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Factors affecting parental safety perception, satisfaction with school travel and mood in primary school children in the Netherlands

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ABSTRACT

Introduction: An increasing number of studies in transportation research have recently focused on well-being and travel satisfaction. These studies argue that satisfaction with travel is an indicator of the trip's contribution to subjective wellbeing of the traveler. Although the attention on satisfaction with travel is increasing, relatively few studies have considered satisfaction with travel of children. As children's travel is strongly linked to distance and the built environment, they would be important additional considerations to such research. Therefore, this study looks into the household, built environment and trip characteristics influencing satisfaction with travel and mood among Dutch children attending primary school. Additionally, the study considers the mediating effect of parental safety perception on satisfaction with travel and the relationship between satisfaction with travel and mood.
Methods: In order to study these relationships, survey data were collected in the Netherlands from 660 children (7–12 years) and their parents. The data were analyzed using a path analysis.
Results: Findings show that parental safety perceptions are related to the age of the child, income, perceptions of neighborhood infrastructure and social cohesion. Satisfaction with school travel is higher when parental safety perception is higher, when it is sunny, when traveling with a friend and when traveling by bike when this is the favorite transport mode. Satisfaction with travel is related to children reporting a better mood.
Conclusion: These insights can be used by policy makers to create safe school environments stimulating active travel, which in turn will improve satisfaction with travel, well-being and health among primary school-going children.

1. Introduction

The aim of this study is to analyze the factors influencing satisfaction with travel and mood among children attending primary school. Previous research has examined how different modes affect satisfaction with travel to school and have found that active travel

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is generally positively related (e.g. Westman et al., 2017; Friman et al., 2018; Stark et al., 2018). What explains children's active travel is proposed to be understood through frameworks based on a socio-ecological model of behavior (e.g. Sirard and Slater, 2008; Mitra, 2013). Reviews on the topic find that factors such as distance and parental concerns about traffic and personal security diminish such travel (Mitra, 2013). If a parent is concerned about traffic or personal security, those fears can be passed on to the child (Waygood and Manaugh, 2019), which may result in decreased satisfaction with travel due to stress. Further, if a trip is highly satisfying (or the inverse), it may influence the child's mood which could have implications for how they perform at school. Previous research has found that active travel can make children more alert (Westman et al., 2013; Hillman et al., 2009) and more ready to learn. Thus, in this study, how parental safety perception affects children's travel satisfaction, and how that in turn affects mood will be examined for trips to school in the Netherlands. Finally, this study is the first to study children's satisfaction with travel in the Dutch context.

Several studies have shown that active and independent travel among children is decreasing and children are increasingly transported to school in the backseat of the car. This is an unfavorable development, because active travel provides important health and well-being benefits and the increasing numbers of cars around schools cause safety issues (Waygood et al., 2017b). Most research on children's travel behavior focuses on the consequences this has on physical health, while studies on the psychological consequences are still scarce (e.g. Westman et al., 2017; Friman et al., 2018; Stark et al., 2018; Waygood et al., 2018). Understanding the factors affecting children's psychological well-being related to their travel may provide important suggestions for policy-makers on how to improve quality of life in cities.

In transportation research there is a growing interest in well-being and travel satisfaction. Several studies argue that satisfaction with travel is an indicator of the trip's contribution to subjective well-being of the traveler. The subjective well-being of an individual is their personal evaluation of their life. Despite the increasing attention for satisfaction with travel, relatively few studies have considered satisfaction with travel of children.

Finally, in terms of mood, previous research with adults in the USA (Morris and Guerra, 2015) and in the Netherlands has found that cycling is the most positively related mode in terms of improving mood (Lancée et al., 2017). However, how satisfaction and mood interact is not well studied. Ettema et al. (2017) have studied how different modes and conditions might affect mood, but not whether satisfaction with travel affects mood. Westman et al. (2017) examined whether travel mode influences satisfaction with travel to school and current mood of children, but did not find an influence of mode on mood, though longer trip times decrease mood.

This study presents a path analysis estimated in order to study these important influences of children's travel on their satisfaction and mood. The analyses are based on survey data collected from 660 children of 14 primary schools in the Netherlands in grades 5–8 (7–12 years) and their parents. In the next section the conceptual considerations of this study are discussed in the light of existing literature. In section 3 the data collection methods and sample are presented, followed by the analysis methods and results in section 4. The final section presents the conclusions and implications of the study.

2. Conceptual considerations

In transportation research an increasing number of studies have recently focused on well-being (e.g., Ettema et al., 2010; De Vos et al., 2013, Delbosc, 2012; Nordbakke and Schwanen, 2014; Friman et al., 2017; Van den Berg et al., 2019). However, most studies consider adults' rather than children's travel and well-being. According to Pollard and Lee (2003) and Waygood et al. (2017b) five domains of children's well-being can be distinguished, namely physical, social, psychological, cognitive and economic well-being. Most research on children's travel and well-being has focused on the consequences of reduced active travel on physical health and well-being, while studies on children's travel and psychological well-being are still scarce (Waygood et al., 2017b; Stark et al., 2018). Psychological well-being encompasses many different measures of well-being including measures such as self-esteem, stress, happiness, and mood (Westman et al., 2019). In some cases, subjective well-being will be used as a measure of psychological well-being with measures related to affect, happiness, and satisfaction (e.g. Stark et al., 2018). The term subjective well-being is used as the individual is making a subjective assessment of their current state.

