charging only when necessary or only charging the necessary energy. The fact that these seven behaviours were so infrequently mentioned reflects individual expectations of certain behaviours rather than broadly shared injunctive norms.

The main injunctive norm identified is quite obvious: a vehicle parked at a charging point at one time needs to be moved at another time, either because it is used to make a trip or parked elsewhere. Whether or not a vehicle occupies the charging point significantly influences charging point availability. However, to the best of our knowledge, the behaviours that EV drivers consider important at public charging points have not heretofore been explored and quantified. These results can be used to communicate what should be obvious, ensuring that no discussion arises over what is expected when sharing a public charging point.

4.2. Methodological considerations and suggestions for research

It is important to evaluate the results in this article in light of five methodological factors concerning survey design, sample characteristics, and data collection.

First, we used secondary data based on an existing survey format that we did not construct. This survey included a particular order of questions that potentially introduced some bias. The survey's introduction text refers to disconnecting a vehicle (English version) or moving a vehicle (Dutch version) so that others can charge. The survey question before the survey question on social charging behaviour used in our analysis asked respondents about the extent to which they were annoyed by vehicles connected to the charging point but finished charging. The framing of this question could have influenced answers given by respondents to the survey question about social charging behaviour, where most respondents indicated moving a vehicle from the charging point after charging as an important behaviour. However, moving a vehicle from the charging spot after charging is an important behaviour for charging point availability, as mentioned by various studies (Asensio et al., 2022; Bormioli et al., 2024; Budnitz, 2024; Caperello et al., 2013; Helmus and Wolbertus, 2023; Soetevent, 2024); this upholds the credibility of our results. Future surveys should prevent framing or bias by carefully ordering survey questions and avoiding guiding text or suggestive survey questions.

Second, a major limitation of this study is that the data did not allow us to examine whether these injunctive norms also apply to fast chargers. Since fast charging infrastructure is widely used and shared amongst EV drivers, research on injunctive norms for sharing fast chargers is essential to determine whether the injunctive norms in this paper apply to all forms of public charging infrastructure. Future survey research could therefore explore whether the injunctive norms for fast charging infrastructure are similar to those presented in this paper, and examine any specific injunctive norms that characterise the sharing of fast charging infrastructure. These results would help develop policy and communication specifically aimed at fast charger use.

Third, for three prosocial charging behaviours, we coded the details and context provided in the respondents' answers. However, the main survey question analysed did not ask for additional details. Some respondents provided more elaborate answers suitable for further coding,

whereas others referred merely to a behaviour in a few words without providing further details or context. Thus, the results on the details and context for each behaviour presented here are inconclusive and should spur further investigation. We recommend further research that allows for probing, such as interviews or surveys, including detailed follow-up questions based on a predetermined selection of behaviours. Such studies could systematically investigate, for instance, how and under which specific conditions EV drivers prefer to contact each other, when they consider charging necessary, and the factors that determine their preference to charge a vehicle fully before moving it.

Fourth, the respondents charge at public charging points at various locations, such as their neighbourhood, workplace, or public venues. Most of them charge at public charging infrastructure in the neighbourhood, but answers to the survey question could reflect prosocial charging behaviour at other public charging infrastructure also, such as at work or public venues. The nature of the data precludes us from distinguishing between answers on prosocial charging behaviour related to one type of public charging infrastructure or another. Future research could determine whether EV drivers who use public charging points at multiple locations behave differently at these different locations (e.g., act more prosocially towards, and engage in more interpersonal communication with, known neighbours or co-workers rather than unknown visitors).

A particular focus for further research might be how community-owned semi-public charging points, whereby households jointly purchase a charging point (Azarova et al., 2020), are shared amongst neighbours. This research could include sharing the charging points with non-community members (Velkovski et al., 2024). Members of these communities might have specific ideas about behaviour for sharing their charging points. They might subsequently differentiate between sharing with in-group (neighbours) and out-group (visitors) members. Results from research into sharing community-owned charging points could be used to provide guidelines to communities willing to invest in shared charging infrastructure on how to set up guidelines for the best sharing of this infrastructure.

