



# What drives people to carpool? Explaining carpooling intention from the perspectives of carpooling passengers and drivers

Friedel Bachmann <sup>a,\*</sup>, Anina Hanimann <sup>b</sup>, Jürg Artho <sup>a</sup>, Klaus Jonas <sup>c</sup>

<sup>a</sup> *Sozialforschungsstelle, Department of Psychology, University of Zurich, Binzmühlestrasse 14/13, 8050 Zurich, Switzerland*

<sup>b</sup> *Department of Political Science, Faculty of Humanities and Social Sciences, University of Lucerne, Frohburgstrasse 3, 6002 Lucerne, Switzerland*

<sup>c</sup> *Social and Business Psychology, Department of Psychology, University of Zurich, Binzmühlestrasse 14/13, 8050 Zurich, Switzerland*

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## ABSTRACT

The negative impact of motorized private mobility on the environment can be decreased successfully by encouraging more people to carpool. From a psychological perspective, only little is known about the determinants of carpooling. Therefore, this study investigated carpooling behavior based on a theoretical background that integrates (1) the theory of planned behavior, (2) the norm activation model, and (3) dispositional trust. Additionally, we studied carpooling from two separate perspectives: Passengers sharing rides, and the drivers offering rides. We conducted a survey with a representative sample of 342 participants in Switzerland. The results showed that for both, passengers and drivers, normative aspects such as descriptive and personal norms, in combination with perceived behavioral control predicted carpooling intention. Attitude toward carpooling behavior, however, did not have any predictive power regarding carpooling intention, neither for passengers nor drivers. Dispositional trust displayed an indirect effect on intention to carpool as a passenger or driver via perceived behavioral control. Based on these results, we discuss practical implications for designing measures to promote carpooling successfully in the future.

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## 1. Introduction

In the past few decades, people in almost all industrialized countries consumed more resources than our planet can provide long-term (Global Footprint Network, 2016). Exemplarily, if everyone consumed like a person living in Switzerland, annually 3.3 times the resources the earth can provide would be required (e.g., US: 4.8, UK: 2.9; World Wide Fund For Nature, 2014). Clearly, more sustainable ways of living have to be found and consumers' behavior has to change.

New forms of shared mobility such as carsharing, carpooling or bikesharing have emerged over the last years and are believed to be a “potential new pathway to sustainability” (Heinrichs, 2013, p. 228). In the case of carpooling – the sharing of a ride so that two or more persons travel together in a vehicle – studies have shown that it can contribute to a more sustainable way of living: For example, in San Francisco, 1.7–3.5 million liters of fuel are being conserved per year through the use of carpooling systems (Minett & Pearce, 2011). Regarding the actual energy saving potential of carpooling, it is estimated that carpooling uses nearly 30% less energy than alternative ways of transportation, such as driving alone (Arnold, Bachmann, & Haefeli, 2017). However, in Switzerland, it is still unclear how many people are using carpooling as their means

\* Corresponding author.

E-mail address: [friedel.bachmann@uzh.ch](mailto:friedel.bachmann@uzh.ch) (F. Bachmann).

of transport, as there is no official data record on that specific topic. Based on the rather low vehicle occupancy rate of 1.6 persons per vehicle, we can only assume that few people are currently carpooling (Swiss Federal Statistical Office, 2017). Consequently, the majority of vehicles not being used to their full capacity constitutes an energy saving potential that could still be exploited through better dissemination of carpooling. To exploit this energy saving potential, specific measures to promote carpooling should be developed and implemented. However, the current state of research does not provide an in-depth psychological understanding of carpooling behavior that would allow the development of specific measures to that end.

At least two reasons for this gap of research can be identified, which our study aims to address: First, to our best knowledge, carpooling behavior has so far not been studied in light of a rigorous theoretical background. In recent years, only few studies have focused on psychological factors such as psychological barriers associated with riding with strangers, poor schedule flexibility, or sociable travel (Abrahamse & Keall, 2012; Becker, Ciari, & Axhausen, 2017; Correia & Viegas, 2011; de Almeida Correia, de Abreu e Silva, & Viegas, 2013). But most of these studies considered only attitudinal factors. When trying to explain behavior, the use of theory provides a systematic approach to identifying relevant determinants of the behavior of interest and thereby allows an advanced understanding of it (Michie, West, Campbell, Brown, & Gainforth, 2014). Especially for research that ultimately aims at changing behavior, theory-driven approaches are more effective for designing specific measures and interventions (e.g., Michie, Johnston, Francis, Hardeman, & Eccles, 2008; Steinmetz, Knapstein, Ajzen, Schmidt, & Kabst, 2016).