Subjective well-being can be distinguished into hedonic and eudaimonic well-being (e.g. De Vos et al., 2013). Hedonic well-being has an affective component, characterized by a short-term emotional experience or mood (positive/negative feelings) and a cognitive–evaluative component, which is a more long-term assessment of general life satisfaction (Diener, 2000). In contrast, eudaimonic well-being represents personal growth and finding purpose or meaning in life (De Vos et al., 2013).

The most commonly used scale to measure travel-related hedonic well-being is the Satisfaction with Travel Scale (STS) (Ettema et al., 2011; Bergstad et al., 2011). This is a nine-item scale that measures both affective and cognitive satisfaction. It consists of six affective items that distinguish positive activation versus negative deactivation and negative activation versus positive deactivation and three questions about cognitive evaluation. Westman et al. (2017) adapted the scale to be understandable for children (STS-C).

Bergstad et al. (2011) argue that daily travel affects the overall mood and satisfaction of an individual. In their study on how subjective well-being of adults is impacted by daily travel, they found that travel satisfaction had a direct effect on cognitive as well as affective subjective well-being. In addition, according to Ettema et al. (2011) satisfaction with travel can be considered as an indicator of the trip's contribution to subjective well-being of the traveler, which, is easier to measure than well-being in general.

In this study we measure children's satisfaction with their school trip, as well as their current mood. It is likely that having a satisfying trip results in a better mood. On the other hand, being in a certain mood is likely to affect the way the trip is evaluated. We will test both directions in our model. In addition, as the parental safety perception has been found to be very important in the decision making process of independent travel and transport mode (e.g. Kerr et al., 2006; Veitch et al., 2017), it is likely to also affect children's travel-related well-being. We hypothesize that parental safety perception mediates the relationship between several environmental characteristics and children's satisfaction with school travel.

We consider the influencing factors of parental safety perception and children's mood and satisfaction with travel from a socio-ecological approach (Bronfenbrenner, 1979), which suggests that several layers of the child's environment (personal characteristics, household, social, physical and external environment) may be of influence. The socio-ecological approach has been widely used by authors attempting to increase the understanding of the multi-level influences from the child's environment on their travel behavior (e.g. Curtis et al., 2015; Mitra, 2013; Panter et al., 2010).

First, trip characteristics are likely to affect children's satisfaction with travel. Several studies found an association between children's subjective well-being and their travel mode to school. Waygood et al. (2017b) report consistent findings of walking being related to positive emotions and to lowering stress. Ramanathan et al. (2014) found active travel to school to be associated with positive emotions such as feeling happy or relaxed, for children as well as for parents. Westman et al. (2017) also found that active modes were associated with a higher degree of children's satisfaction with travel than car travel. Stark et al. (2018) also found active school travel to be related to psychological well-being.

In the personal layer of the socio-ecological model we hypothesize that gender and age may influence parental safety perception, and (indirectly) satisfaction with travel and mood. Existing studies revealed that as children get older, they generally gain more independence in travel (Carver et al., 2013; Curtis et al., 2015). This suggests that parents have fewer safety concerns when their children are older. Age was also found to be associated with the experience of the trip to school; older children experience the least excitement and quality of their trip (Westman et al., 2017). Boys have been reported to more often be allowed to travel independently than girls (Carver et al., 2013), which results in more active travel participation. However, Kemperman & Timmermans (2014) found no association between travel behavior and gender in the Netherlands, Cervesato and Waygood found no consistent relationship of gender for independent travel in Canada (2019), and Waygood and Kitamura (2009) found no relationship of gender for Japan.

Household characteristics such as socio-economic status have also been found to affect children's travel behavior. For instance, lower income was found to be associated with less active travel participation (Van Goeverden and de Boer, 2013). Aarts et al. (2013) found that children in larger households cycle more often and children in households with more cars less often use active modes to travel to school. These factors might also affect parental safety perception and children's satisfaction with travel.

The social environment has also been found to significantly influence children's travel behavior. Aarts et al. (2013) found perceived social safety and social cohesion in the neighborhood to be related to more active school travel. Similarly, Kemperman & Timmermans (2014) found that children who live in neighborhoods that are perceived safe and have high social cohesion cycle more often. Waygood et al. (2017a) suggest that having connections in the neighborhood decreases parental concerns, which in turn increases children's independent mobility.

