Incentives, Morality, Or Habit? Predicting Students' Car Use for University Routes With the Models of Ajzen, Schwartz, and Triandis

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INCENTIVES, MORALITY, OR HABIT? Predicting Students' Car Use for University Routes With the Models of Ajzen, Schwartz, and Triandis

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ABSTRACT: The predictive power of the Ajzen, Triandis, and Schwartz models are compared in the context of car use for university routes. Two hundred fifty-four students filled out a questionnaire designed to measure the components of the three models. In the prediction of intention to use a car, results indicated that one variable from the Trinandis model—role beliefs—increased the explanatory power offered by the components of the Ajzen model. In the prediction of self-reported car use, one variable of the Triandis model—car use habit—significantly increased the predictive power of the Ajzen model. The central variable of the Schwartz model—personal norm—exerted no significant effect either on intention or on behavior. The

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implications of the findings for interventions to reduce the car use of students for university routes are discussed.

Keywords: *norm activation model; theory of planned behavior; theory of interpersonal behavior; travel mode choice*

The development of models for explaining and predicting environmental behaviors has become a key issue of social science environmental research. The increasing amount of literature on this issue suggests a wide variety of factors that may influence environmentally relevant behavior patterns. Factors that have been studied include the perceived benefits of the behavior (e.g., Granzin & Olsen, 1991; Jackson, Olsen, Granzin, & Burns, 1993), difficulty of the behavior (e.g., Granzin & Olsen, 1991), perceived barriers to performing the behavior (De Young, 1990; Howenstine, 1993; Vining & Ebreo, 1990), perceived effectiveness of the behavior (e.g., Ellen, Wiener, & Cobb-Walgren, 1991), knowledge of the behavior (e.g., Hines, Hungerford, & Tomera, 1987), and social influences on the behavior (e.g., Granzin & Olsen, 1991; Jackson et al., 1993; Lord, 1994; Vining & Ebreo, 1990). Especially in the 1970s and 1980s, many of these studies were exploratory in nature. As such, many of them examine variables without providing a strong theoretical basis for doing so. Often it remained unclear how these factors relate to each other. In the meantime, the problems of this "empiristic" approach became evident. In the 1990s, a shift toward the application of well-established social-psychological theories for explaining and predicting environmental behavior can be noticed, such as the norm activation model (Schwartz, 1977), motivation protection theory (Rogers, 1983), the health belief model (Rosenstock, 1974), or the theory of reasoned action (TRA) of Ajzen and Fishbein (1980) and its successor, the theory of planned behavior (TPB) (Ajzen, 1991). A great advantage of such more theory-driven models is that they contain precise operationalizations of the theoretical constructs used and specify the causal processes through which they affect behavior. For example, Taylor and Todd (1997) showed how Ajzen's (1991) TPB can be used as a theoretical framework to organize and relate research findings systematically concerning the determinants of participation in waste management programs.

Although the use of well-established social-psychological models may give the research on determinants of environmental behavior fruitful impulses, it simultaneously raises a new problem. As mentioned earlier, diverse social-psychological models are momentarily used in environmental research. So, both the researcher and the practitioner are confronted with the question of which model should be used. The major aim of the present article

is to make a contribution to this problem. We will compare empirically the following three social-psychological models: the norm activation model (Schwartz, 1977; Schwartz & Howard, 1981), the theory of planned behavior (Ajzen, 1991), and the theory of interpersonal behavior (TIB) (Triandis, 1977, 1980). These three models were selected because they cover issues that are currently discussed in environmental research in a controversial manner: Are proenvironmental behaviors mainly normative, moral behaviors (due to the norm activation model) or mainly guided by the calculation of personal utility and costs (theory of planned behavior)? Is the enactment of everyday environmentally relevant behavior mainly under conscious control (theory of planned behavior), or is it activated in a more automatic, habitualized fashion (theory of interpersonal behavior)?

The three models are compared in the behavioral domain car use. In the industrialized countries, the ever increasing number of cars and their daily use has developed into a threat to the natural environment and to the quality of urban social life. This is due to a wide range of environmental effects of motor traffic; CO_2 emissions are just one of them (Verhoef, 1994). Policy makers have begun to realize that the protection of natural environments and the quality of life in and around cities require that the use of motor vehicles be significantly restrained in the years to come. Besides technological measures aimed at making cars cleaner, a solution of these problems requires people to change their behavior, that is, to reduce private car use (Steg & Tertoolen, 1999).

The norm activation model. The norm activation model was developed in the research context of explaining prosocial, altruistic behaviors. Schwartz (1977; Schwartz & Howard, 1981) restricted the validity of his model explicitly to this domain. Schwartz argued that personal norms are the only direct determinants of prosocial behavior patterns. They were conceptualized by Schwartz as feelings of moral obligations that people hold for themselves. He seemed to reject the proposal that the effect of personal norms on behavior is mediated by behavioral intentions (see Schwartz, 1977, p. 227). Furthermore, he proposed that behavior will correspond only to one's personal norm to the extent that one is both aware of the consequences of this behavior and feels some responsibility for these consequences. So the relationship between personal norms and actual helping behavior should be stronger among people who are aware of the negative consequences of not helping and feel some responsibility for these consequences than among those who deny negative consequences and responsibility. Over the past few years there has been an increasing amount of literature on the use of Schwartz's norm activation model to explain actions intended to ameliorate environmental problems

(Black, Stern, & Elworth, 1985; Hopper & Nielsen, 1991; Stern, Dietz, & Black, 1986; Vining & Ebreo, 1992). Those authors treat proenvironmental behavior as a special case within a social-psychological theory of altruism. It is implicitly assumed that people have a general value orientation toward the welfare of others, that is, that they are motivated to prevent harm to others.