Fifth, a recent development since the original data collection in early 2020 is the increased attention on, and implementation of, smart or grid-conscious charging, aimed at charging within the limits of the local grid, amongst other goals (National Charging Infrastructure Agenda, 2022). Charging according to grid conditions was mentioned by only a few respondents and was not included as a prosocial charging behaviour in our study. New technological developments that alter the charging process might extend EV drivers' perceptions of appropriate behaviour at public charging points, where emphasis might shift to charging in favour of the grid and, indirectly, other local electricity users. Future research could study how smart charging influences the injunctive norm for charging at, and sharing, public charging points.

5. Conclusions and policy recommendations

Our study aimed to identify injunctive norms for sharing public charging points from the perspective of EV drivers. The main injunctive norm identified is to move a vehicle from the charging spot once sufficiently or fully charged. Two minor injunctive norms are communicating with other EV drivers about the charging point, and charging only when necessary or only charging the necessary energy. With the rollout of public charging infrastructure, injunctive norms for sharing public charging points will become increasingly relevant in the transition to electric mobility to ensure that these charging points are used efficiently. For each of the three injunctive norms identified in this study, we discuss the implications for policy and provide recommendations for policy and practice to effectively use the injunctive norms for sharing public charging points.

First, communications about moving a vehicle from the charging spot after charging should emphasise the link between this behaviour and a shared goal or a larger user group. This includes communication

about fees or rewards for moving a vehicle; simply emphasising that a vehicle should not remain parked at the charging point neglects any positive effect for other charging point users. We therefore recommend that municipalities and charge point operators make the social dimension of this behaviour salient in their communication: reinforce the social motive of this behaviour by emphasising the shared goal of this behaviour, which is to move the vehicle *for someone else*. Research confirms that social and injunctive norm messages emphasising the benefits of moving a vehicle from the charging point for other charging point users effectively encourage people to move their vehicles (Asensio et al., 2022; Bornioli et al., 2024). This makes moving the vehicle not a goal in itself, but rather a method for obtaining a shared goal: available charging infrastructure for all. Furthermore, people might favour doing something for someone whom they consider part of an in-group (Balliet et al., 2014). Focusing on how the individual relates to similar others, for instance through shared identities as fellow neighbours or co-workers with EVs, could make the social nature of the communicated injunctive norms more salient (White and Simpson, 2013). References to the social context could encourage EV drivers' behaviour change from both the individual and the community perspective (Young and Middlemiss, 2012). Thus, who the other users are in each context, such as neighbours or co-workers, could strengthen the identification with these other users and with the injunctive norms to act prosocially. This works predominantly at locations where the same users repeatedly use the same charging points (e.g., in the neighbourhood, at the workplace, or at a sports complex), and probably less so at locations where any given EV driver does not habitually charge and mostly remains anonymous (e.g., shopping centres). Additionally, charge point operators could add a display to the charging point, showing the battery percentage of the connected vehicle(s). This might incentivise the owner to move their vehicle once sufficiently charged.