Second, to our knowledge, carpooling has so far not been studied in light of both relevant groups of people, namely (1) passengers who use carpooling rides ('passengers'), and (2) drivers who offer carpooling rides ('drivers'). This distinction is important because the determinants of carpooling behavior might be different across both groups: While passengers might experience uncertainty about a driver's driving skills or security in general, drivers may need to spend additional time for detours or experience uncertainty regarding a passenger's willingness to pay. Also, it is crucial to look at the behavior as specifically as possible so as to make the best prediction (e.g., Ajzen, 1991; Donald, Cooper, & Conchie, 2014).

This study contributes to the existing body of knowledge twofold: First, it provides a clear estimation of how many people actually engage in carpooling. Second, it identifies determinants of carpooling intention and possibly behavior on the basis of established psychological theories while looking at carpooling passengers and carpooling drivers separately.

### 1.1. Model for explaining carpooling intention and behavior

The theory of planned behavior (TPB) has been shown to be strong in predicting intentions and behavior (e.g., Armitage & Conner, 2001) and useful for designing behavior change interventions (Steinmetz et al., 2016). The basic idea of the TPB is that intention to perform a certain behavior is the main driver of behavior. Intention in turn is predicted by three determinants: attitude toward the behavior ("[...] the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question."), subjective norm ("[...] the perceived social pressure to perform or not to perform the behavior."), and perceived behavioral control ("[...] the perceived ease or difficulty of performing the behavior [...].") (Ajzen, 1991, p. 188). When the behavior is not under complete volitional control, the TPB states that, if perceived behavioral control reflects actual control over the behavior, it can be correlated with the behavior itself (e.g., de Leeuw, Valois, Ajzen, & Schmidt, 2015). The TPB was successfully applied to other forms of mobility behaviors such as travel mode choice (Bamberg, Ajzen, & Schmidt, 2003), use of public transportation (Heath & Gifford, 2002), and car use (Bamberg & Schmidt, 2003). Thus, the TPB appears well suited for our purpose of explaining carpooling behavior.

However, although the TPB has served as a useful theoretical framework to explain a wide range of behaviors, potential shortcomings need to be addressed to thoroughly study carpooling intention and the respective behavior. One shortcoming of the TPB is that it "remains under-defined with regard to the functioning of norms" (Nigbur, Lyons, & Uzzell, 2010, p. 259). A meta-analytic review found the normative component of the TPB, the subjective norm, to be the weakest determinant of intention (Armitage & Conner, 2001). Considering the theory of normative conduct (Cialdini, Reno, & Kallgren, 1990), which distinguishes two types of social norms, namely injunctive (specifying what others approve or disapprove of) and descriptive norm (specifying what most others do), Ajzen's original operationalization of the subjective norm only covers the injunctive type (Ajzen, 1991, p. 195; Ajzen & Driver, 1992). Studies have shown (for an overview see Ravis & Sheeran, 2003) that descriptive norms play an important role in predicting intention, which has also been shown for the context of mobility behavior (Heath & Gifford, 2002). Some studies even found only the descriptive norm to be a significant predictor of intention. Exemplarily, de Leeuw et al. (2015) found that pro-environmental behaviors such as showering for less than 20 minutes or recycling were, besides attitude and perceived behavioral control, predicted only by the descriptive norm and not the injunctive norm.

A second shortcoming of the TPB lies within the fact that social norms are not the only normative predictors of behavior related to the environment. People also act upon feelings of moral obligation to engage in a certain behavior (Schwartz, 1977). Schwartz's norm-activation model (NAM) describes these feelings as a *personal norm*, defining it as self-expectations based on internalized values. In the context of travel mode choice, studies have shown that personal norm influences intention above and beyond the determinants of the TPB and therefore enhances the predictive power of the model (e.g., Bamberg, Hunecke, & Blöbaum, 2007; Harland, Staats, & Wilke, 1999; Nigbur et al., 2010; Nordlund & Garvill, 2003). It is therefore worthwhile investigating the effect of personal norm on intention, in addition to the determinants of the TPB.

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