The theory of planned behavior. The theory of planned behavior (Ajzen, 1991) is an expansion of the theory of reasoned action (Ajzen & Fishbein, 1980). Whereas Schwartz (1977) restricted the relevance of his model to the domain of moral behavior, Ajzen (1991) claimed that TPB is a general theory of social behavior—that is, it can be used to explain all kinds of intentional social behaviors. Briefly, the TPB stipulates that when confronted with the need to decide on a course of action, people consider the likely consequences of available alternatives (behavioral beliefs), they weigh the normative expectations of important reference individuals or groups (normative beliefs), and they consider required resources and potential impediments or obstacles (control beliefs). These considerations or beliefs result, respectively, in the formation of attitudes toward the behavior of interest, subjective norms with respect to the behavior, and perceived behavioral control. Expectancy-value formulations are used to describe the ways in which salient beliefs combine to produce the more general constructs. Furthermore, the TPB assumes that people form behavioral intentions based on their attitudes, subjective norms, and perceptions of behavioral control and that these intentions are the immediate determinants of behavior. To the extent that perceived behavioral control reflects the objective actual control, it should be an additional direct determinant of behavior. Compared with the norm activation model, which stresses the potential role of personal norms (moral) as behavioral determinants, the TPB stresses the importance of benefit/cost arguments. Similar to subjective expected utility models, it views the individual mainly as a utility-maximizing actor (see Ajzen, 1991). It assumes that when confronted with the choice between two behavioral alternatives, an actor selects that alternative associated with the most positive behavioral consequences. The TPB also assumes that the processes underlying the performance of a behavior are mainly of a controlled nature. Salient beliefs (i.e., beliefs available to conscious introspection) determine attitudes, subjective norms, perception of behavioral control, and intention. To the extent that the same or similar beliefs are also salient at the time and place of behavior, accurate prediction is expected. The empirical validity of the TPB has been demonstrated across different behavioral domains (for a review, see Ajzen, 1991; Godin & Kok, 1996; Sheeran & Orbell, 1998; Sheeran & Taylor, 1999). In general, these applications provide support for the theory. In literature, one

can find some application of the theory of reasoned action to the domain of environmentally relevant behaviors (Bagozzi & Dabholkar, 1994; Goldenhar & Connell, 1993; Jones, 1990; Kantola, Syme, & Campbell, 1982; Macey & Brown, 1983). But applications of the TPB to this domain are rare. Apart from our studies on travel mode choice (Bamberg & Schmidt, 1998, 1999), we are only familiar with the study of Taylor and Todd (1997) on composting behavior.

The theory of interpersonal behavior. There is a considerable similarity between the TPB and Triandis's (1977, 1980) theory of interpersonal behavior. Both claim to be general theories of social behavior. Both include expectancy-value and normative beliefs constructs, and both attempt to explain the intention to perform a specific behavior and the actual performance of that behavior. The main distinction between the models lies in the relative importance attributed to the level of consciousness in explaining and predicting a given social behavior. Whereas the TPB states that social behavior is under the individual's conscious control, the TIB proposes that the level of consciousness decreases as the level of habit in performing the behavior increases. Consequently, Triandis suggested that apart from intention and behavioral control (which he conceptualized as the presence of facilitating objective conditions), the construct habit is to be considered as an additional predictor of behavior. Triandis (1980) defined habit as "situation-behavior sequences that are or have become automatic, so that they occur without self-instruction. The individual is usually not 'conscious' of these sequences" (p. 204). A second difference between the TPB and the Triandis model refers to the factors determining intention. Expectancy-value beliefs, labeled *cognition* by Triandis, help to explain the intention. However, Triandis also included a purely affective measure of attitude toward the behavior to explain intention. It is considered to be distinct from the cognitive (expectancy-value) measure of attitude. Finally, intention is also explained by a construct designated as social factor by Triandis. This construct includes the normative belief construct of the TPB but also includes personal norms, role beliefs about the appropriateness of the behavior for one's perceived social role, interpersonal agreements, and self-definitions. Summarizing, the TIB conceptualizes the social component much more broadly than the TPB and uses two different concepts for measuring the attitudinal component: Expectancy-value calculations represent the "cold" cognitive assessment and evaluation of long-term behavioral consequences, whereas the affective measure should represent the "hot" evaluation of consequences associated directly with the performance of the behavior (see also Gold, 1993). The last difference between the two models consists in the conceptualization of the

influence of restricting situational factors. According to the TPB, the subjective perception of these factors influences the performance of behavior in a direct way as a subjective representation of the actual degree of objective behavioral control and in an indirect way via its effect on the intention building process. Triandis's concept does not refer to the perceived degree of facilitating factors but to the objective presence of such factors. In his model, the presence of such objective facilitating factors should moderate the degree to which intention and habit influence behavior.