Second, communicating with fellow EV drivers about using the charging point is important for some EV drivers. This includes sending and receiving messages, sharing contact details, and providing time indications when charging is finished or the vehicle will be moved. Several mobile phone applications currently facilitate social interactions between charging point users, such as sending messages (NeedToCharge, n.d.). However, few of these applications were reportedly used by respondents, meaning that such initiatives can be further promoted for EV drivers willing to communicate with others. Such initiatives might also provide a more secure and convenient alternative to leaving notes with contact details. Additionally, parking discs or charging discs are used to communicate to other EV drivers when a vehicle will be charged or moved from the charging point. Although the use of applications and parking discs evidently answers a need amongst certain EV drivers, these initiatives exist in addition to charging apps from charge point operators and other mobility service providers. Hence, there is an opportunity to bundle such features into one online platform, where EV drivers might already view other relevant information about their vehicles' charging sessions. Charge point operators or mobility service providers can use these results to facilitate various forms of interactions amongst EV drivers in their charging apps. Including or expanding social features in charging apps already used by EV drivers (e.g., to monitor charging sessions) allows EV drivers to communicate with one another easily, particularly in settings where EV drivers do not know one another beforehand. Additionally, when the decision to install a new public charging point is shared with residents, municipal policymakers can emphasise how communication about sharing the charging point can be a topic of conversation between neighbours, facilitated by various smartphone applications. Doing so emphasises the shared nature of the charging point and the benefits of prosocial charging behaviour for the neighbourhood.

Third, charging when this is considered necessary, charging only the necessary energy, and charging until the vehicle is sufficiently charged are behaviours subjective to individual and contextual conditions, such as individual preferences for a fully charged vehicle and the presence of

charging facilities at the location of the next trip. We recommend that municipal policymakers, charge point operators, and grid operators avoid communication about these behaviours. These behaviours could be interpreted as unspecific, ambiguous, or irrelevant and, therefore, do not provide a clear description of a behaviour on which EV drivers can act. Insufficient or ambiguous information on injunctive norms might lead people to act in their own interest rather than act according to these norms (Lindenberg and Steg, 2007). For instance, people might argue that their understanding of, and preference for, a sufficiently charged vehicle is a fully charged vehicle, regardless of whether a full charge is necessary for making their next trip. Such individual interpretation is at odds with an injunctive norm meant to encourage people to charge less.

In summary, our study is the first to identify injunctive norms for sharing public charging points from the perspective of EV drivers. Incorporating these injunctive norms in policy, and particularly communication, can improve the efficient use of the public charging infrastructure necessary for the transition to EVs.

CRedit authorship contribution statement

Milan Tamis: Writing – review & editing, Writing – original draft, Project administration, Formal analysis, Data curation, Conceptualization. **Gerdien de Vries:** Writing – review & editing, Supervision,

Conceptualization. **Reint Jan Renes:** Writing – review & editing, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A.: The Dutch and English versions of the survey

The original authors of the survey provided translations from Dutch to English. The Dutch and English versions of the main survey question (variable 8, survey question 4 in Table A.1) used for answering the research question are not exact translations: the English version of the survey question uses the word *definition*, whereas the Dutch version asks respondents what social charging behaviour is according to them. Additionally, the English version of the survey question asking respondents how long they stay connected to charging points at different locations (variable 7, survey question 3 in Table A.1), refers not to *public* charging points but to charging points in general. However, in both language versions of the survey, the explanatory text before this question states that the subsequent questions are only about public charging points. Although this difference in wording could mean that respondents viewing the English version of the survey interpreted both questions differently, the distribution of responses in English and Dutch for prosocial charging behaviours 1–3 is comparable with the overall distribution of responses for each language in the sample. Hence, we do not believe that the difference in wording produced different results. The answer distribution per language for the entire sample and the behaviours can be found in Table B.1 in Appendix B.

Table A1

Dutch and English language versions of the original survey content.

