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## The effectiveness of an intervention to promote active travel modes in early adolescence



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### ARTICLE INFO

#### Article history:

Received 22 December 2017  
 Received in revised form 23 March 2018  
 Accepted 24 March 2018  
 Available online 7 April 2018

#### Keywords:

Active travel  
 Intervention  
 Adolescents  
 Evaluation  
 Structural equation modeling  
 Theory of planned behavior

### ABSTRACT

This study investigates the changeability of transport-related attitudes and mode choice of early adolescents. Data on attitudes and travel behavior were collected in Austria and Germany in two consecutive survey waves with an interval of one year. The approach is based on a before-after control group experiment with an intervention promoting active travel modes. Based on the Theory of Planned Behavior we used structural equation modeling analyzing effects of the intervention; the potential for behavioral changes was modelled as moderator variable between intention and behavior. Findings suggest that the intervention was effective in changing attitudes, perceived behavioral control (PBC) and intentions to use non-motorized travel modes more, and car less. Difference models show that changes of attitude, subjective norm, and PBC accounted for 29% (car passenger) to 92% (walking) of the variance in changes in intention. The changes in intentions are however weak predictors of changes in reported behavior.

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## 1. Introduction

Recent developments show that children levels in physical activity decrease to alarming rates. In Austria, only 57% of young people fulfil the recommendations of the World Health Organization (WHO) on health-enhancing physical activity (HEPA); adults show even lower rates (BMFJ, 2016). At the same time, the independent mobility is declining with significant consequences for the physical, social and mental development of children (e.g. Frauendienst & Redecker, 2011; Shaw et al., 2013, 2015). Although there are some promising tendencies among Germans young adults in terms of declining car ownership rates and car travel (Kuhnimhof, Wirtz, & Manz, 2012), the car is still seen as a symbol of freedom: Accordingly, 72% of pre-license teenagers residing in the city of Vienna with a high quality supply of public transport (strongly) agreed on the question, whether they would like to obtain a driving license as soon as possible and drive a car on their own (Bartana, Stark, & Fritz, 2015). Against the background of these developments and the pressure of current European emission reduction targets, many awareness campaigns and policies promoting walking and cycling have been conducted in recent years. Most of them target adults, although the willingness of teenagers to accept habitual changes is higher than for adults (Scholl & Sydow, 2002). Some authors state that the changeability of personality traits ends in early adulthood (Bloom, 1964; Costa & McCrae, 1985). According to Scholl and Sydow (2002) the car gains a symbolic value for adolescents long before they obtain a driving license. In addition, Flade and Limbourg (1997) state that a pro-car orientation seems to be acquired from

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the age of 12; it increases with rising age. Therefore, it can be assumed that behavioral interventions for young adolescents in the age group of 12–14 – representing a “transition phase” between childhood and adulthood – may be relevant and, presumably, even more effective compared to older target groups. Of course, this age group does not act totally autonomously and their travel behavior is still influenced by their parents’ travel decisions. However, some positive impacts on travel behavior may become evident only after teenagers reach adulthood and exercise their preference for a certain mode of transport. The current study will therefore focus on early adolescents in this developmentally important phase.

Travel behavior of children is a widely discussed topic, especially primary school children and mode choice on their school trips are often subject of programs. However, there is a scarcity of empirical information about well-tested complex interventions to influence the everyday mobility, especially, of young people in the transition period from children to teenagers. Some evaluations exist for Safe Routes to School (SRTS) programs promoting active school travel (AST) which started in 2005 in the U.S. (Stewart, 2011): The objective of SRTS is to increase the rate and safety of AST through both infrastructure improvements and non-infrastructure activities. Particularly, SRTS programs support walking or biking safely on school trips through some combination of (i) engineering measures (e.g. infrastructure improvements), (ii) education (e.g. safety courses), (iii) enforcement (e.g. increased police patrols near schools), (iv) encouragement (e.g. events or media campaigns), and (v) evaluation (e.g. data collection and analysis). In existing evaluations, none of the changes in AST-rates could be directly attributed to the effects of SRTS programs because they were not compared to changes in rates at control schools. In conclusion Stewart (2011) states that evaluations using more rigorous experimental designs are necessary.

