# Seminar on Theory of Planned Behavior

E-proceedings

Charles University Environment Center
Prague, September 24-25, 2010

Acknowledgement

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Environment Center
Charles University
in Prague

# Seminar on Theory of Planned Behavior

**September 24, 2010, Charles University, Karolinum**
**Ovocný trh 3, Prague 1**

## Program

| | |
|---|---|
| *8:30 – 9:00* | *Registration and welcome coffee* |
| **9:00 – 9:15** | **Jiří Buriánek: Seminar opening and welcoming**<br>*Department of Sociology, Faculty of Arts, Charles University in Prague* |
| **9:15 – 10:15** | **Icek Ajzen: Keynote lecture I**<br>**Environmental Protection and the Theory of Planned Behavior** |
| 10:15 – 10:45 | Discussion |
| *10:45 – 11:00* | *Coffee break* |
| **11:00 – 11:30** | **Jochen Wittenberg: Applying the theory of planned behavior to juvenile shoplifting** |
| 11:30 – 11:45 | Discussion |
| **11:45 – 12:15** | **Sibylle Nideröst, Daniel Gredig: Condom use with casual partners in heterosexual men: extending the theory of planned behaviour by adding the socio-cultural variable somatic culture** |
| 12:15 – 12:30 | Discussion |
| *12:30 – 13:30* | *Lunch* |
| **13:30 – 14:30** | **Peter Schmidt: Keynote lecture II**<br>**Theory driven evaluation and evidence based policies** |
| 14:30 – 15:00 | Discussion |
| **15:00 – 15:30** | **Jana Lukačovská, Katarína Hennelová: Motivation towards blood donation based on the theory of planned behavior** |
| 15:30 – 15:45 | Discussion |
| *15:45 – 16:00* | *Coffee break* |
| **16:00 – 16:30** | **Iva Zvěřinová: Determinants of organic food consumption** |
| 16:30 – 16:45 | Discussion |
| **16:45 – 17:15** | **Jan Urban: Factors of proenvironmental behavior of university students** |
| 17:15 – 17:30 | Discussion |
| *19:00* | *Dinner / Social program* |

Acknowledgement
We gratefully acknowledge the financial support of the Czech Science Foundation GAČR.

# Abstracts

### Icek Ajzen: Environmental Protection and the Theory of Planned Behavior

*(University of Massachusetts-Amherst, USA)*

According to the theory of planned behavior (TPB), eco-friendly intentions and behaviors are a function of beliefs about the likely consequences of these behaviors as well as normative and control beliefs. Also, the theory's principle of compatibility suggests that general pro-environmental attitudes and values predict an aggregate of eco-friendly behavior, but not any particular action. In addition, the theory elucidates why environmental knowledge rarely correlates with eco-friendly behavior. Empirical research is reviewed to show how the TPB can be used to predict, explain, and modify eco-friendly behaviors.

### Jochen Wittenberg: Applying the theory of planned behavior to juvenile shoplifting

*(University of Bielefeld, Germany)*

This paper analyses data concerning juvenile delinquency, which were collected in the still running research project 'Juvenile Delinquency in Modern Towns' (CRIMOC) in the cities of Münster, Bocholt and Duisburg from 2001 through 2004. In the center of this paper stand analyses concerning juvenile shoplifting. Shoplifting is an everyday occurrence of juvenile delinquency. It is one of the most frequently committed offenses among youths and is for many the only crime they will commit in their youth.

### Sibylle Nideröst, Daniel Gredig: Condom use with casual partners in heterosexual men: extending the theory of planned behaviour by adding the socio-cultural variable somatic culture

*(University of Applied Sciences, Northwestern Switzerland)*

The background of this presentation was a qualitative study that determined an association between somatic culture and condom use with casual partners in Swiss heterosexual men. Somatic culture is that part of a person's habitus that structures how he or she deals with his or her own body. We hypothesized that somatic culture may play an important role and would be able to increase the proportion of explained variance of intention to use a condom with casual partners. The quantitative study tested and extended the theory of planned behaviour (TPB) by adding the variable somatic culture on a sample of 81 heterosexual men between the ages of 25 and 65. In the presentation we will show that integrating a socio-cultural variable into the model of TPB can increase its explanatory power and can be used to counter some of the critique on the TPB.

### Peter Schmidt: Theory driven evaluation and evidence based policies

*(University of Marburg, Germany)*

In this presentation the combination of using explicitly formulated theories like the theory of planned behaviour, the use of quasiexperimental and experimental longitudinal designs in field settings and the use of generalized latent variable models for analysing the data and performing metanalysis is discussed and applied to the topic of travel mode choice. Firstly we present an observational study from Austria using the TOPB. Then we present results from a longitudinal quasiexperiment at one university to test the effect of the introduction of a semester ticket and a university circle line and present then data for all German universities concerning the effects of the semester ticket. In a next step we present data from two true experiments in two german towns(Frankfurt and Stuttgart). For the purpose of knowledge integration we present results of a new metaanalysis on travel mode choice using the TOPB metaanalytic structural equation modeling. Finally we present some data on metanalysis of intervention studies.

### Jana Lukačovská, Katarína Hennelová: Motivation towards blood donation based on the theory of planned behavior

*(Comenius University, Slovakia)*

Our research compared the motivations towards blood donation using the Theory of Planned Behaviour. According to this theory we considered the components from basic model of TPB (intention, attitude, perceived behaviour control, subjective norm) and two additional variables (moral norm and anticipated regret) as factors of motivation. The aim of our study was to compare regular donors, first-time donors and nondonors in factors mentioned above. In addition we proposed to test the predictability of intention by the other components of motivation.