Survey part or variable in the new dataset	Dutch version	English version
Introductory text in the informed consent form (the part that refers to behaviour)	We zijn geïnteresseerd of er mensen zijn die hun auto bij een laadpaal weghalen zodat iemand anders kan laden of andersom. We onderzoeken of dit sociaal laadgedrag wenselijk is waardoor de laadpalen efficiënter gebruikt worden en er minder laadpaalklevers zijn.	We are interested whether EV users disconnect their EVs from charging point such that other EV users are able to charge. We investigate whether social charging behavior is desirable and how policy makers can accommodate on such behavior. This may result in more efficient use of charging stations and fewer charging station hogging.
Variable 5 / survey question 1	Wat voor voertuig heeft u?	What kind of vehicle do you have?
Variable 6 / survey question 2	Wat is de verdeling van uw laadsessies (in aantal sessies, niet kWh) over de verschillende type laadpalen?	At what kind of charge point do you charge and what is the percentage that you charge there?
Introductory text to variables 7 and 8 (and other survey questions not included in this study).	De onderstaande vragen gaan alleen over (semi) publieke AC laadpalen, dus <u>niet</u> over fastchargers of superchargers.	The questions below only concern (semi) public AC charging points, <u>not</u> fastchargers or superchargers.
Variable 7 / survey question 3	Hoe lang bent u gemiddeld verbonden aan een (semi) publieke AC laadpaal van onderstaande type?	How long are you typically connected to a charging station for the types of charging stations below?
The survey question prior to variable 8 (not included in the analysis).	In hoeverre ergert u zich aan voertuigen die niet laden maar wel aan de laadpaal aangesloten zijn?	To what extent are you annoyed by EVs that are connected vehicles while charging is finished?
Variable 8 / survey question 4	Wat is volgens u sociaal laadgedrag?	How would you define social charging behavior?

Appendix B.: The distribution of answers per language

Table B.1 shows the distribution of respondents per language (Dutch and English) for the entire sample, for the deductively coded behaviours 1–4, and for the total of inductively coded behaviours 7–13. Behaviours 5 and 6 are not included in this table because respondents did not mention them.

Table B1

Distribution of the number of answers per language.

	Total	EN		NL	
	N	N	%	N	%
Sample	246	53	21.54	193	78.46
Behaviour 1: Contacting other EV drivers about the charging point	37	6	16.22	31	83.78
Behaviour 2: Charging only when necessary or only charging the necessary energy	36	10	27.78	26	72.22
Behaviour 3: Moving a vehicle from the charging spot after charging or within a specific time after charging	208	44	21.15	164	78.85
Behaviour 4: Treating the charging point properly by avoiding damage or misuse	1	1	100	0	0
Deductively coded behaviours (behaviours 7–13)	29	12	41.38	17	58.62

Source: Tamis et al. (2024).

Appendix C.: Results per coded details

Table C.1 displays the results for all the coded details for behaviours 1–3. No additional details were coded for behaviours 4–6.

Table C1

Results per coded details.

Behaviours	Type of details	Categories per type of detail	N	%	
1. Contacting other EV drivers about the charging point	Type of contact	a. Smartphone apps	12	32.43	
		b. Sharing contact details	28	75.68	
		c. Other references	2	5.41	
	2. Charging only when necessary or only charging the necessary energy	Motivations and considerations	a. <i>Motivation</i> : for other charging point users	36	100.00
			b. <i>Consideration</i> : distance to (charging facilities at) the next location	2	5.56
			c. <i>Consideration</i> : availability of the charging infrastructure	6	16.67
			d. <i>Consideration</i> : other considerations	5	13.89
	3. Moving a vehicle from the charging spot after charging or within a specific time after charging	State of charge	a. Reference to battery percentage	3	8.33
				4	11.11
		Reference to charging session	a. An explicit reference to a fully charged vehicle.	208	100.00
b. A reference to a finished but not necessarily fully charged vehicle.			88	42.31	
c. An explicit reference to a vehicle that is not fully charged yet			105	50.48	
d. Other or no reference to a charging session (e.g., reference to parking)			5	2.40	
Motivations, considerations, or prompts (other than a full battery)				12	5.77
		a. <i>Motivation</i> : for other charging point users	28	13.46	
		b. <i>Consideration</i> : availability of charging point	12	5.77	
		c. <i>Prompt</i> : based on knowledge of charging times	6	2.88	
	d. <i>Prompt</i> : at the request of others	2	0.96		
		5	2.40		
Timeframe		a. Within half an hour or less	9	4.33	
		b. Within one hour	2	0.96	
		c. Within two hours	1	0.48	
		d. Within three hours	3	1.44	
		e. Within four to eight hours	1	0.48	
		f. Within twelve hours	3	1.44	
		g. Within 24 h	3	1.44	
		a. Reference to moving only during daytime	15	7.21	
		b. During the night	26	12.50	
		c. Other exceptions:	7	3.37	
4. Treating the charging point properly by avoiding damage or misuse	N/A		1	100.00	
5. Reporting damage to, or malfunctioning of, the charging point	N/A		N/A	N/A	
6. Requesting a new public charging point	N/A		N/A	N/A	

