



Application Planned Behavior Theory in Determining Factors Conditioning Use of Active Transport in the Context of Sustainable Development

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Abstract

Climate change has highlighted the importance of choosing sustainable behavior. The use of active transport models has multiple benefits to health and the environment. According to the World Health Organization, active transport helps achieve 14 of the 17 Sustainable Development Goals. The importance of active transport in achieving the goals of sustainable development is recognized [4], [20], but there is still a lack of research that analyzes the factors that help to explain a person's behavior related to the use of active transport. The theory of planned behavior [1] is one of the most applied theories that help to explain and predict people's pro-environmental and health-promoting behavior, and it is increasingly being applied to understand the factors that determine the use of active transport. The aim of this study is to determine the prevalence of active transport use and the individual factors that conditioning it among young Lithuanian adults using the theory of planned behavior. Methods: 250 respondents participated in the cross-sectional study. Theory of Planned Behavior-based questionnaire was used to identify behavior related to the use of active transport. Environmentally friendly attitudes were measured by the Sustainability Consciousness Questionnaire. Active transport prevalence was measured by item based on the Transtheoretical Model (Stages of Change) and identified the proportion of people in each of the stages of change in terms of active transport. Results: it was found that 26.4% of respondents use active transport when traveling to/from educational institutions/work, 10% when traveling to/from social events, 54.4% when traveling to/from shops. Significant relationships were found between greater involvement in active transport and attitudes favorable to active transport ($r=.170$, $p<.05$), attitudes favorable to environmental protection ($r=.134$; $p<.05$), subjective norms regarding active transport ($r=.159$; $p<.05$), perceived control ($r=.351$; $p<.05$) and intention to use active transport ($r=.445$; $p<.05$). Interpretation. The increasing awareness of the health and environmental benefits of active transport encourages people to replace motor vehicles with active transport. Conclusion. The use of active transport is associated with favorable attitudes towards sustainable development, subjective norms, perceived behavioral control and intention to use active transport.

Keywords: sustainable development, active transportation, active transport, physical activity, sustainability, planned behavior theory

1. Introduction

It has been scientifically proven that the use of active transport provides double benefits for the environment and for people. The primary benefits are direct to human physical health, mental health, and quality of life due to increased physical activity, while secondary benefits are obtained through the environment due to reductions in air and noise pollution [4], [6], [20]. In the context of sustainable development, active transport is given an important role, it is indicated as a cost-effective means of contributing to the implementation of the sustainable development goals and is indicated as one of the most promising ways to achieve a physically active society [13], [25]. According to studies presented by Litman (2003) and Handy et al., (2005), promoting active transport is the most feasible way to improve public physical state and health. As active transport vehicles combine regular human activities with daily habits and transport needs, walking and cycling can help integrate physical activity into daily life. As Allen and Nolmark (2022) points out, walking and cycling can be done by almost everyone, so active transport can effectively replace short car journeys and can be more easily integrated into people's busy schedules as part of everyday life.

Due to the importance of active transport for both physical activity and achieving sustainable development goals, scientists are increasingly focusing on research to identify factors that can increase the use of active transport. It was established that factors influencing active transport are usually divided into two groups: environmental and psychosocial factors. Adequate infrastructure and



other environmental factors are very important in promoting the active use of transport, but it has been observed that even with ideal environmental conditions for using active transport, people still do not use it. As an example, a study by Lois et al., (2015) was initiated by the fact that despite the city (Vitoria-Gasteiz, Spain) having implemented one of the first cycling schemes in Europe in 2004, with 457 free bikes, which were located in 19 collection points in the city center, leisure and shopping centers, the city still did not have a practically functioning bicycle use system, i.e. physical environmental factors did not increase the number of active transport users, therefore it is important to determine the factors of the social context that would be used to influence the use of active transport.