In addition, factors from the physical environment have been found to significantly influence children's travel behavior. Not surprisingly, distance to school is the most commonly found factor influencing school travel behavior. Living closer to school was found to enable active travel internationally (e.g. McMillan, 2007; Panter et al., 2010) as well as in the Netherlands (Aarts et al., 2013; Kemperman and Timmermans, 2014). Distance to school is likely to affect parental safety perception. Curtis et al. (2015) found distance to influence whether or not children were allowed to travel independently, which might be an indirect effect of parental safety perception.

Finally, in the external layer, the weather may play a role. For instance, Buliung et al. (2011) found the weather to be one of the reasons for Canadian parents to drive their children to school. For adults, weather has been found to play a role with both mood and satisfaction for commute trips in Sweden (Ettema et al., 2017). Controlling for mood prior to the commute, valence (e.g., very sad to very glad) was positively affected by temperatures above the monthly average and negatively affected by rain. A surprising result was that there was a negative interaction between sunshine and using active (or slow in their terms) modes. Travel satisfaction was measured with respect to quality, enthusiasm-boredom, and relaxation-stress. Positive influences were sunshine (across all three), above monthly average temperature (relaxation), rain/snow (relaxation, quality), wind speed (enthusiasm), and interaction effect of using public transport in the summer when it was raining. Negative influences were higher than monthly average temperatures for public transport and active modes (relaxation), and again sunshine on active modes (relaxation, quality). The weather is also likely to influence mood and satisfaction with travel in children.

3. Data collection

For this study a survey was developed for primary school pupils and their parents. The survey for the children asked about the travel mode to school that morning, the favorite travel mode, mood, satisfaction with travel that morning, the weather, and with whom the child traveled to school. Mood was asked on a five point scale ranging from very happy to not happy at all. Emoticons were used to make the survey more appealing to children. Satisfaction with Travel was measured using the Satisfaction with Travel Scale for Children (STS-C) (Westman et al., 2017), translated to Dutch. It consists of the following nine questions which the children could answer on a five point scale.

What did you think of the trip to school this morning?

1. A lot of fun – very lame
2. Very easy – very difficult
3. I learned a lot – I learned nothing

How did you feel during your trip to school this morning?

4. Very bored – very excited
5. Very indifferent – very much looking forward to the day
6. Very tired – very well rested
7. Very much at ease – very tense
8. I had a lot of time – I was in a big hurry
9. I was carefree – I was worried

The survey questions for the parents asked about personal and household characteristics such as household composition and income, distance to school, their perception of safety, and perceptions of the social and built environment, such as social cohesion, the quality of the bike and walk paths, and street connectivity.

To measure social cohesion in the neighborhood the following statements were used, again to be answered on a five point scale:

1. People in this neighborhood are prepared to help each other;
2. This neighborhood is a tight community;
3. I trust the people that live in this neighborhood;
4. Normally, the people in this neighborhood get along well;
5. My child has a lot of contact with other children in the neighborhood.

The parental safety perception considers three factors, namely the confidence in the travel skills of their children, the perceived traffic safety of the route between home and school and the perceived social safety of the neighborhood. Parental safety perception is measured using the following set of statements for which parents have to indicate on a five point scale to what extent they agree:

1. My child is good at riding a bicycle;
2. If my child walks to a destination, he or she pays good attention to other users of the road;
3. If my child cycles to a destination, he or she pays good attention to other users of the road;
4. My child is good at estimating potential danger in relation to traffic safety;
5. There is so much traffic on the route to school that I find it unsafe to walk or cycle to school with my child;
6. There is so much traffic on the route to school that I find it unsafe to let my child walk or cycle alone to school;
7. I have the feeling that drivers of cars pay good attention to pedestrians and cyclists;
8. If my child is alone outside, I fear that they might run into the wrong kind of people (people that are dangerous to my child);
9. I find my neighborhood safe enough to allow my child to be outside by themselves.

The scores for these statements of safety concerns are combined into one general parental safety perception variable.

Regarding the quality and safety of pedestrian paths and bicycle lanes on the route from home to school parents were asked to indicate to what extent they agree with the following statements on a five point scale:

1. Most streets have safe bicycle lanes or are safe to cycle on;
2. Most bicycle lanes and pedestrian paths are well maintained.

To measure the street connectivity, parents were asked to what extent (on a five point scale) there are different routes in the neighborhood that their child can take to get to school.

The survey was distributed in the fall of 2018 at 15 primary schools in and around the Dutch city Arnhem that were located in areas with different urban density levels. Arnhem is a moderately large and steadily growing city of 155,000 inhabitants in the east of the Netherlands. To ensure variability between the types of schools and the types of school environments, several criteria were taken into consideration in the selection of schools, namely urban density, size of the school, type of school schedule (do children have lunch at school or not), and education vision of the school. A school board which manages 35 schools in Arnhem was approached. From their schools, which are located in the city as well as the surrounding villages, 12 schools agreed to participate in the study. As these included no schools in the lowest and highest urban density levels, approximately 10 additional schools were approached individually. Of these, 3 agreed to participate in the study, which leads to a total of 15.