After some applications in the 1970s (Jaccard & Davidson, 1975), the TIB received little attention later on, whereas the TRA and the TPB took the lead in research. However, the TIB has recently been discussed again (Baumann, Brown, Fontana, & Cameron, 1993; Boissonneault & Godin, 1990; Boyd & Wandersman, 1991; Montano & Taplin, 1991; Parker, Manstead, & Stradling, 1995; Valois, Desharnais, & Godin, 1988). We see two reasons for this new popularity: the increasing empirical evidence that the TPB is not a sufficient model for explaining all kinds of social behaviors and a new interest in exploring the influence of habitualization on everyday behaviors (see especially the work of Verplanken, Aarts, van Knippenberg, & Moonen, 1998; Verplanken, Aarts, van Knippenberg, & van Knippenberg, 1994).

Until now, studies that directly compare the explanatory power of the three models empirically have been rare. In an early study, Zuckerman and Reis (1978) compared the TRA and the norm activation model in the context of the prosocial behavior of blood donation. In this study, the TRA performs better than the Schwartz (1977) model. Valois et al. (1988) compared the TRA and the TIB in the context of predicting exercise intention and behavior. Boyd and Wandersman (1991) and Godin et al (1996) compared the TRA, TPB, and TIB in the context of predicting condom use. In these studies, one construct of the TIB, personal norm, increased significantly the predictive power offered by the Fishbein/Ajzen (Ajzen, 1991; Ajzen & Fishbein, 1980) model in explaining intention. In explaining behavior, Triandis's (1980) habit construct significantly raises the explained behavioral variance.

What do we expect when comparing the three models within the domain of travel mode choice? In the past, car use has been stimulated by the government and the society because motorized mobility is seen as an important prerequisite for people's quality of life. As a consequence of these pro-car policies in the meantime, from the individual's perspective car use has great advantages over alternative means of transport. We expect that these objective advantages of car use (higher speed, comfort, and flexibility) are subjectively reflected and are the main determinants of individual travel mode choice. Maybe affective factors such as the perceived joy of driving add to the perceived overall advantage of car use. Because car use is now a widely

shared and socially supported practice, perceived social expectations promote the individual car use decision. The perceived advantages of car use also encourage it to become a habit. People develop activity patterns and a lifestyle that is tuned toward the use of a car. Once adopted, these lifestyles and habits are main barriers for taking into account alternative means of transport. Because of the subjective advantages and the social support of car use, we are rather skeptical whether people view car use as a behavior with a moral dimension. Thus, we do not expect that personal norms (moral) have an influence on people's travel mode choice.

METHOD

SAMPLE AND PROCEDURE

Over a period of 8 working days in 1997, a questionnaire was distributed to 1,000 randomly selected students at the University of Giessen, Germany. Of these 1,000 students, 608 returned the completed questionnaire to us. The mean age of these participants was 24.5 years, and 32.2% of them were men. Those 608 students who filled out the questionnaire received an additional postcard 3 weeks later measuring the actual travel mode choice for university routes. This postcard was sent back by 321 (52.8%) students.

To assess the salient behavioral, normative, and control beliefs associated by the students with the car use for university routes, a qualitative prestudy was conducted. In an open-ended elicitation questionnaire, a representative student sample reported positive and negative consequences of their car use for university routes (behavioral beliefs), situational factors that might restrict or facilitate the car use for university routes (control beliefs), and the people in their lives who might influence their car use for university routes (normative beliefs) (see Ajzen & Fishbein, 1980). The most frequently reported behavioral, normative, and control beliefs were included in the final questionnaire as standardized items.

MEASURES

Independent variables common to the TPB and the TIB. The following four behavioral beliefs were measured: When I use the car for university routes next time, this will be (1) quick, (2) comfortable, (3) without stress, (4) flexible. The response range was a 5-step bipolar scale from +2 (*likely*) to –2 (*unlikely*). The following two control beliefs were measured: Do you own a

car (yes, no)? When I want to use the car for university routes next time, a car would be available for me. The response range was a 5-step bipolar scale from +2 (*likely*) to –2 (*unlikely*). The following two normative beliefs were measured: How strong would (1) your friends; (2) your partner support you if you use the car for university routes next time? The response range was a 5-step bipolar scale from +2 (*likely*) to –2 (*unlikely*). Intention was assessed with the following two items: Next time I intend to use the car for university routes (*likely*/*unlikely*). My intention to use the car for university routes next time is (*high*/*low*). The response range was a 5-step bipolar scale from +2 (*likely*) to –2 (*unlikely*).