Mendoza, Levinger, and Johnston (2009) evaluated the implementation of a walking school bus (WSB) at one school in Washington within a controlled, quasi-experimental trial with consecutive cross-sectional assessments. They found that WSB is a promising intervention in the short and long term among urban, low-income elementary school students. More studies can be found in the area of health research: A systematic review on the effectiveness of interventions to promote physical activity in early adolescence was conducted by Van Sluijs, McMinn, and Griffin (2007). The authors identified 33 studies aimed at children and 24 at adolescents. Twenty-four studies were of high methodological quality, including 13 studies in children. Although some evidence was found for potentially effective strategies to increase the levels of physical activity, as stated by the authors, a lack of high quality evaluations hampers conclusions concerning effectiveness, especially among children.

This article contributes to the literature by presenting a before-after control group experiment with intervention on young adolescents (12–14 years), which enjoy relatively little research attention in comparison with adults, early-license teens and primary school children. The paper provides an insight into their everyday mobility and in better understanding of the effectiveness of campaigns using a robust experimental design. Our intervention focused on a reduction of car passenger use and promoting walking and cycling as environmentally friendly and healthy modes of transport. In contrast to other studies, this study examines the impacts on travel behavior and attitudes in this age group. Our approach is based on the Theory of Planned Behavior (TPB), which is a widespread socio-psychological model for the prediction respectively explanation of planned behavior. Furthermore, Steinmetz, Knapstein, Ajzen, Schmidt, and Kabst (2016, p225) highlight “the utility of the TPB for designing and evaluating the effectiveness of interventions across different behaviors”. The theory was developed by Icek Ajzen in 1980s based on the Theory of Reasoned Action (TRA). According to the theory, intentions and behaviors can be influenced if significant effects are caused on one or more of the following predictors: (i) attitudes toward the behavior, (ii) the expectations on how others will evaluate the behavior (subjective norm) and (iii) the expectation on how easy it is to perform a certain behavior (perceived behavioral control) (e.g. Ajzen, 1991, 2011). These three dispositions guide the intention which is assumed to be the immediate antecedent of behavior: The more favorable the attitude and subjective norm, and the greater the perceived behavioral control, the stronger should be the person’s intention to perform the behavior. The stronger the intention, the more likely an individual will perform the behavior. This relation can be moderated by the degree of control over the performance of a questioned behavior (Ajzen, 2011). If there are factors outside an individual’s control, PBC can also contribute directly to prediction of behavior. PBC may also have a moderating effect of the intention-behavior relationship (Fishbein & Ajzen, 2010). In this context, higher PBC is associated with better intention-behavior consistency. There could be also other moderating effects (e.g. habit), which are not discussed in detail here.

The theory is very often applied in the field of health studies. The TPB is also applied in research on travel behavior in different contexts (e.g. Abrahamse, Steg, Vlek, & Gifford, 2009; Bamberg, 1995; Bamberg, Ajzen, & Schmidt, 2003; Bamberg & Schmidt, 1998, 2003; Forward, 2014; Heath & Gifford, 2002). However, no application can be found in this study area on 12–14 years old adolescents, except for one study on bicycle use in New Zealand (Frater, Kuijer, & Kingham, 2017). Main focus of the study of Frater et al. (2017) was to assess how variables from the prototype/willingness model contribute to TPB to predict intention to cycle to school. In other research subjects, TPB is a well-supported theoretical framework applied to analyze attitudes and behavior of children and youth; most of them refer to health-related decision making and sports-psychology (e.g. Fila & Smith, 2006; Lien, Lytle, & Komro, 2002; Wigginton, 2011). In this context, findings indicate that TPB is useful for predicting factors directly related to behavior, but not for predicting the indirect effect of intention (e.g. Fila & Smith, 2006). They summarize that older samples (26 or older) are more likely to act on their intentions, and thus more likely to perform the intended behaviors, than are younger samples (25 or less) (Wigginton, 2011). In the field of exercise behavior “intention-behavior gaps” were confirmed for young age groups by several studies (e.g. Martin, Kulinna, McCaughtry, Cothran, & Dake, 2005; Martin, Oliver, & McCaughtry, 2007; Motl et al., 2002; Trost, Saunders, & Ward, 2002). Researchers suggest that intentions are not stable in young age groups, and that other factors besides intention

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