Scholars emphasize the importance of psychosocial factors in the choice of active transport, pointing out that these factors provide detailed knowledge of community social and behavioral characteristics, which help those who are responsible to determine which strategies and methods are appropriate in the context of their community and meet the transport needs of the whole population [7]. As suggested by Buehler, 2011, Atasoy et al., (2010), although psychosocial factors play a significant role in the choice of transport, especially in societies where citizens can choose between means of transport. Due to the importance of psychosocial factors in the choice of active transport, a lot of attention has recently been paid to various active transport promotion programs, which are usually based on motivating psychosocial factors, especially in societies where the physical environment is already adapted to the use of active transport. To increase the effectiveness of such programs, research is being conducted, which aims to identify psychosocial factors that can influence environmentally and health-friendly behavior, such as using active transport.

However, although it has been scientifically proven that the use and promotion of active transport contributes to the sustainable development goals, there is still a lack of information about the prevalence of active transport use and the factors influencing it. This information can help to understand how to effectively transition from comfortable motorized transport to active modes of transport.

The aim of this study is to determine the prevalence of active transport use and the individual factors that are associated with it among young Lithuanian adults.

2. Application of Planned Behavior Theory by Investigating the Use of Active Transport

Active transport is both a health and environment-friendly behavior, to explain such behavior in research, researchers usually use the theory of planned behavior, which is also widely applied to explain behavior related to active transport use [9], [16], [19]. According to the theory of planned behavior, the intention to behave is determined by three independent components: attitudes about a certain behavior, subjectively assessed social norms and perceived behavioral control. Attitudes about behavior describe a person's subjective evaluation of a certain behavior, which can be favorable or unfavorable [1]. Social norm in a broad sense refers to what behavior is acceptable or desirable in a certain group or society, it is a person's perception that people that are important to them think that they should or should not engage in a certain behavior [10].

One of the most recent studies explaining active transport related behavior took place in Serbia. Djokic et al., (2023) conducted a study examining the motivations of student's choice to use an electric bicycle in the context of the theory of planned behavior, including the element of financial incentives. The research findings state that the strongest predictors of intentions to use electric bicycles are financial incentives, attitudes and subjective norms, while perceived behavioral control was not significant. The recommendations indicate that, considering the research results, the positive attitude of young people towards electric bicycles should be strengthened, as well as the social pressure to use them (emphasizing the importance of the media), and the authorities should (considering the importance of financial incentives), offer support for the purchase of an electric bicycle, thus encouraging their usage.

Forsberg et al., (2023) also conducted one of the most recent studies that sought to identify factors that determine parents' willingness to allow/disallow children to use active transport (walking or cycling) for school trips. During the study, there were educational interventions for parents, the aim of which was to encourage parents to allow their children to use active transport during the trip to school. It was found that parents who participated in the intervention (i.e. educational activities) were significantly more favorable towards active transport and willing to provide conditions for their children to use active transport on their way to school, compared to parents who did not participate in the intervention. Willingness to allow a child to use active transport was most related to positive attitude toward active transport and subjective norms.



Zhang et al., (2020) in a study to predict transport related bicycle use among Chinese students also used the theory of planned behavior, complementing it with perceptions of the neighborhood environment. The study findings reported that intention to use active transport had a direct effect on transport related cycling, while attitudes, subjective norms, and perceived behavioral control predicted cycling indirectly through intention. Perceptual differences in the neighborhood environment did not influence bicycle use through elements of the theory of planned behavior.

In a Swedish study, researchers Eriksson and Forward (2011) tried to explain the factors determining the intention to choose a mode of transport (car, public transport or bicycle) using the theory of planned behavior and found that perceived behavioral control and subjective norms, are the most important factors in predicting the intention to use a bicycle for transport purposes.

Sun et al., (2015) research used the theory of planned behavior to identify students' behavior related to walking for transportation purposes. During the study, students filled out a questionnaire and a diary for walking. The results indicated that perceived behavioral control is a key determinant of the intention to walk.

Scott, etc., (2007) conducted a study in which the theory of planned behavior was trying to determine the behavior related to walking. Respondents recorded pedometers for a week, then filled the questionnaire about walking behavior, and then again recorded pedometers for a week. Walking behavior before and after questioning was compared. The results state that the perceived behavioral control was significantly related to increased walking.