### Iva Zvěřinová: Determinants of organic food consumption

*(Charles University Prague, Czech Republic)*

Since formulation of the theory of planned behavior, many researchers suggested various modifications and extensions to the TPB. One of the proposed extensions of the TPB is inclusion of risk perception. Our presentation proceeds as follows. First, we review the empirical literature on integration of risk perception into the TPB framework. Second, we apply the TPB as a means of predicting consumers' purchasing behaviour and examine several possible ways of including risk perception in the model. Our empirical analysis exploit data from a survey of consumers conducted in two Czech cities (Znojmo and Prague) in 2008.

### Jan Urban: Factors of proenvironmental behavior of university students

*(Charles University Prague, Czech Republic)*

The purpose of this presentation is to summarize results of an empirical study that aimed at testing of the theory of planned behavior (TPB) as a means of modeling proenvironmental behavior. The study uses survey data (N=200) on proenvironmental behavior of university students living in student dormitories. The survey have focused on three types of proenvironmental energy-saving behavior: defrosting of refrigerators, economic use of cookers, and switching off of the stand-by mode. Theoretical model postulated by TPB is tested by means of path modeling. The results of our study suggest that theory of planned behavior explains large part of variability in the proenvironmental behaviors and even larger part in variability of intentions. Further, our study shows that attitudes are the most important factors that influence proenvironmental behavior. The effects of social norms and perceived behavioral control vary between the three types of behavior. The results of this study also indicate that students have enough information about energy-saving effects of the three types of proenvironmental behavior but that they do not attribute greater importance to potential of these energy saving behaviors.

# *Environmental Protection and the Theory of Planned Behavior*

*Icek Ajzen*
*University of Massachusetts*
*Amherst (USA)*

# *Energy-Saving Behaviors*

*(Ajzen, Joyce, Sheikh, & Gilbert Cote, in prep.)*

1. I walk, ride a bicycle, or take public transportation to work or school.
2. I use rechargeable batteries.
3. I wait until I have a full load before doing my laundry.
4. When shopping, I ask for paper bags rather than plastic ones.
5. I regularly read at least one environmental journal/magazine.
6. I make sure to recycle regularly (e.g., glass bottles, paper, and plastic).
7. I am a member of an environmental organization.
8. I turn off electricity and appliances when not in use.

## *Environmental Attitude Scale*

*(Cordano, Welcomer, & Scherer, 2003)*

9-item scale: Sample Items

- The balance of nature is very delicate and easily upset.
- When humans interfere with nature it often produces disastrous consequences.
- Humans are severely abusing the environment.
- The so-called "ecological crisis" facing humankind has been greatly exaggerated.
- Humans were meant to rule over the rest of nature.

$\alpha = .77$

## *Global Attitude-Behavior Correlations*

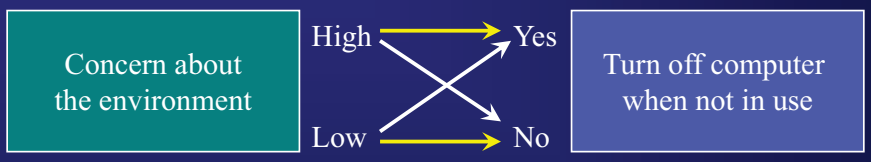
1. I walk, ride a bicycle, or take public transportation to work or school: .19
2. I use rechargeable batteries: .12
3. I wait until I have a full load before doing my laundry: .31*
4. When shopping, I ask for paper bags rather than plastic ones: .13
5. I regularly read at least one environmental journal/magazine: .17
6. I make sure to recycle regularly (e.g., bottles, paper, plastic): .30
7. I am a member of an environmental organization: .15
8. I turn off electricity and appliances when not in use: .26

* $p < .05$

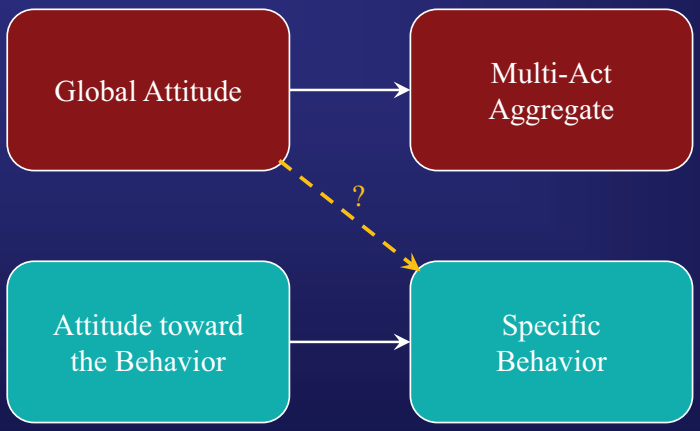
## *9-Item Environmental Concern Scale and Environmental Behavior in Germany (Diekmann & Preisendörfer, 2003)*

| *Behavioral items* | *Percent* | *Pearson correlation* | *Gamma correlation* |
|---|---|---|---|
| Recycling of paper | 86 | 0.14 | 0.24 |
| Recycling of glass | 85 | 0.14 | 0.23 |
| Recycling of plastics | 69 | 0.14 | 0.19 |
| Depositing packaging material in stores | 68 | 0.17 | 0.22 |
| Buying products with eco-label | 62 | 0.17 | 0.21 |
| Buying seasonal fruits/vegetables from region | 61 | 0.15 | 0.19 |
| Switching off lights | 58 | 0.10 | 0.12 |
| Buying refill bottles | 57 | 0.13 | 0.16 |