All schools paper questionnaires as well as a note with clear instructions about the distribution of the questionnaires and the collection of completed questionnaires, and a note with a brief instruction for teachers, including the answers to some questions and confusions that children may have when filling in the questionnaires.

All children in grades 5–8 (aged 7–12 years old) of the 15 participating schools received a survey in class in the morning. They were asked to immediately fill in the first page of the survey. They were then asked to take it home and ask their parent to complete the rest of the survey. According to Waygood et al. (2019) “children have been found to report consistently on life satisfaction questions above grade 3 (ages 7 and 8) and it is weakly associated with social desirability response (Huebner and Diener, 2008).”

The teachers or the principal collected the completed questionnaires that the children brought back to school after a week and the researcher picked them up from each school. To improve the chances of a sufficient response rate, the principal was asked to send a description of the research, including an explanation of the relevance (written by the researcher), to all parents via e-mail or another digital platform.

All parents gave their informed consent before participating in the study. In total, 676 surveys were collected that were completed

by the children and their parents. Although 15 schools agreed to participate in the study, one of the schools did not receive any completed surveys from the parents in their school. After removing some incomplete surveys, a final sample of 660 respondents remained, resulting in a response rate of 46%. For more information on the data collection please refer to Van de Craats (2019). For more details on the conditions of children's travel in the Netherlands see van de Craats et al. (2019)

3.1. Sample characteristics

Table 1 shows the sample characteristics. Age is quite equally distributed; only the seven-year-olds and the twelve-year-olds are less common. Almost equal numbers of boys and girls participated. The largest share of respondents (43.3%) reported their household income to be average; 38.2% had a higher income than average and 18.5% reported to have a lower income than average. Almost half of the households have two or more cars and only 7.9% of the households in the sample did not own a car. This is similar to the household car ownership pattern in the Dutch population. Three quarters of the respondents live in a household with two parents and at least two children (75.6%). Half of the children in our sample have a school travel distance of 1 km or less. Around a quarter of the

Table 1
Sample characteristics.

Variables		N	%
Age	7	27	4.1
	8	140	21.2
	9	180	27.3
	10	155	23.5
	11	132	20.0
	12	26	3.9
Gender	Boy	315	48
	Girl	341	52
Household income	More than average	252	38.2
	Equal to average	286	43.3
	Lower than average	122	18.5
Household car ownership	No car	52	7.9
	One car	292	44.2
	Two or more cars	319	47.9
Household composition	One parent – one child	25	3.8
	One parent – more children	75	11.4
	Two parents – one child	61	9.2
	Two parents – more children	499	75.6
Travel distance	<500 m	145	22.0
	500–1000 m	190	28.8
	1–2 km	172	26.1
	2–5 km	100	15.2
	>5 km	53	8.0
Transport mode used	Bicycle (including kick-bike)	315	47.7
	Walking	140	21.2
	Car	148	22.4
	Other (including public transport)	57	8.6
Preferred transport mode	Bicycle	331	51.2
	Walking	117	17.7
	Car	119	18.0
	Other	86	13.0
Favorite mode used	Yes	268	40.6
	No	392	59.4
Interactions	Favorite mode used * Bicycle	172	26.0
	Favorite mode used * Walking	43	6.5
	Favorite mode used * Car	36	5.5
	Favorite mode used * Other	17	2.6
Weather	Sunny	57	8.6
	Very cloudy	247	37.4
	Partly cloudy	282	42.7
	Rainy	72	10.9
Trip companions	Alone	155	23.5
	With friend	79	12.0
	With parent, sibling or combination	426	64.6
		Mean	**St. deviation**
Quality bike/walk paths		3.24	0.82
Street connectivity		3.20	0.96
Social cohesion		3.61	0.60
% low income in neighborhood		37.6	15.81
Parental safety perception		3.64	0.55
Satisfaction with travel		3.72	0.59
Mood		3.88	0.81

respondents have a medium travel distance (1–2 km) and another quarter have a long travel distance (>2 km) to school. Almost half of the children (47.7%) came to school by bicycle that morning. Around one fifth were brought by car and about the same percentage of children walked to school. Only a small amount of children came to school by another mode, including taxibus, public transport or on the back of a bicycle. Two fifths of the children used their favorite transport mode that day.

For the majority, the bike is their preferred transport mode to go to school. Most children went to school with a parent, sibling or combination of those two. Almost a quarter of the children went to school alone and 12% traveled with a friend.

Cronbach's Alpha was calculated to assess the internal consistency of the scale items for quality of bike/walk paths, social cohesion, parental safety perception and satisfaction with travel. Cronbach's Alpha is a function of the number of test items and the average inter-correlation among the items.

The two statements on the quality of the bike/walk paths had a Cronbach's Alpha of 0.655, indicating moderate to good internal consistency. They were combined into one variable taking the mean score on these statements.