Summarizing the presented research, it can be said that in explaining active transport related behavior, the theory of planned behavior is applied as a basis for developing structured survey instruments aimed at understanding the cognitive mechanisms underlying behavioral intentions to use active transport and the behavior itself. The theory of planned behavior is applied both alone and by expanding and supplementing it with various factors. The results of most studies that apply the theory of planned behavior intended to explain both physically active behavior and active transport related behavior indicate that perceived behavioral control can have the greatest influence on intentions to be active.

3. Methods

250 respondents participated in the cross-sectional study, 80% of them were women and 20% were men, aged from 18 to 39 years old, an average age is 20.38 years. More than half (59.2%) of the respondents had a secondary education, 24.8% had a university education, 12.8% had a non-university education, and 3.2% had a vocational education. Both genders had the equal possibility to fill the questionnaire. However, only 20% of males filled it.

Active transport prevalence was measured by item based on Stages of Change model and identified the proportion of people in each of the stages of change in terms of active transport [14]. Theory of Planned Behavior-based questionnaire was used to identify attitudes, subjective norm, perceived behavioral control and intention to use active transport [1]. Environmentally friendly attitudes were measured by the Sustainability Consciousness Questionnaire [12].

4. Results

Prevalence of the active transport. It was found that 26.4% of respondents use active transportation (walking, riding a bicycle, scooter, or other active transportation vehicle) when traveling to/from an educational institution/work, (34.8% use public transport, 34.4% drive a car, 2.8% ride a car as a passenger). To get to/from social events, 10% use an active transportation vehicle (34% use public transport, 40% drive a car, 15.2% ride a car as a passenger). When traveling to shops, 54.4% of respondents use an active transportation vehicle (7.6% use public transport, 32.4% drive a car, 5.6% ride a car as a passenger).

Involvement in using active transport. It was found that 12% of the respondents prefer active transport when choosing a mode of travel and do so regularly, more than 6 months. 48% of respondents indicated that they currently prefer a car or public transport over an active transportation vehicle when choosing a vehicle and do not plan to change their behavior in the next 6 months. 24% of respondents, although currently choosing a car, plan to use active transportation more often for their mobility in the next 6 months. 12.6% use active transportation for mobility but do so irregularly. 3.4% regularly choose active transport and started doing so in the last 6 months.



The unemployed (16.7%) and the employed (17.4%) significantly more frequently use an active transportation vehicle regularly for more than 6 months, compared to students (9.1%) and those on parental leave (0%).

Significantly more unemployed people (50%) plan to choose an active transport vehicle in the next 6 months, compared to students (24.7%), employed people (23.3%) and those on parental leave (0%). Meanwhile, significantly more people on parental leave choose an active transport vehicle irregularly (50%) or regularly (25%), but only in the last 6 months.

Respondents who have spouse or partner (52.8%), significantly more often indicated that they currently prefer a car over an active transport vehicle when choosing a vehicle for their mobility compared to people who are single (41.7%); single people (6.5%) significantly more often choose an active transport vehicle in the last 6 months, compared to people who have spouse or partner (0.6%).

Significantly more (32.4%) respondents that have a scooter use active transport regularly and do so for more than 6 months. 8.5% does not have a scooter.

Respondents who volunteer significantly more often (8.2%) choose an active transport vehicle in the last 6 months compared to non-volunteers (2%).

Table 1. Involvement in using active transport

Variable	Involvement in active transport (AT)					Chi-Square Tests
	Prefer to use motorized transport	Intend to use AT in the next 6 months	Use AT but irregularly	Start use AT in the last 6 month	Regularly use AT	
Percent						
Unemployed	33.3	50	0	0	16.7	$\chi^2=29.19$ 6; df12; p<.05
Student	45.5	24.7	16.2	4.5	9.1	
Working	54.7	23.3	4.6	0	17.4	
On paternity leave	25	0	50	25	0	
Single	41.7	23.1	16.7	6.5	12	$\chi^2=10.90$ 1; df4; p<.05
With spouse or partner	52.8	25.4	9.2	0.6	12	
Have a scooter	32.4	21.6	10.8	2.7	32.5	$\chi^2=17.56$ 1; df4; p<.05
Don't have a scooter	50.7	24.9	12.7	3.3	8.4	
volunteer	34.7	32.7	16.3	8.2	8.2	$\chi^2=10.14$ 6; df4; p<.05
Non-volunteer	51.1	22.4	11.4	2.0	12.9	

Significant relationships were also found between greater involvement in active transport and attitudes favorable to AT ($r=.170$, $p<.05$), attitudes favorable to environmental protection ($r=.134$; $p<.05$), subjective norms regarding active transport ($r=.159$; $p<.05$), perceived control ($r=.351$; $p<.05$) and intention to use active transport ($r=.445$; $p<.05$).