Variables specific to the TPB. Attitude toward using the car next time for university routes was assessed with the two semantic differentials, *good* to *bad* and *pleasant* to *unpleasant*, each using a 5-step bipolar scale from +2 to –2. Subjective norm was assessed with the following two items, each using a 5 step-step bipolar scale from +2 (*likely*) to –2 (*unlikely*): When I use the car for university routes next time, most people who are important to me would support this. Most of the people who are important to me think that I should use the car for university routes next time. Perceived behavioral control was assessed with the following two items, each using a 5-step bipolar scale from +2 to –2: Using the car for university routes next time would be (*easy*/*difficult*) for me. My autonomy to use the car for university routes next time is (*large*/*small*).

Variables specific to the TIB. The affective dimension of attitude toward using the car for university routes was assessed with the following two items: Imagine you are driving the car to the university. To what degree do you have the following emotions/moods? (1) in high spirits/energetic; (2) happy/joyful. The response range was a 5-step bipolar scale from +2 (*agree*) to –2 (*disagree*). Role beliefs were assessed with the following two items, each using a 5-step bipolar scale from +2 to –2: For me as a student it is (*appropriate*/*not appropriate*) to use the car for university routes. Using a car for university routes is (*fitting*/*not fitting*) my position as a student. Habit was assessed with the "script-based" habit measure developed by Verplanken et al. (1994). It comprised a procedure that used mental representations or personal scripts (e.g., Schank & Abelson, 1977) as the basis of the operationalization of habit strength. The students were presented with the following 10 imaginary leisure-time activities: (1) a summertime trip with friends to a nearby lake, (2) visiting a friend, (3) visiting parents, (4) going to do a sport, (5) shopping in town, (6) visiting a pub in the evening, (7) going on

an outdoor trip on a sunny day, (8) doing the everyday shopping, (9) eating at the university canteen, and (10) viewing a film in the cinema. The students were asked to indicate as quickly as possible what travel mode they would choose in each situation. Verplanken et al. (1994) assumed that the more invariant the responses are (e.g., concerning choosing the car), the stronger the habit concerning choosing that option. The habit strength of car use is thus indexed by the number of car choices across the 10 items.

Variables specific to the norm activation model. The perceived ascription of negative consequences (AC) of the increased traffic were assessed with the following two items, each using a 5-step bipolar scale from +2 (*agree*) to –2 (*disagree*): (AC1) Traffic related noise and air pollution reduce the quality of life in our cities. (AC2) Constructing new roads and parking places for the increasing number of car threatens the last intact biosphere in this country. Ascription of responsibility (AR) was assessed with the following two items, each using a 5-step bipolar scale from +2 (*agree*) to –2 (*disagree*): (AR1) It is not only the state and the industry who are responsible for reducing the traffic related environmental pollution, but me too, for example with my decision which travel mode I use for university routes. (AR2) With my travel mode choice for university routes I am also responsible for the degree of traffic pollution in the environment.

Variables common to the TIB and the norm activation model. The personal norm (PN) toward using environmentally friendly travel modes for university routes was assessed with the following three items, each using a 5-step bipolar scale from +2 to –2: (PN1) If I use the car for university routes next time, I would have a "moral stomach-ache" (*likely/unlikely*). (PN2) Not using environmentally friendly travel modes like a bike or public transport for university routes next time would violate my principles (*agree/disagree*). (PN3) How strongly do you feel a personal obligation to use environmentally friendly travel modes like a bike or public transport for university routes next time (*obliged/not obliged*)?

Dependent variable. As reported earlier, the 608 students who filled out the questionnaire received an additional postcard 3 weeks later asking which travel mode they had used to get to the campus on the day that they received the postcard.[1] A person who checked the car option was given a score of 1 for car use, whereas a person who checked one of the other options was given a score of 0 for car use.[2] The student registration number asked for at both time points was used to add this information to the data file.

RESULTS

DESCRIPTIVE RESULTS AND TEST OF THE MEASUREMENT MODELS

Of the 321 students who sent back the postcard, 38.8% reported that they used the bike for their last university route, 37.1% used public transport, 18.7% used the car, and 5.4% walked to the university. Table 1 presents the means and standard deviations of the items measuring the theoretical constructs of the three models. For the following analyses, the reported actual travel mode choice was transformed into a dichotomous variable scoring 1 to indicate car use and 0 for other travel modes. The same holds true for the 10 habit items. The indicated choices of the car are scored as 1 and indicated choices of other travel modes as 0.

Next we checked the quality of the measurement models for the latent constructs. For this purpose, a simultaneous confirmatory factor analysis was conducted using LISREL 8.30 (variance-covariance matrix, maximum likelihood estimator). Only cases with no missing values in all analyzed variables are used. This reduces the sample size to $N = 254$. Because there is only one indicator for measuring behavior, this construct cannot correct for measurement error. To have multiple indicators for the latent construct car use habit we did not summarize the 10 habit items into one sum index as proposed by Verplanken et al. (1994) but built three subindices instead. Because of the item contents and the results of an exploratory factor analysis, Habit Items 2, 5, 6, 9, and 10 were taken together as one subindex; Habit Items 1 and 7 as a second; and Habit Items 3, 4, and 8 as a third subindex.