The four social cohesion statements had a Cronbach's Alpha of 0.827. This value indicates that the four variables can be merged into one social cohesion variable. This final social cohesion variable represents the mean of the responses given to the four social cohesion statements.

Regarding parental safety perception, the Cronbach's Alpha analysis showed that the overall set of statements was properly internally consistent with a Cronbach's Alpha value of 0.779. This variable represents the mean response of parents to the 9 statements of parental safety perception.

Finally, regarding satisfaction with travel the Cronbach's Alpha analysis indicated that it would be best to not include the second and third item (about difficulty level and learning). The combination of the remaining seven items resulted in a Cronbach's Alpha of 0.673, indicating moderate to good internal consistency. The final satisfaction with travel variable will therefore represent the mean of the scores on items 1 and items 4–9 of the scale.

4. Analysis methods and results

The aim of this study is to analyze the factors affecting children's satisfaction with travel and mood and the mediating role of parental safety perception. Fig. 1 shows the distribution of the endogenous variables in our model.

In order to simultaneously estimate the effects of the explanatory variables on the dependent variables, as well as the relationships between the dependent variables, path analysis is used. The path analysis model was estimated using the statistical software package LISREL (Jöreskog and Sörbom, 2001). The maximum likelihood method was used to estimate the models.

A number of different model specifications were tested, with different directions between mood and satisfaction with travel and different explanatory variables. Variables (such as gender, household car ownership and household composition) that did not significantly affect any of the endogenous variables were removed. The standardized coefficients of direct and total (direct + indirect) effects of the final model are shown in Table 2 and Fig. 2.

The goodness-of-fit statistics of the model are reported in Table 2. To provide a good fit, the Chi-square statistic divided by the degrees of freedom should preferably be smaller than 2 (Golob, 2001), or at least smaller than 5 (Washington et al., 2003). With a value of 2.33, the model still has a good fit. The model has a root mean square error of approximation (RMSEA) of 0.044 which also indicates a good fit, as the value should preferably be less than 0.05 (Golob, 2001). The model's goodness of fit index compares the fitted model to the saturated model. The value should be close to 1 (Washington et al., 2003). With a goodness of fit index of 0.99 and an adjusted goodness of fit index of 0.91, the model provides a good fit.

Regarding the relationship between satisfaction with travel and mood, both directions (mood affecting satisfaction, and satisfaction affecting mood) were tested in the model. The results indicate that satisfaction with travel affects mood. As expected, a positive relationship is found, suggesting that if children are more satisfied with their trip to school, they feel happier. Ettema et al. (2017) found that mood prior to the trip affected mood after the trip, but they did not test whether mood prior to the commute affected satisfaction, or whether satisfaction with the commute affected mood directly after. Although we tested the relationships between all other explanatory variables and mood, no other variables were found to significantly affect current mood. Mood is thus not affected by weather, transport mode, or personal and household characteristics. Westman et al. (2017) found that only grade and long trips influenced mood. However, no influence of age (grade) was found here.

We find that satisfaction with travel is influenced by several characteristics of the trip as well as age of the child and parental safety perception. A negative coefficient is found for age, indicating that older children are less satisfied with their trip to school. This finding

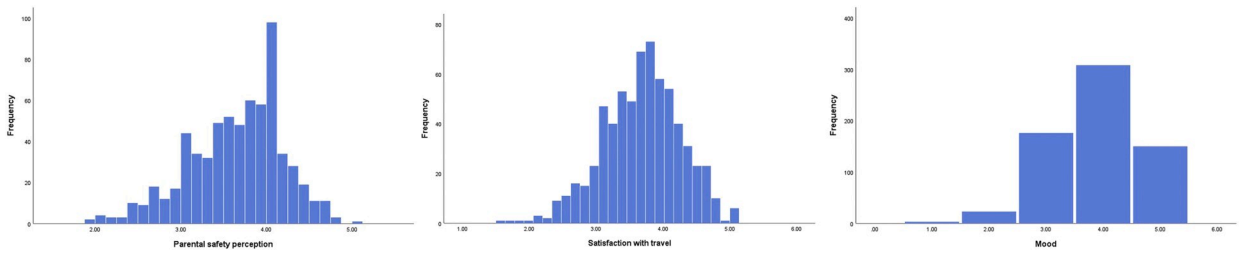

Fig. 1. Distribution of endogenous variables.

Table 2
Path analysis results.