## *Attitude-Behavior Inconsistency*



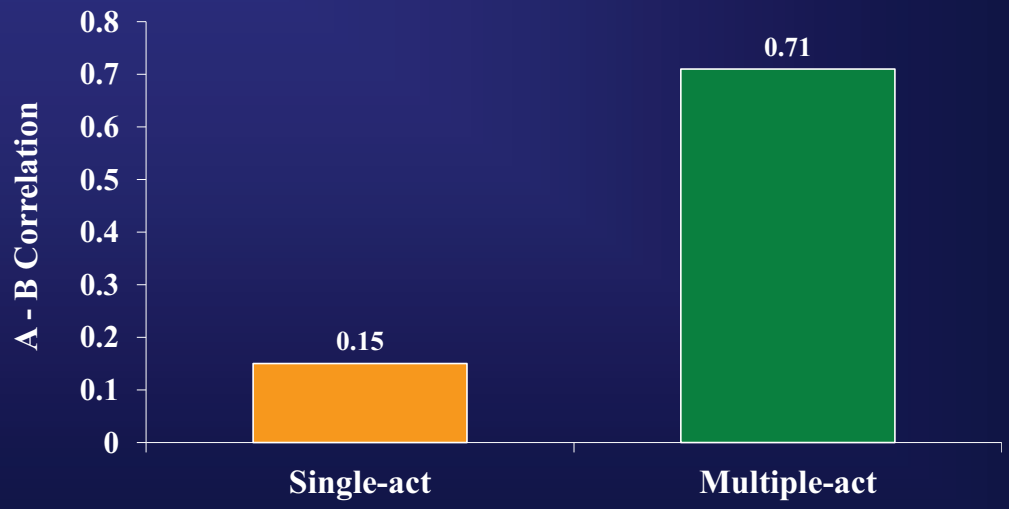
## *Attitude-Behavior Relations*



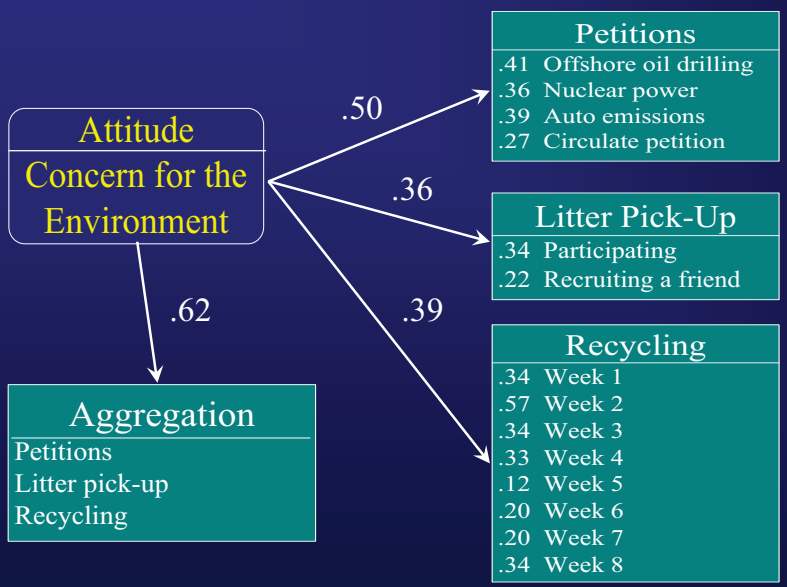

## *Example: Eco-Friendly Behaviors*

- Recycling paper and bottles
- Conserving water when taking a shower or bath
- Turning off unused lights
- Buying organic food
- Using public transportation
- Employing reusable shopping bags
- Voting for pro-environment candidates
- Contributing to an environmental protection organization
- Participating in a litter pick-up event
- Buying a fuel-efficient car

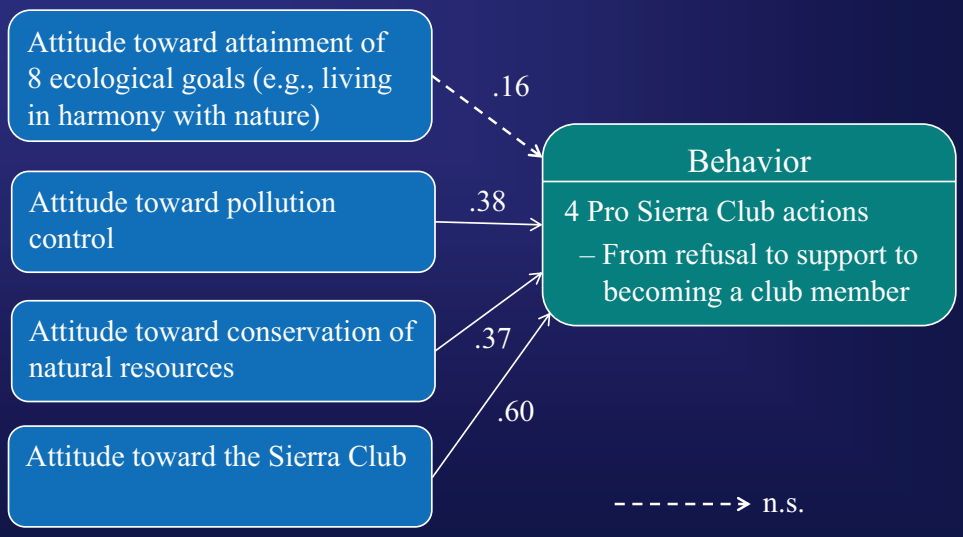
## *Compatibility of Religious Attitudes and Behavior: Effect of Aggregation (Fishbein & Ajzen, 1974)*




## *Environmental Attitudes and Behavior (Weigel & Newman, 1976)*



# *Attitude-Behavior Correlations: Sierra Club (Weigel, Vernon, & Tognacci, 1974)*




# *Predicting Single Behaviors: TACT Elements*

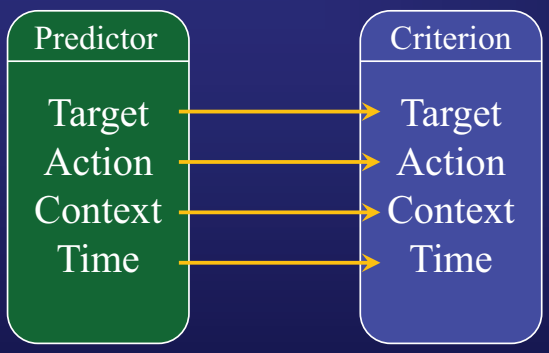
Target – Action – Context – Time

*Option 1:* Using (action) public transportation (target) to commute to work (context) in the next 6 months (time).