Source: Tamis et al. (2024).

References

- Ambrosio-Albalá, P., Upham, P., Bale, C.S.E., 2019. Purely ornamental? Public perceptions of distributed energy storage in the United Kingdom. *Energy Res. Soc. Sci.* 48, 139–150. <https://doi.org/10.1016/j.erss.2018.09.014>.
- Anderson, J.E., Lehne, M., Hardinghaus, M., 2018. What electric vehicle users want: real-world preferences for public charging infrastructure. *Int. J. Sustain. Transp.* 12 (5), 341–352. <https://doi.org/10.1080/15568318.2017.1372538>.
- Asensio, O.I., Apablaza, C.Z., Lawson, M.C., Walsh, S.E., 2022. A field experiment on workplace norms and electric vehicle charging etiquette. *J. Ind. Ecol.* 26 (1), 183–196. <https://doi.org/10.1111/jiec.13116>.
- Azarova, V., Cohen, J.J., Kollmann, A., Reichl, J., 2020. The potential for community financed electric vehicle charging infrastructure. *Transp. Res. Part D: Transp. Environ.* 88, 102541. <https://doi.org/10.1016/j.trd.2020.102541>.
- Balliet, D., Wu, J., De Dreu, C.K.W., 2014. Ingroup favoritism in cooperation: a meta-analysis. *Psychol. Bull.* 140 (6), 1556–1581. <https://doi.org/10.1037/a0037737>.
- Bingham, A.J., 2023. From data management to actionable findings: a five-phase process of qualitative data analysis. *Int. J. Qual. Methods* 22, 1–11. <https://doi.org/10.1177/16094069231183620>.
- Bornioli, A., Vermeulen, S., Mingardo, G., 2024. Can app notifications reduce charging hogging? An experiment with electric vehicle drivers. *Case Stud. Transp. Policy* 15, 101143. <https://doi.org/10.1016/j.cstp.2023.101143>.
- Budnitz, H., 2024. From interest to evangelist: Accelerating the adoption of electric vehicles via distinct parking and charging practices in the United Kingdom. *Energy Res. Soc. Sci.* 116, 103675. <https://doi.org/10.1016/j.erss.2024.103675>.
- Budnitz, H., Meelen, T., Schwane, T., 2024. Electric vehicle adoption intentions among UK residents parking in shared and public spaces. *Transportation*. <https://doi.org/10.1007/s11116-024-10518-0>.
- Caperello, N., Kurani, K.S., TyreeHageman, J., 2013. Do you mind if I plug-in my car? How etiquette shapes PEV drivers' vehicle charging behavior. *Transp. Res. A Policy Pract.* 54, 155–163. <https://doi.org/10.1016/j.tra.2013.07.016>.
- Cialdini, R.B., 2003. Crafting normative messages to protect the environment. *Psychol. Sci.* 12 (4), 105–109.
- Cialdini, R.B., Goldstein, N.J., 2004. Social influence: Compliance and conformity. *Annu. Rev. Psychol.* 55, 591–621. <https://doi.org/10.1146/annurev.psych.55.090902.142015>.
- Cialdini, R.B., Kallgren, C.A., Reno, R.R., 1991. A focus theory of normative conduct: a theoretical refinement and reevaluation of the role of norms in human behavior. *Adv. Exp. Soc. Psychol.* 24, 201–234.
- Cialdini, R.B., Trost, M.R., 1998. Social influence: social norms, conformity, and compliance. In: Gilbert, D.T., Fiske, S.T., Lindzey, G. (Eds.), *The Handbook of Social Psychology*. McGraw-Hill, pp. 151–192.