	Parental safety perception		Satisfaction with Travel		Mood	
	Direct	Total	Direct	Total	Direct	Total
Parental safety perception			0.13 **	0.13		
Satisfaction with travel					0.47 **	0.47
Age	0.25 **	0.25	−0.14 **	−0.10		−0.05
Low income	−0.06 *	−0.06		−0.01		0.00
High income	0.07 *	0.07		0.01		0.00
Quality bike/walk paths	0.18 **	0.18		0.02		0.01
Street connectivity	0.19 **	0.19		0.02		0.01
% Low income in neighborhood	−0.07 *	−0.07		−0.01		0.00
Social cohesion	0.15 **	0.15		0.02		0.01
Distance <1 km	0.08 **	0.08		0.01		0.01
Distance 2–5 km	−0.08 **	−0.08		−0.01		−0.01
Distance >5 km	−0.14 **	−0.14		−0.02		−0.01
Traveled alone			−0.02	−0.02		−0.01
Traveled with friend			0.13 **	0.13		0.06
Weather: sunny			0.09 **	0.09		0.04
Weather: very cloudy			−0.09 **	−0.09		−0.04
Weather: rainy			−0.04	−0.04		−0.02
Mode: walking			0.01	0.01		0.01
Mode: bike			−0.03	−0.03		−0.02
Mode: other			0.08	0.08		0.04
Used favorite mode			0.00	0.00		0.00
Walking * favorite mode			0.10	0.10		0.05
Bike * favorite mode			0.22 **	0.22		0.10
Other * favorite mode			0.02	0.02		
R-squared	0.31		0.10		0.22	
R-squared reduced form	0.31		0.09		0.02	
Degrees of freedom	44					
Chi-Square	102.32					
Chi-Square/degrees of freedom	2.33					
RMSEA	0.044					
Goodness of Fit Index	0.98					
Adjusted Goodness of Fit Index	0.91					

is in line with Westman et al. (2017) and Friman et al. (2018) which also did not find significant influences of sex. It might be related to lower satisfaction related to adolescence.

The results suggest that children who traveled to school with a friend are more satisfied with their trip. Westman et al. (2017) also found that children who engaged in social activities on the way to school would be likely to be more satisfied. The weather was also found to be associated with travel satisfaction. When it was very cloudy, children were less satisfied with their trip and when it was sunny they were more satisfied with their trip. Although no literature on children was found to verify this finding, it seems a plausible finding. However, Ettema et al.'s (2017) study of adults in Sweden found that sunshine had a negative influence on two measures of active travel satisfaction (relaxation and quality).

Regarding the relationship between travel mode and satisfaction with travel we considered the effect of travel mode itself, whether or not the mode used was the favorite mode, and interactions between these two. In a separate bivariate analysis of variance we found a significant difference in satisfaction with travel for the different transport modes ($F = 2.73$; $p = 0.043$). The analysis indicated the highest satisfaction with travel for children who traveled with an 'other' mode (mainly taxibus or public transport) (mean = 3.79) and the lowest satisfaction with travel for car trips (mean = 3.60). Mean satisfaction with travel for walking and cycling are 3.75 and 3.76 respectively. Several other studies have found that active travel is related to higher satisfaction with travel by children (Ramanathan et al., 2014; Waygood et al., 2017b; Westman et al., 2017; Stark et al., 2018). The high satisfaction with travel for other modes might be related to the socializing opportunities in a taxibus or public transport (Jones et al., 2012; Westman et al., 2017). A t-test indicated a significant difference ($t = 4.44$; $p = 0.000$) in satisfaction with travel between children who used their favorite mode that day and children who did not. As expected, children who used their favorite mode were more satisfied with their trip (mean = 3.83) than children who did not use their favorite mode (mean = 3.63). In the path analysis however, the main effects of transport mode and using favorite mode become insignificant when we add the interaction effects of mode*favorite mode used. The results then indicate that children are more satisfied with their trip if they travel by bike and the bike is also their favorite mode.

Although previous studies on travel satisfaction for adults finds that active modes (e.g., Ettema et al., 2017), and in particular bicycling (e.g., De Vos et al., 2016; St-Louis et al., 2014; Ye and Titheridge, 2017; Zhu and Fan, 2018), are often the most positive, no significant direct result was found in our study. This may be in line with other travel satisfaction research on children examining travel in general (Waygood et al., 2019), though Westman et al. (2017) found that public transport and active travel modes were all rated to have better quality than travel by car for trips to school, with Friman et al. (2018) also finding that active modes to school were rated more positively.