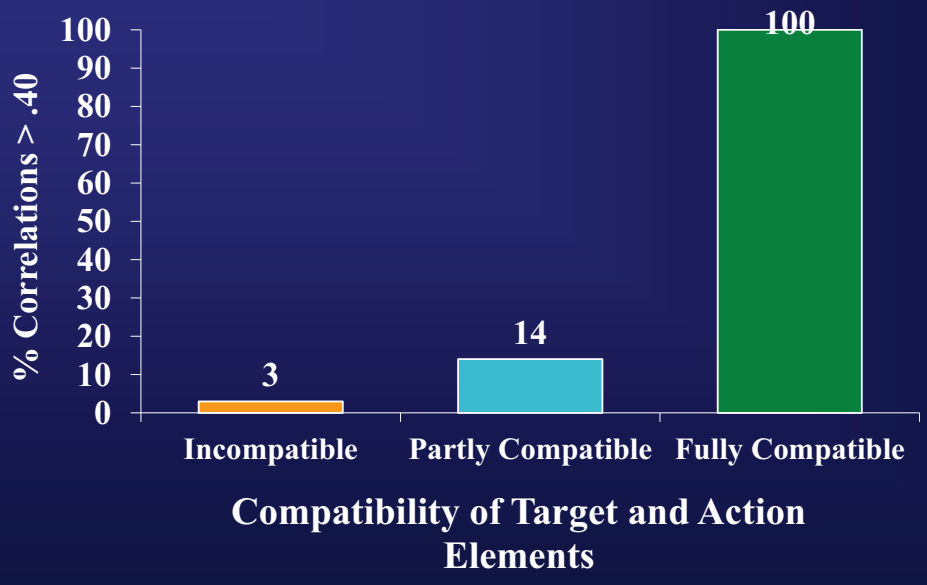
*Option 2:* Using (action) public transportation (target) to commute to work (context) – no time element.

*Option 3:* Using (action) public transportation (target) – no context or time element.