The estimated standardized factor loading of the items (λ) on the postulated latent constructs are presented in Table 1. As can be seen from Table 1, the behavioral belief comfortable was omitted because the factor loading of this belief was below .50. The resulting fit of the measurement models to the data was not satisfying, $\chi^2(315, N = 254) = 461.87$, *ns*; Goodness of Fit Index (GFI) = .90. We assume that this bad fit is mainly caused by semantically similar questions/wordings and using the same response formats. Inspection of LISREL output confirms this expectation. The modification indices indicate that adding residual correlations, especially between the residuals of the behavioral beliefs, would improve the model fit considerably. After adding 22 residual correlations, the fit is very good, $\chi^2(293, N = 254) = 300.57$, $p = .37$, GFI = .93. Most of these residual correlations are rather small. From the 22 residual correlations, only 4 are greater than .10.

TABLE 1
Means, Standard Deviations, and the Results of the Confirmatory Factor Analysis (*N* = 254)

Indicator	M	SD	λ[a]
Behavior[b]			
Behavior 1[c]	0.19	0.39	1.00
Intention			
Intention 1	–1.07	1.44	0.95
Intention 2	–1.13	1.46	0.97
Attitude			
Attitude 1	–0.23	1.26	0.78
Attitude 2	0.50	1.26	0.81
Perceived behavioral control (PBC)			
PBC1	0.28	1.71	0.85
PBC2	0.35	1.67	0.86
Subjective norm			
Norm 1	–0.98	1.18	0.85
Norm 2	–1.25	1.11	0.86
Ascription of responsibility (AR)			
AR1	1.09	0.95	0.54
AR2	1.30	0.80	0.71
Ascription of consequences (AC)			
AC1	1.62	0.64	0.74
AC2	1.15	0.95	0.55
Role beliefs			
Role 1	–0.83	1.28	0.89
Role 2	–0.91	1.15	0.73
Personal norm (PN)			
PN1	–0.44	1.35	0.76
PN2	0.22	1.32	0.86
PN3	0.43	1.22	0.80
Car habit			
Habit 1	1.38	1.61	0.71
Habit 2	0.49	0.67	0.56
Habit 3	1.01	1.04	0.52
Normative beliefs			
Friends	–0.73	1.01	0.90
Partners	–0.61	1.12	0.83
Behavioral beliefs			
Quick	0.74	1.37	0.65
Comfortable	1.30	1.11	—
Without stress	–0.40	1.29	0.76
Flexible	1.17	1.18	0.58

TABLE 1 (continued)

Indicator	M	SD	λ^a
Control beliefs			
Car ownership	0.51	0.50	0.87
Car availability	0.17	1.87	0.96
Affect			
Affect 1	–0.11	1.08	0.87
Affect 2	–0.15	1.02	0.84

a. Standardized factor loading.
b. Latent constructs.
c. Indicator items.

TEST OF THE STRUCTURAL MODELS

Structural model derived from the norm activation model. After testing the measurement models of the latent variables, we specified and tested models of the structural relationships between these latent constructs derived from the three social-psychological theories presented earlier. We started with a test of the norm activation model. The results are depicted in Figure 1.

As predicted by the norm activation model, the latent construct personal norm has a significant negative effect on the actual car use for university routes. It explains 14% of the variance of the behavior itself. In a second step, we tested if the relationship between PN and behavior is stronger for students with high scores in the two constructs ascription of responsibility and ascription of negative consequences compared with students with low scores as postulated by Schwartz (1977). For this purpose we built a sum index of the four items measuring the two constructs and split the whole sample along the median into two subgroups. The multiple-group option of LISREL was used to test whether the relationship between personal norm and behavior differs significantly between these two subgroups. The results do not confirm the interaction hypothesis, that is, in the present data, the effect of personal norm on behavior does not seem to be moderated by AR and AC. Finally, we tested if AR and AC influence behavior indirectly via their effect on personal norm. As can be seen from Figure 1, this hypothesis was partly confirmed. AR exerts a strong positive effect on PN, whereas the effect of AC on PN is not significant. This last finding may be caused by the high intercorrelation of AR and AC. The fit of the model depicted in Figure 1 is good, $\chi^2(10, N = 254) = 14.97$, $p = .13$, GFI = .98.

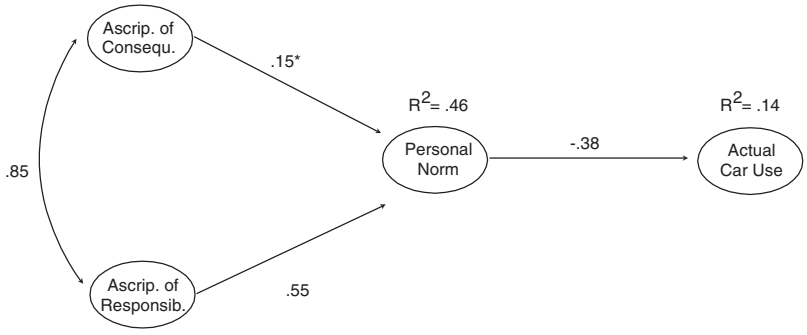

Figure 1: Structural Model Derived From the Norm Activation Model (Car Use, Standardized Path Coefficients, and Explained Variances)
NOTE: * = not significant at .05 level.