- Curtius, H.C., Hille, S.L., Berger, C., Hahnel, U.J.J., Wüstenhagen, R., 2018. Shotgun or snowball approach? Accelerating the diffusion of rooftop solar photovoltaics through peer effects and social norms. *Energy Policy* 118, 596–602. <https://doi.org/10.1016/j.enpol.2018.04.005>.
- Globisch, J., Plötz, P., Dütschke, E., Wietschel, M., 2019. Consumer preferences for public charging infrastructure for electric vehicles. *Transp. Policy* 81, 54–63. <https://doi.org/10.1016/j.tranpol.2019.05.017>.
- Helmus, J.R., Vogel, I.S.P., Van Den Hoed, R., 2020. Exploring social charging behavior between EV users in sharing charging points. 33rd Electric Vehicle Symposium (EVS33), (May). <https://doi.org/10.5281/zenodo.4021363>.
- Helmus, J.R., Wolbertus, R., 2023. Cooperative behaviour at public electric vehicle charging stations. *Travel Behav. Soc.* 32, 100572. <https://doi.org/10.1016/j.tbs.2023.100572>.
- International Energy Agency, 2024. Global EV outlook 2024. Moving towards increased affordability. <https://iea.blob.core.windows.net/assets/a9e3544b-0b12-4e15-b407-65f5c8e1b5f/GlobalEVOutlook2024.pdf>.
- Jenny, A., Hechavarria Fuentes, F., Mosler, H.J., 2007. Psychological factors determining individual compliance with rules for common pool resource management: the case of a Cuban community sharing a solar energy system. *Hum. Ecol.* 35 (2), 239–250. <https://doi.org/10.1007/s10745-006-9053-x>.
- Jenny, A., López, R.D., Mosler, H.J., 2006. Household energy use patterns and social organisation for optimal energy management in a multi-user solar energy system. *Prog. Photovolt. Res. Appl.* 14, 353–362. <https://doi.org/10.1002/pip.672>.
- Ledna, C., Muratori, M., Brooker, A., Wood, E., Greene, D., 2022. How to support EV adoption: tradeoffs between charging infrastructure investments and vehicle subsidies in California. *Energy Policy* 165, 112931. <https://doi.org/10.1016/j.enpol.2022.112931>.
- Lindenberg, S., Steg, L., 2007. Normative, gain and hedonic goal frames guiding environmental behavior. *J. Soc. Issues* 63 (1), 117–137. <https://doi.org/10.1111/j.1540-4560.2007.00499.x>.
- Long, Z., Aksen, J., Kormos, C., 2019. Consumers continue to be confused about electric vehicles: comparing awareness among Canadian new car buyers in 2013 and 2017. *Environ. Res. Lett.* 14. <https://doi.org/10.1088/1748-9326/ab4ca1>.
- Meyer, D.Z., Avery, L.M., 2009. Excel as a qualitative data analysis tool. *Field Methods* 21 (1), 91–112. <https://doi.org/10.1177/1525822X08323985>.
- National Charging Infrastructure Agenda, 2022. *Smart charging for all 2022 - 2025 | Action plan*. <https://www.agendalaadinfrastructuur.nl/english/documents/handlerdownloadfiles.ashx?idnv=2498802>.
- NeedToCharge. (n.d.). NeedToCharge. Retrieved January 21, 2025, from <https://www.needtocharge.com/>.
- Nelson, S., Allwood, J.M., 2021. The technological and social timelines of climate mitigation: lessons from 12 past transitions. *Energy Policy* 152. <https://doi.org/10.1016/j.enpol.2021.112155>.
- Netherlands Enterprise Agency, 2019. Electric vehicle charging. Definitions and explanation. https://www.rvo.nl/files/file/2019/01/Electric%20Vehicle%20Charging%20-%20Definitions%20and%20Explanation%20-%20january%202019_0.pdf.