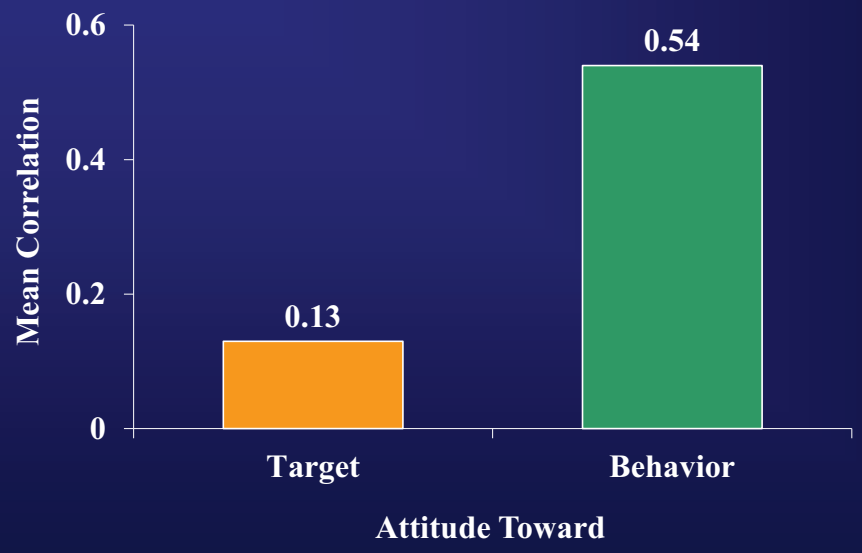
# *Principle of Compatibility*



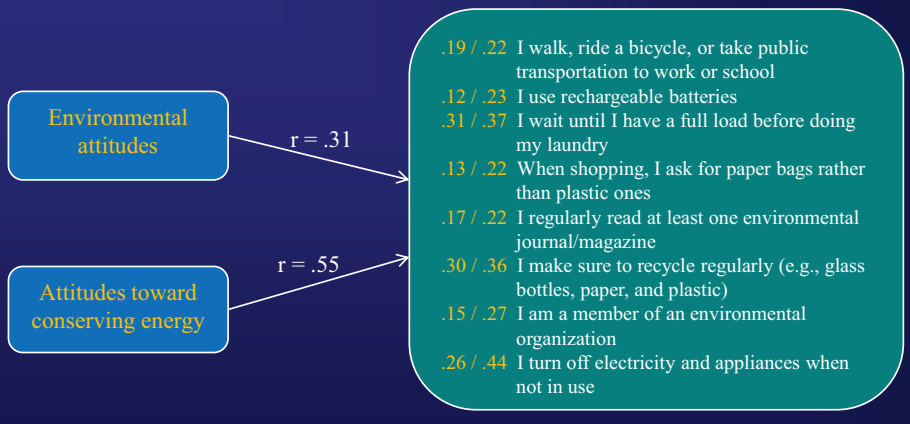

# *Attitude-Behavior Relations as a Function of Compatibility (K=142) (Ajzen & Fishbein, 1974)*



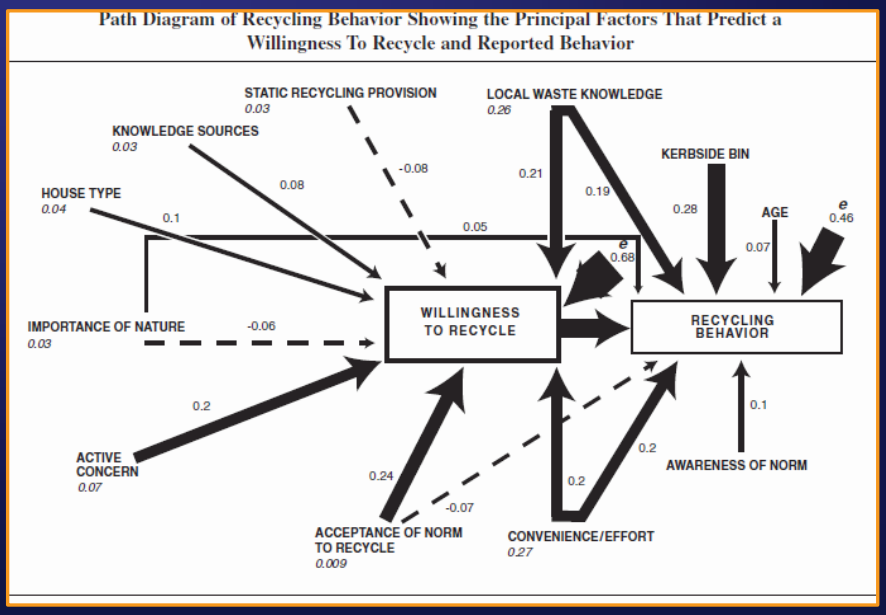
## *Predicting Specific Behaviors: Meta-Analysis (K = 8) (Kraus, 1995)*



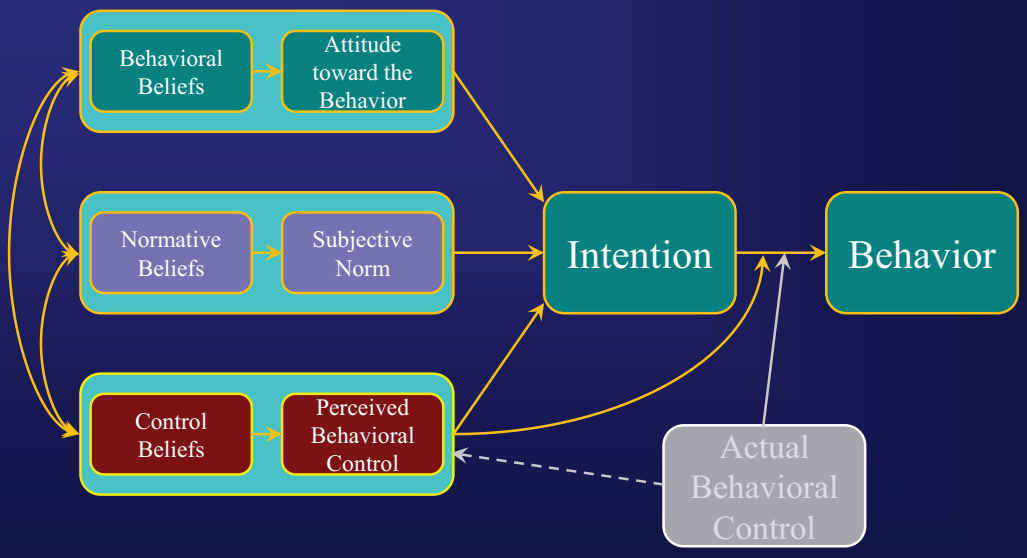

## *General Attitudes and Eco-Friendly Behavior (Ajzen, Joyce, Sheikh, & Gilbert Cote, in prep.)*



# *Model of Recycling (Barr, 2007)*




# *The Theory of Planned Behavior*
## *Ajzen (1991)*



# *Theory of Planned Behavior: Sample Applications*

**Health-Related**
- Infant sugar intake
- Smoking cessation
- Condom use
- Food choice
- Living kidney donation
- Physical activity
- Testicular self-examination
- Using illegal drugs
- Donating blood
- Medical decisions
- Dental hygiene
- Breast self-examination
- Drinking alcohol
- Eating low-fat diet
- Weight loss
- Eating fruit and vegetables
- Medical compliance
- Dieting
- Physician referrals
- Medical checkup
- Using dental floss
- Skin protection
- Taking hormone replacements

**Other**
- Playing basketball
- Investment decisions
- Playing video games
- Seeking redress
- Volunteering behavior
- Political participation
- Employment turnover
- Driving violations
- Using infant seats
- Purchase decisions
- Motorcycle safety
- Environmental protection
- Job-search behavior
- Academic performance
- Choice of travel mode
- Shoplifting
- Taking physics classes
- Extramarital relations
- Voting
- Anti-nuclear activism
- Attending church
- Recycling
- Applying for promotion
- Employment decisions
- Conserving water
- Studying for an exam
- Technology acceptance
- Gift-giving
- Using safety helmets
- Hunting
- Leisure behavior

*List of references on the Web:*
http://www.people.umass.edu/aizen/tpbrefs.html

# *Intention → Behavior*

*Correlation* (k = 422) – (Sheeran, 2002)

➢ Mean $r$ = .53

*Intention & Behavior Change* (k = 47) – (Webb & Sheeran, 2006)

Δ Intention: Mean $d$ = .66

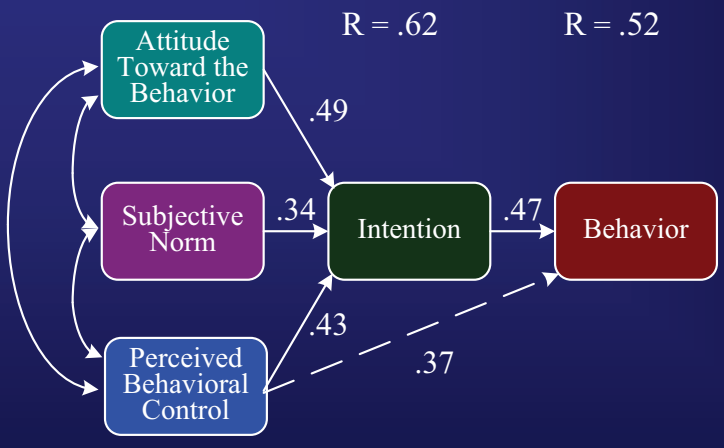
Δ Behavior: Mean $d$ = .36

# *Causal Effect of PBC on Behavior: Empirical Evidence*

*Experimental manipulation of self-efficacy (PBC)*
*(Bandura & Locke, 2003)*

- *Perseverance at intellectual puzzles*
- *Handling snakes*
- *Pain tolerance*
- *Physical endurance*