Table 2. The relationships between the active transport ant attitudes, subjective norms, perceived behavioral control

Variable	Active transport (Pearson r)	Sig. (2-tailed)
Attitudes favorable to AT	.170	.007
Attitudes favorable to environmental protection	.134	.034
Subjective norms regarding AT	.159	.029
Perceived behavioral control	.351	<.001



Intention to use AT	.445	<.001
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5. Discussion

The main objective of this study was to determine the individual factors that are associated with active transport among young Lithuanian adults. To achieve this goal, the theory of planned behavior was used, which is cited as one of the most useful and commonly used theories of social cognition, helping to explain and predict people's environmental and health-friendly behavior, and therefore also behavior related to active transport [1]. The results of the study showed that higher active transport use is significantly related to all theory of planned behavior items i. e. attitudes favorable to active transport and environmental protection; subjective norms regarding active transport; perceived control and intention to use active transport. As the theory of planned behavior is increasingly applied to understand the determinants of active transport use, the results of the study were compared with other similar studies. The results of one recent study using the theory of planned behavior questionnaire indicated that the strongest relationships were found between intentions to use bicycles (electric) and attitudes and subjective norms. The relationship between perceived behavioral control and intention to use a bicycle was not significant [8]. Attitudes and subjective norms were significantly related to the intention to allow children to use active transport on a school trip in Forsberg et al., (2023) study. A study by Zhang et al., (2020) intended to predict transport related cycling among Chinese students reported that intention to use active transport had a direct effect on transport related cycling, while attitudes, subjective norms, and perceived behavioral control predicted cycling indirectly through intention. In a Swedish study, researchers Eriksson and Forward (2011) tried to explain the factors determining the intention to choose a mode of transport (car, public transport or bicycle) using the theory of planned behavior and found that perceived behavioral control and subjective norms are the most important predictors of the intention to use a bicycle for transport purposes. The results of Sun et al., (2015) study indicate that perceived behavioral control is a key determinant of the intention to walk. It is important to note that the influence of each element of the planned behavior construct may vary depending on the population and context studied. It is also indicated that if prior physical activity behavior (i.e., habit) is used as a control factor, the significance of intention and perceived behavioral control for an action (i.e., actual increase in physical activity) is reduced [21], [24]. Hagger, Chatzisarantis, and Biddle (2002), conducted a meta-analysis on the theories of planned behavior and reasoned behavior in physical activity and found that attitudes and, to a lesser extent, perceived behavioral control, were key factors in shaping intentions to participate in physical activity. In the conclusions, the authors indicated that interventions based on improving attitudes towards physical activity can lead to an increase in physically active behavior.

No significant results were found when investigating the correlations between active transport use and sociodemographic factors. Different studies indicate different associations between active transport use and sociodemographic factors. In our study, no significant differences were found between active transport and the most common sociodemographic variables, i.e. gender, social status, education, economic level. However, as indicated by Ferrari et al. (2021) in a meta-analysis: men, people with higher education and social status use active transport more often than women; people of lower education and social status.

It is emphasized that promoting active transport must improve the health literacy of the entire population, emphasizing the benefits of active transport for health, social well-being, and environmental protection. Increasing awareness of the health and environmental benefits of active transport encourages people to replace motor vehicles with active transport, especially during short trips [4].

5. Conclusions

The use of active transport is associated with favorable attitudes towards sustainable development, subjective norm, perceived behavioral control and intention to use active transport. The increasing awareness of the health and environmental benefits of active transport encourages people to replace motor vehicles with active transport.

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