Structural model derived from the TPB. Figure 2 presents the structural model derived from the TPB. In the present data, all relations postulated by the TPB are confirmed empirically with one exception: Perceived behavioral control does not have a direct effect on the actual car use.

The inspection of the modification indices shows that adding two additional paths from the latent construct control beliefs to subjective norm, respectively, direct to actual car use results in a significantly better model fit. After adding these two paths, the model fit is very good, $\chi^2(293, N = 254) = 300.57$, $p = .37$, GFI = .93. Intention and the control beliefs explain 45% of the variance of the actual car use. In turn, attitude, subjective norm, and perceived behavioral control explain 60% variance of the intention. The relationships between the belief-based and direct attitude, subjective norm, and behavioral control measures are very strong.

Structural model derived from the TIB. Figure 3 presents the results for the structural model derived from the TIB. Besides intention, car use habit has an additional, stronger effect on actual car use, as postulated by Triandis (1980). Together, both latent constructs explain 51% variance of actual car use.

Following the TIB, we used PN, affect, the role beliefs, and behavioral, normative, and control beliefs as direct predictors of intention. These constructs explain 68% of the variance of intention. But only the effect of the following three constructs are statistically significant: behavioral beliefs, control beliefs, and role beliefs. In the present data, the construct car use habit does not only have a strong effect on the actual car use but has strong effects on all six intention predictors too. Habit explains 29% to 69% variance of

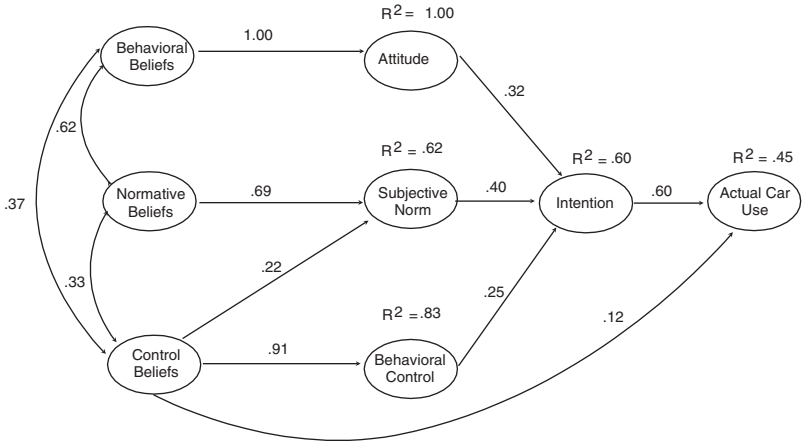

Figure 2: Structural Model Derived From the Theory of Planned Behavior (Car Use, Standardized Path Coefficients, and Explained Variances)

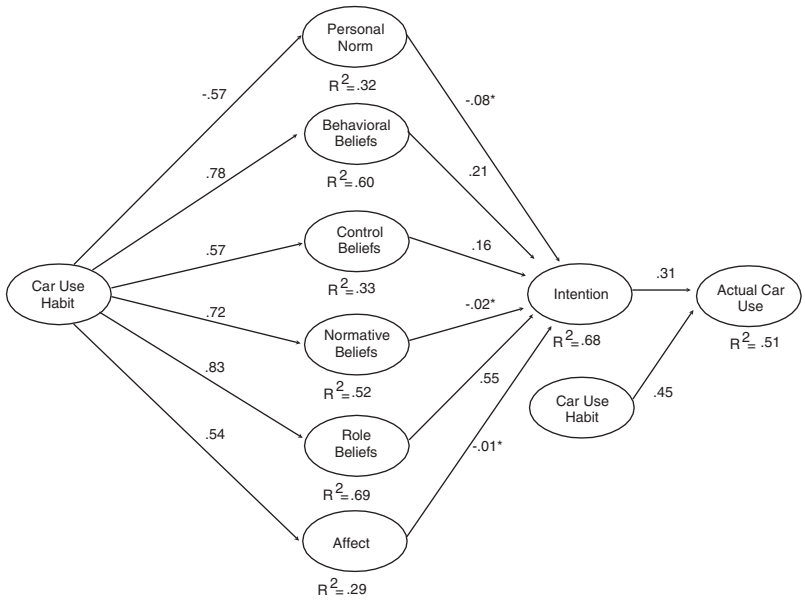

Figure 3: Structural Model Derived From the Theory of Interpersonal Behavior (Car Use, Standardized Path Coefficients, and Explained Variances)

NOTE: * = not significant at .05 level.

these intention predictors. After controlling the effect of habit on behavior, the direct effect of the construct control beliefs on behavior is no longer significant. The fit of the model depicted in Figure 3 is rather good, $\chi^2(145, N = 254) = 152.43$, $p = 0.32$, GFI = 0.94.

Test of a combined model. The aim of the present article is not only to compare the predictive power of the three alternative models but also to examine whether the three theoretical approaches can be integrated in one model. Figure 4 presents the results for such an integrated structural model.