# *Meta Analysis (Mean Correlations, N =185)*
*(Armitage & Conner, 2001)*



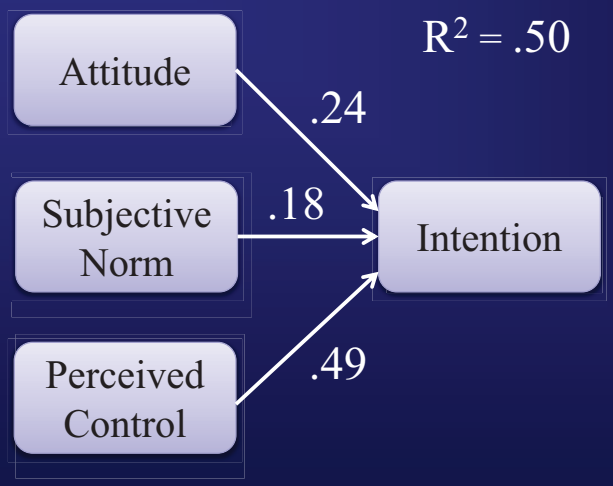
## *Environmental Intentions and Behavior (Schwenk & Möser, 2009)*

Meta-analysis: K = 11

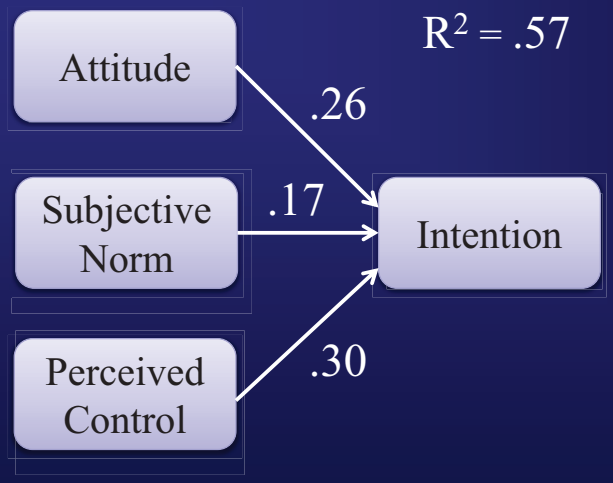
| Literature | Moderator | Year | Study size | *r* | *z* |
|---|---|---|---|---|---|
| Bamberg et al. (2007) | Travel mode | 2003 | 437 | 0.48 | 0.52 |
| Bamberg et al. (2007) | Travel mode | 2003 | 796 | 0.71 | 0.89 |
| Heath and Gifford (2002) | Travel mode | 2002 | 175 | 0.72 | 0.91 |
| Joireman et al. (2001) | n.r. | 2001 | 191 | 0.57 | 0.65 |
| Kaiser and Shimoda (1999) | GEB | 1999 | 443 | 0.31 | 0.32 |
| Kaiser et al. (1999) | GEB | 1999 | 441 | 0.52 | 0.58 |
| Knussen et al. (2004) | Recycling | 2004 | 241 | 0.67 | 0.81 |
| Kaiser and Gutscher (2003) | GEB | 2003 | 891 | 0.56 | 0.63 |
| Davies et al. (2002) | Recycling | 2002 | 317 | 0.06 | 0.06 |
| Rise et al. (2003) | Recycling | 2003 | 112 | 0.78 | 1.04 |
| Terry et al. (1999) | Recycling | 1999 | 114 | 0.64 | 0.76 |
| Staats et al. (2004) | Recycling | 2004 | 95 | 0.07 | 0.07 |

Mean r = .54; w/o Staats et al., mean r = .62

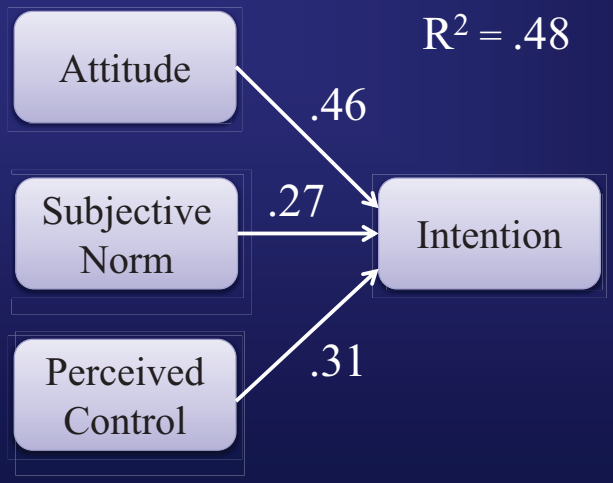
## *Intention to Use Transportation Other Than Car (Harland, Staats, & Wilke, 1999)*



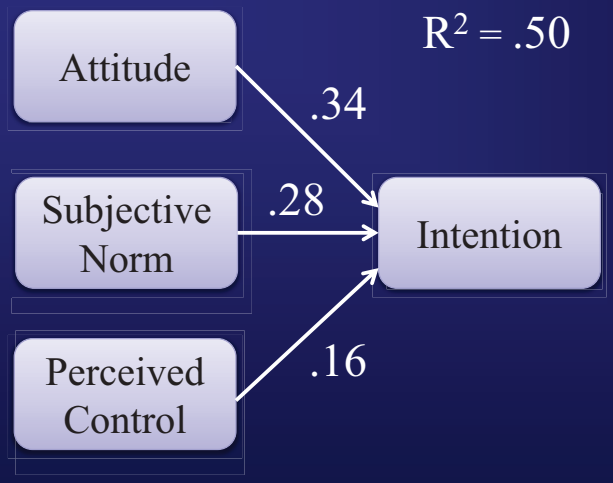
## *Intention to Recycle Household Waste*
*(Mannetti, Pierro, & Livi, 2004)*




## *Intention to Use Park-and-Ride Facility in Groningen (de Groot & Steeg, 2007)*



## *Intention to Engage in Environmental Activism (Fielding, McDonald, & Louis, 2008)*




## *Getting Information About Accessible Behavioral, Normative, and Control Beliefs*

- Elicit accessible beliefs using open-ended questions.
  - *Outcomes:* Advantages & disadvantages; likes and dislikes associated with the behavior.
  - *Normative referents:* People or groups who approve or disapprove; perform or do not perform the behavior.
  - *Control factors:* Factors that make performance of the behavior easier or more difficult; that afford or prevent control over the behavior.