- Philipsen, R., Brell, T., Brost, W., Eickels, T., Ziefle, M., 2018. Running on empty – users' charging behavior of electric vehicles versus traditional refueling. *Transp. Res. Part F: Traff. Psychol. Behav.* 59, 475–492. <https://doi.org/10.1016/j.trf.2018.09.024>.
- Soetevent, A.R., 2024. I'd like to move it! The effect of consumption rivalry on demand estimation: evidence from the EV public charging market. *J. Environ. Econom. Manag.* 124, 102929. <https://doi.org/10.1016/j.jeem.2024.102929>.
- Sparkman, G., Howe, L., Walton, G., 2021. How social norms are often a barrier to addressing climate change but can be part of the solution. *Behav. Public Policy* 5 (4), 528–555. <https://doi.org/10.1017/bpp.2020.42>.
- Sprei, F., Kempton, W., 2024. Mental models guide electric vehicle charging. *Energy* 292. <https://doi.org/10.1016/j.energy.2024.130430>.
- Tamis, M., de Vries, G., Renes, R.J., Alkemade, F., 2024. Plugging in with neighbours: defining the social dimension of electric vehicle charging in the Netherlands. *Energy Res. Soc. Sci.* 118, 103791. <https://doi.org/10.1016/j.erss.2024.103791>.
- The Australian Electric Vehicle Association. (n.d.). Electric vehicle charging etiquette. Retrieved April 17, 2024, from <https://aeva.asn.au/electric-vehicle-charging-etiquette/>.
- TyreeHageman, J., Kurani, K.S., Caperello, N., 2014. What does community and social media use look like among early PEV drivers? Exploring how drivers build an online resource through community relations and social media tools. *Transp. Res. Part D: Transp. Environ.* 33, 125–134. <https://doi.org/10.1016/j.trd.2014.09.005>.
- Velkovski, B., Gjorgievski, V.Z., Markovski, B., Cundeva, S., Markovska, N., 2024. A framework for shared EV charging in residential renewable energy communities. *Renew. Energy* 231, 120897. <https://doi.org/10.1016/j.renene.2024.120897>.
- Visaria, A.A., Jensen, A.F., Thorhauge, M., Mabit, S.E., 2022. User preferences for EV charging, pricing schemes, and charging infrastructure. *Transp. Res. Part A: Policy Pract.* 165, 120–143. <https://doi.org/10.1016/j.tra.2022.08.013>.
- White, K., Simpson, B., 2013. When do (and don't) normative appeals influence sustainable consumer behaviors? *J. Market.* 77 (2), 78–95. <https://doi.org/10.1509/jm.11.0278>.
- Wolbertus, R., Kroesen, M., van den Hoed, R., Chorus, C., 2018. Fully charged: an empirical study into the factors that influence connection times at EV-charging stations. *Energy Policy* 123, 1–7. <https://doi.org/10.1016/j.enpol.2018.08.030>.
- Wolterman, B., Duurkoop, T., Zweistra, M., Hiep, E., van Biezen, M., 2024. Nationaal Laadonderzoek 2024: Laden van elektrische auto's in Nederland - Ervaringen en meningen van EV-rijders. <https://elaad.nl/wp-content/uploads/2024/09/Nationaal-Laadonderzoek-2024.pdf>.
- Young, W., Middlemiss, L., 2012. A rethink of how policy and social science approach changing individuals' actions on greenhouse gas emissions. *Energy Policy* 41, 742–747. <https://doi.org/10.1016/j.enpol.2011.11.040>.