In this model, only intention and habit are direct predictors of the actual car use. The effects of all other constructs should be mediated by the intention building process. As postulated by the TPB, the effect of the behavioral, normative, and control beliefs should be mediated by attitude, subjective norm, and perceived behavioral control. The same holds true for the constructs AR and AC. They should influence the intention only via their effects on the direct intention predictors, especially PN.

We expect that car use habit does not only influence actual car use but also the diverse beliefs associated with using the car for university routes. As evident in Figure 4, this integrated model is confirmed empirically, $\chi^2(354, N = 254) = 370.36$, $p = .26$, GFI = .91. It explains 68% variance of the intention and 52% variance of the actual car use. In the integrated model, the effects of PN and effect on intention remain statistically insignificant, whereas the effect of subjective norm is significant.

DISCUSSION

The major aim of the present article was to test empirically the validity of central propositions underlying the norm activation model, the TPB, and the TIB and to compare the predictive power of these three models in the context of students' car use. Whereas for the Ajzen (1991) and Triandis (1980) model the hypotheses concerning the structural relationships of the model components are confirmed empirically, the hypotheses derived from the norm activation model are confirmed only partly. In the present data, the constructs ascription of consequences and ascription of responsibility do not moderate the effect of personal norm on behavior as postulated by Schwartz (1977). This result replicates results reported by Zuckerman and Reis (1978). In our study, ascription of responsibility exerts a strong direct effect on the personal norm itself, whereas ascription of consequences is an additional predictor of the subjective norm. Concerning the ability to predict the actual car use, the

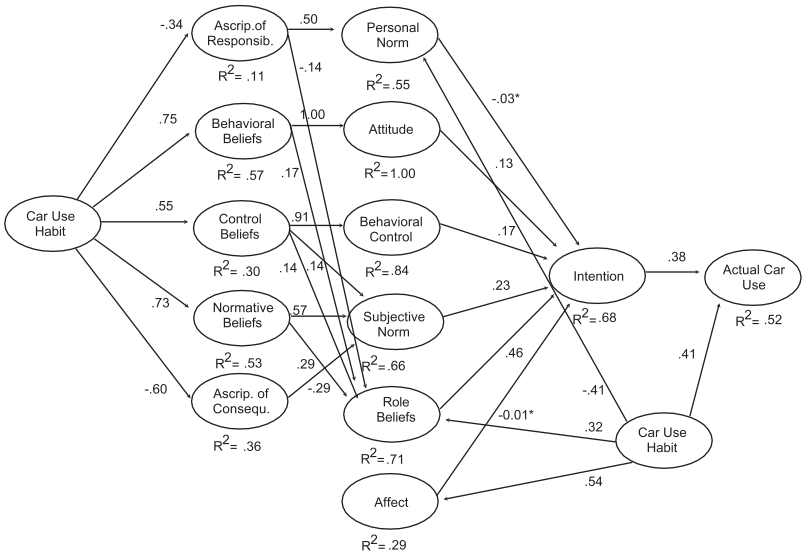

Figure 4: Combined Structural Model (Car Use, Standardized Path Coefficients, and Explained Variances)

NOTE: * = not significant at .05 level.

power of the Schwartz model is considerably lower than that of the Ajzen and Triandis models. Whereas the personal norm explains 14% of the behavioral variance, intention alone explains 45% and intention and habit together 51% of the behavioral variance. Moreover, the comparison of the three models raises serious doubts concerning the validity of Schwartz's proposition that personal norm is a direct predictor of behavior. After checking for intention, personal norm does not exert any direct effect on behavior. This result confirms the position of Ajzen and Triandis that forming an intention marks the end of the conscious choice process, in which a preference is set between alternative behavioral options by deliberating their desirability and feasibility. Furthermore, the present study confirms the position of Triandis that in the case of frequently performed everyday behavior patterns such as travel mode choice, the enactment of behavior is not only determined by controlled, conscious process as suggested by the Ajzen model. In addition, it is influenced by a more automatic, habitualized process: After controlling the effect of intention, the construct car use habit has a significant, even stronger effect on behavior, and the explained behavioral variance increased from 45% to 51%. This result confirms the view that car use is a habitual choice process

that, rooted in once made conscious considerations about pros and cons, usually involves routine-shaped automatic associations between stimulus situations and habitually chosen options.

The TPB and TIB differ in their propositions concerning the factors determining the intention building process. Generally speaking, the TPB is more parsimonious. It suggests that attitude, subjective norm, and perceived behavior mediate the influence of all kinds of outcome expectations on intention. The TIB renounces these three mediating constructs and uses diverse classes of anticipated outcome expectations as direct determinants of intention instead. The empirical evidence concerning these alternative assumptions is mixed. Compared with the parsimonious TPB, the much more complex Triandis (1980) model explains 8% more intentional variance. Furthermore, after checking for the effects of attitude and behavioral control, the affective attitudinal component, the behavioral, control, social normative, and moral beliefs do not have any direct effect on intention. Attitude, subjective norm, and perceived behavioral control seem to mediate the effects of these beliefs on intention, as suggested by the TPB. On the other hand, even after controlling the effect of the subjective norm, the TIB construct role beliefs has a significant, very strong effect on intention. This result confirms the position of Triandis that the subjective norm construct used by the TPB is probably too narrow to reflect all the social factors influencing the intention building process. It only reflects the influence of perceived social pressure and not the influence of more internalized, self-generated expectation as the self-ascripted social role. If one subsumes the subjective norm and the role beliefs under one broader social factor, the more parsimonious proposition of the TPB is empirically confirmed that attitude toward a behavioral alternative, the perceived behavioral control, and the social factor are the three main determinants of the intention building process. From this point of view, Ajzen's (1991) conception of intention building seems to be more supported by our data.