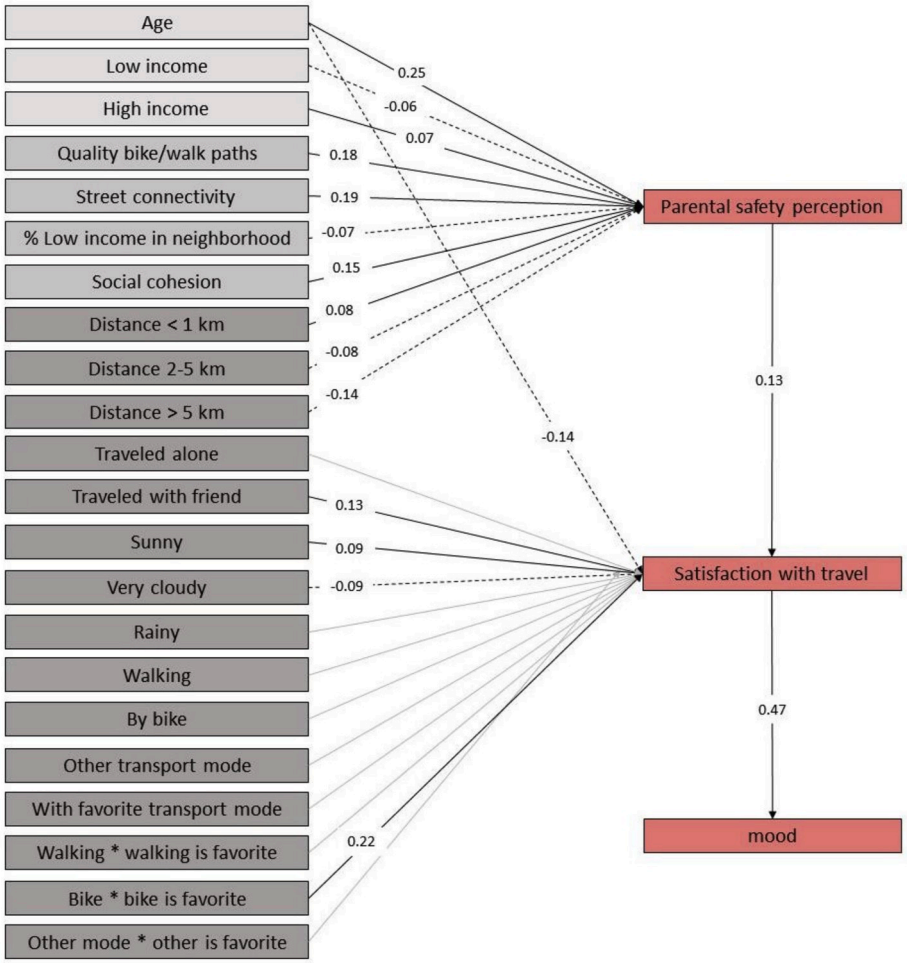

Fig. 2. Path analysis results – standardized direct effects.

Finally, we find that parental safety perception has a significant positive effect on satisfaction with travel. This indicates that parents who worry less about the safety situation have children who are more satisfied about their trip. This relationship has not been investigated in previous studies, though the relationship with the likelihood of active school travel has been investigated (e.g. Ikeda et al., 2019). There are some possible explanations for this relationship. Firstly, it could be that parental safety is a mediating variable between active travel participation and satisfaction with travel, i.e. parents that are less concerned let their children travel actively, which the children enjoy. Another possibility is that the route is simply safer, which allows the children to enjoy their trip.

Parental safety perception is affected by the child's age, income, travel distance, quality of infrastructure, and social cohesion. As children age, the parents generally have a more positive perception of the safety. This is a plausible finding because older children are generally better at paying attention to complicated traffic situations. No specific results have been found in the literature review for this association, but several researchers found that children generally were granted more independence by their parents when they were older (Hillman et al., 1990; Carver et al., 2013; Curtis et al., 2015; Shaw et al., 2015), which is an indication of positive safety perceptions.

We find that parents with a low income have stronger safety concerns compared to parents with a high income. This may be linked to problems such as environmental injustice where poorer households who walk more often live in areas with higher traffic danger (e.g. Pabayo et al., 2012). Also the percentage of low income households in the neighborhood has a negative effect on parental safety perception.

Furthermore, parental safety perception significantly decreases (i.e. they perceive it more dangerous) with an increase in the distance to school. The association of distance with parental safety perceptions was not found in the literature review. However, Curtis et al. (2015) did find distance to influence whether or not children were allowed to travel independently. This might be an indirect effect of parental safety perception. Panter et al. (2010) found that distance moderated attitudes related to cycling in children as well.

Better connectivity between the home and school, and thus likely having more possible routes to take to school, is associated with a more positive parental safety perception. This could be because having more routes to choose from makes it possible to choose a safe route the child can take to school. Also when parents perceive bicycle and walking paths to be better, they are significantly more

positive about the safety. This may be because the perception of bicycle and walking paths can be influenced by traffic safety, which is likely to influence parental safety perception. Related, Kerr et al. (2006) also found a positive association between parental concerns and the quality of walking paths.

When the parents' perception of social cohesion is higher, they are also more positive about the safety. This is in line with arguments put forward by Waygood et al. (2017a) that having connections in the neighborhood decreases parental concern. Previous research has examined perceptions of social safety (e.g. Alparone and Pacilli, 2012), but the influence of social cohesion is less well studied. In a recent study, Ikeda et al. (2019) found that the neighborhood social environment (a composite of neighborhood connections, cohesion, and safety) was positively associated with active travel to school. Aarts et al. (2013) did find it increased outdoor play in children, which may be linked to active travel as well. Johansson (2006) found that a good sense of community increased positive attitudes towards children's independent mobility.