# *Accessible Beliefs: Personal and Modal*

*Personal Accessible Beliefs*

– First few beliefs mentioned by the individual.

*Modal Accessible Beliefs*

– Most frequently listed beliefs in a sample from the research population.

# *Hunting: Behavioral Beliefs*
## *(Hrubes, Ajzen, & Daigle, 2000)*

| Behavioral belief | Belief strength | Outcome evaluation | $rb_ie_i$ with intention | $rb_ie_i$ with behavior |
|---|---|---|---|---|
| Viewing scenery and enjoying nature | 1.96 | 2.65 | .54 | .52 |
| Observing and learning about wildlife | 2.56 | 2.38 | .46 | .44 |
| Feeling tired and exhausted | –0.05 | –0.03 | .12* | .10* |
| Creating or maintaining significant relationships with family or friends | 1.00 | 2.67 | .61 | .58 |
| Relaxing and relieving stress | 1.32 | 2.66 | .68 | .65 |
| Getting exercise and staying in shape | 1.39 | 2.60 | .62 | .59 |
| Feeling a sense of competence | 1.25 | 2.42 | .59 | .56 |
| Experiencing solitude, time to think | 2.01 | 2.52 | .56 | .52 |
| Getting dirty, wet, or cold | 2.10 | –0.05 | .04* | .03* |
| Feeling a sense of belonging and familiarity with nature | 1.54 | 2.45 | .60 | .57 |
| Experiencing excitement | 2.32 | 2.40 | .60 | .58 |
| Seeing wounded or dead animals | 2.38 | – 1.35 | .40* | .39* |

*Note*. Belief strength measured on a scale of -5 to +5; outcome evaluation on a scale of -3 to 3.
*Not significant; all other correlations significant at $p < .01$.

## *Hunting: Normative Beliefs*
### *(Hrubes, Ajzen, & Daigle, 2000)*

| | Belief Strength | Correlation with Behavior |
|---|---|---|
| My friends encourage me to engage in hunting | 4.25 | .56 |
| My family encourages me to engage in hunting | 4.03 | .55 |

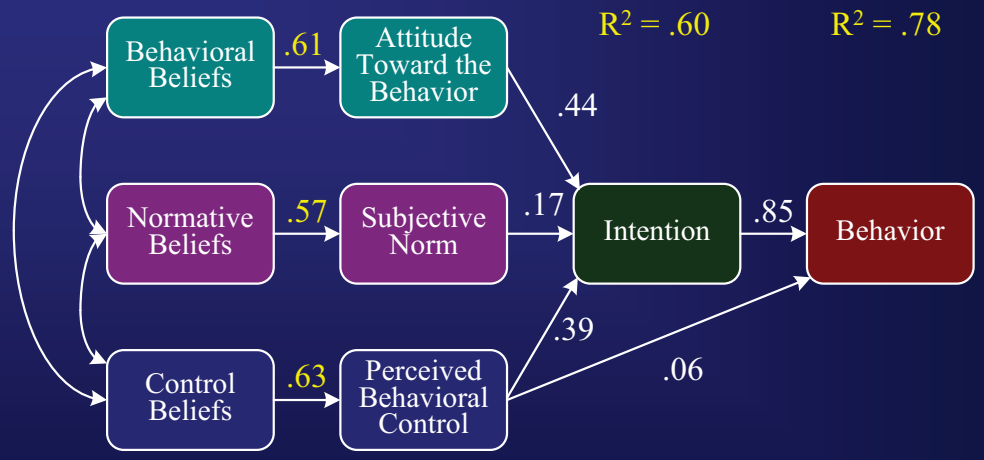
*Note.* Belief scores from 1 (extremely uncertain) to 10 (extremely certain).
All correlations significant at $p < .05$.

## *Hunting: Control Beliefs*
### *(Hrubes, Ajzen, & Daigle, 2000)*

| | Belief Strength | Correlation with Behavior |
|---|---|---|
| I am too busy to engage in hunting* | 5.66 | .30 |
| I have the knowledge and skills to engage in hunting | 5.32 | .48 |
| In can afford to engage in hunting | 6.61 | .35 |
| I takes great effort and time for me to engage in hunting* | 4.94 | .31 |

*Note.* Belief scores from 1 (extremely uncertain) to 10 (extremely certain).
*Reverse scored so that higher scores represent greater control.
All correlations significant at $p < .05$.

# *Recycling of Glass (Lüdemann, 1995)*




*Note.* Yellow numbers = correlations; white numbers = regression coefficients.