The second aim of the article was to examine whether the three models must be treated as distinct alternative theoretical approaches. This question is especially important in view of our starting question: Which model should a practitioner use in an applied context? We think that the presented results confirm the view that the three models should not be viewed as alternative but as supplementary models. They were developed in different research contexts and focus on different aspects of social behavior. Our integration of the model provides a sound theoretical framework that covered most of the factors that were identified as important determinants of ecologically relevant behavior patterns. Using this integrated framework, the question raised in the title of our article can be answered more thoroughly: Is the car use for

university routes a question of incentives, morality, or habit? In our study, the intention to use the car for university routes is not significantly determined by moral beliefs. At present, most students do not perceive car use as a behavior with moral implications. But we do not exclude that morality may be an important determinant of the intention to choose other environmentally relevant behaviors such as recycling behaviors (Taylor & Todd, 1997). Perceived personal outcomes of the car use (e.g., quick, flexible, and without stress) do have a significant influence on the intention to use this travel mode via their effect on the overall evaluation of the behavioral option car use. A surprising result of the present study is the very strong influence of perceived external and self-generated social expectations on the intention to use the car for university routes. This result may be partly caused by using a student sample. Young people such as students are probably especially sensitive to perceived social expectations. But if this result can be replicated in representative population samples, it would be an interesting starting point for developing practical interventions aiming to change travel mode choice. At the moment, this field is dominated by the economic approach, that is, interventions concentrate mainly on changing the personal material incentives (e.g., price, time, and comfort) associated with travel mode options. Normally, the economic approach does not take into account "soft" social incentives as social support or expressing a self-wished social role, which are so influential in our study.

Furthermore, the present study points to the probably habitualized nature of the travel mode choice. Rooted in once made conscious considerations about pros and cons, the choice behavior is becoming more and more habitual, that is, elicited in an automatic fashion by situational cues. Although there are a growing number of studies that shows empirically that habit is probably an important predictor of behavior (e.g., Ouellette & Wood, 1998), the theoretical and practical status of this construct is still rather unclear. Our theoretical knowledge of how habit together with intention influence the performance of a goal-directed behavior is not very developed. Many researchers (e.g., Boyd & Wandersman, 1991) also deny the practical utility of this construct. But taking the effect of habit into account may increase our sensitivity to the problem that changing behavioral intentions is often not sufficient to change behavior. In the case of strong habitualized behavior patterns, new intentions must succeed against these habitualized behavioral tendencies. From an applied perspective, this concurrence between the enactment of consciously formed new behavioral intentions and the automatic activation of habitual behaviors by situational cues might be an interesting explanation of why people often fail to enact their intentions to change behavior. With his concept of implementation intention, Gollwitzer (1993) offered a very interesting strategy for how people can consciously solve this problem.

Implementation intentions as plans of action ("I intend to do X when situation Y is encountered") install contingencies between situational cues and goal-directed responses. Actions that lead to goal fulfillment thus gain a degree of automaticity by being under the control of relevant situational cues. As a result of forming implementation intentions, people are more likely to enact their intentions, even in situations where this intention interferes with habitual decision making. In the field of travel mode choice, Bamberg (2000) tested this idea successfully in a field experiment.

NOTES

1. The reviewer asked why we use as dependent behavioral variable the reported travel mode choice for the last conducted university route rather than the most frequently chosen travel mode for university routes. There are two reasons, one theoretical and one methodological: Schwartz (1977), Ajzen (1991), and Triandis (1980) stressed the point that they intend to predict specific behaviors and not aggregated ones. Furthermore, pilot studies showed that questions such as "What is the most frequently chosen travel mode?" seem to result in an underestimation of car use and an overestimation of bicycle use. This bias is reduced by asking for the travel mode choice for a specific route.

The reviewer further asked whether for long distances car use is not largely a function of the objective route distance. In prior analyses, we checked this. Objective distance is indeed an important determinant of car use. But objective distance has no direct effect on travel mode choice but an indirect one, completely mediated by the model variables, especially perceived behavioral control. Thus, the discussed theoretical models are able to reflect the effect of different objective infrastructural conditions on the individual travel mode choice. Because the main focus of the present article is on the comparison of the theoretical models, we do not present the results of these analyses here.

2. Use of a single binary indicator of behavior prevents correction of the latent variable for unreliability and violates the multinormality assumption underlying LISREL (Bollen, 1989).

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