The association between satisfaction with travel and parental safety perception also results in several indirect effects on satisfaction with travel, through the mediation of parental safety perception.

5. Conclusions and discussion

The aim of this study was to analyze the factors influencing satisfaction with travel and mood among Dutch children attending primary school and the mediating role of parental safety perception. For this study survey data were collected in the Netherlands from 660 children (7–12 years) and their parents. The data were analyzed using a path analysis.

The results indicate that parental safety perceptions are related to the age of the child, income, perceptions of neighborhood infrastructure and social cohesion. This is in line with recent studies such as Ikeda et al. (2019) who also found that age and perceptions of neighborhood infrastructure played a role. In this study, we demonstrated that satisfaction with school travel is higher when parental safety perception is higher. This association results in several indirect effects of the social and physical environment on satisfaction with travel, through the mediation of parental safety perception.

For the influences on parental safety, several explanations can be offered. As a child's age increases, they increase their experience with traffic conditions, their height increases making them both more visible and more able to see over vehicles. Income levels, both individual and neighborhood, may be related to neighborhood quality and traffic levels (Pabayo et al., 2012). Higher quality bicycle and walking infrastructure likely relate to greater safety given through such infrastructure. Greater connectivity gives children more options for routes, allowing them to avoid dangerous routes. Social cohesion relates to trust and has been previously found to increase active travel to school (McDonald et al., 2010). Finally, distance will influence exposure time to the dangers of traffic. Future studies could also look to examine the influence of weather on parental safety perception. In this study, the exact day that the parents completed the survey is not known, as such it could not be included as an explanatory variable.

Satisfaction with travel was found to be influenced by a number of measures. Parental safety increased satisfaction, which may be related to levels of stress. Age was negatively associated, which may be related to adolescence, though this is not clear. Travel with friends allows for increased socializing which children desire (Waygood et al., 2017b; Waygood, 2019) and social activities during travel were previously found to increase satisfaction (Westman et al., 2017). Satisfaction with school travel is also higher when it is sunny, which in areas where it is often cloudy is likely a welcome sight. Finally, although no mode had a direct effect on satisfaction, the combination of traveling by bike if it was the child's preferred mode increased satisfaction. The positive influence of bicycle on satisfaction was previously found, but this is the first study to account for preference.

This research is also the first to demonstrate that satisfaction with travel was found to have a positive effect on children's mood. No other influences were found, though in previous research on children's travel and mood, Westman et al. (2017) demonstrated a negative relationship between grade and mood as well as longer trips and mood.

These insights can be used by policy makers to create safe school environments stimulating active travel, which in turn will improve satisfaction with travel, well-being and health among primary school-going children. Studies (e.g. Ikeda et al., 2019) which examined many similar points with respect to active school travel found similar results. Along with results that demonstrate a link between travel satisfaction and life satisfaction in children (Friman et al., 2018; Waygood et al., 2018) this suggests that facilitating active school travel leads to more satisfied and happier children. Important aspects to focus on when aiming to increase active travel rates and psychological well-being among children include the parental safety perception, distance to school, social cohesion in neighborhoods, connectivity and the quality of cycling and walking paths.

High quality walking and cycling infrastructure is very important to promote active travel, parental safety perception and children's well-being. It is also important to keep distances to schools limited by retaining (small) schools in local communities. In addition to built environment interventions, the promotion of active travel by informing parents and children of the benefits could be also effective.

This study has some limitations. Mood was measured after the trip, so it is not possible to know whether how much of the mood was influenced by mood prior to the trip. As mentioned, Ettema et al. (2017) found that mood prior to the trip affected mood after the trip, though they did not test whether the satisfaction with the trip affected mood. Other work has controlled for moods at different points of the day (i.e., just before the trip (Morris and Guerra, 2015)), or in comparison to mood at home (Lancée et al., 2017), but their role on trip satisfaction was not studied. Further, mood is likely affected by the destination, thus a study that examines mood over a variety of destination types could help establish the destination's role on mood. In addition, while an established tool to measure satisfaction with travel was used (e.g., Friman et al., 2018), this scale only captures momentary satisfaction (with their trip that morning) and not long-term satisfaction or general satisfaction (e.g., Waygood et al., 2019) which has been highlighted recently as a point for future study (Westman et al., 2019). Children's momentary satisfaction might fluctuate more that adults' satisfaction, making it more

difficult to capture. More research into the measurement of momentary and long-term satisfaction with travel among children is therefore desired. This study used many subjective characteristics of the environment, such as parental safety perception, perceived social cohesion, and perceived quality of bicycle and walking paths. In future research it might be interesting to add more objectively measured characteristics of the built environment. In addition, data collection would ideally be spread over different seasons, while for this study all data were collected in fall. Finally, there are additional considerations that may influence children's satisfaction with their travel that were not captured from the parent's such as their support of different modes. Despite these limitations, this study adds new empirical evidence on children's school travel and well-being in the Dutch context.

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