# *Glass Recycling in Trash vs. Public Bins: Behavioral Beliefs (Lüdemann, 1995)*

| Outcome | Differential belief strength | | Outcome evaluation | |
|---|---|---|---|---|
| | Non-recyclers | Recyclers | Non-recyclers | Recyclers |
| Storing at home | -3.34 | -3.43 | -1.35 | -0.79 |
| Good conscience | -2.16 | -3.62 | 1.47 | 1.93 |
| Trash can fills up fast | 3.47 | 4.22 | -1.38 | -2.04 |
| Cleaning used bottles | -2.30 | -2.65 | -1.40 | -0.77 |
| Convenient trash removal | 3.91 | 2.63 | 2.05 | 1.78 |
| Time-saving | 4.19 | 3.12 | 1.94 | 1.45 |
| Burdening environment by trash | 2.01 | 3.22 | -1.62 | -2.38 |
| Re-use of raw materials | -3.15 | -4.13 | 1.82 | 2.53 |
| Inconvenient removal | -3.39 | -2.14 | -1.86 | -1.47 |
| Saves space in landfill | -3.09 | -3.68 | 1.66 | 2.45 |
| Heavier trash can | 3.52 | 4.28 | -1.34 | -1.43 |

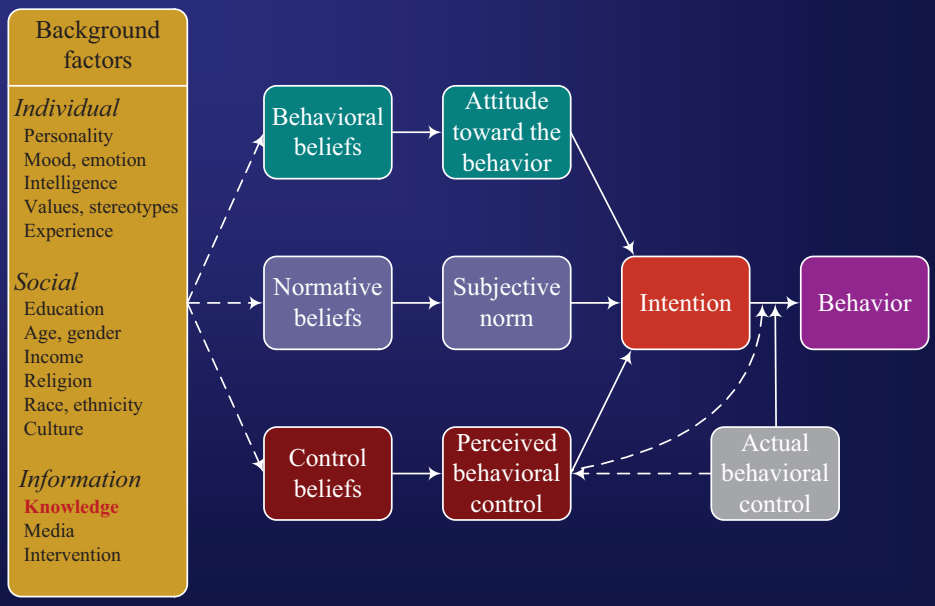
## *Glass Recycling in Trash vs. Public Bins: Normative Beliefs (Lüdemann, 1995)*

| Referent (Partner, Relatives, Colleagues, Fellow citizens, Friends and Acquaintances, Neighbors) | Differential belief strength | | Motivation to comply | |
|---|---|---|---|---|
| | Non-recyclers | Recyclers | Non-recyclers | Recyclers |
| Referent 1 | -2.03 | -3.64 | 3.43 | 4.48 |
| Referent 2 | -2.12 | -3.32 | 2.71 | 4.03 |

## *Glass Recycling in Trash vs. Public Bins: Control Beliefs (Lüdemann, 1995)*

| Control Factor | Belief strength | | Power | |
|---|---|---|---|---|
| | Non-recyclers | Recyclers | Non-recyclers | Recyclers |
| Knowledge of nearest bin | 1.20 | 2.49 | 0.79 | 1.68 |
| Good physical condition | 1.16 | 2.14 | 1.30 | 1.93 |
| Availability of transportation | -0.14 | 1.74 | 1.54 | 2.06 |
| Great distance to container | 0.52 | -1.19 | -1.62 | -1.33 |

# *Background Factors*




# *Environmental Knowledge and Energy Conservation* *(Ajzen, Joyce, Sheikh, & Gilbert Cote, in prep.)*

- 79 college students administered a self-contained questionnaires. Assessed…
  - Environmental knowledge
  - Environmental attitudes (support for protection of the environment)
  - TPB constructs
  - Energy conservation behavior

## *33-Item Environmental Knowledge Test: Sample Items (true/false)*

Based on Kaiser and Frick (2002)

- If the polar ice caps completely melted the sea level would rise approximately 4-5 inches.
- Nuclear energy and fossil fuels are 2 types of renewable energy.
- The tropics are most affected by the hole in the ozone layer.
- Recycling aluminium foil is important because producing new aluminium uses a substantial amount of energy.
- Paper shopping bags are more environmentally friendly than plastic shopping bags.

- Mean correct = 19.31 (58%)

## *Conserving Energy: TPB Measures*

Attitude, subjective norm, perceived behavioral control, and intention with respect to conserving energy,

defined as including, but not limited to:

*-- turning off lights and computers when not in use*

*-- walking or using bike/pubic transportation instead of your car*

*-- car pooling*

*-- limiting the duration of your hot showers or shampooing*

## *Conserving Energy: Sample TPB Items*
### *(6 items each; 5-point scales)*

Attitude: For me to conserve energy this semester would be…very unpleasant --- very pleasant

SN: People who are close to me approve of my conserving energy this semester. (strongly disagree --- strongly agree)

PBC: For me to conserve energy this semester is …

Completely impossible --- Definitely possible

Intention: I am planning to conserve energy this semester.

(Definitely --- Definitely not)

*α = .73 – .97*

## *Energy Conservation Behavior*

- 6 specific behaviors: e.g.,

"I walk, ride a bicycle, or take public transportation to work or school"

"I make a genuine effort to turn off electricity and appliances when not in use"

- 2 General measures:

"Generally speaking, do you make an effort to conserve energy in your daily living?" (Never — Always)

"Thinking back over the past few weeks, how much energy have you been conserving?" (None at all — A great deal)

Correlation between specific and general: r = .67. They were combined. α = .77.

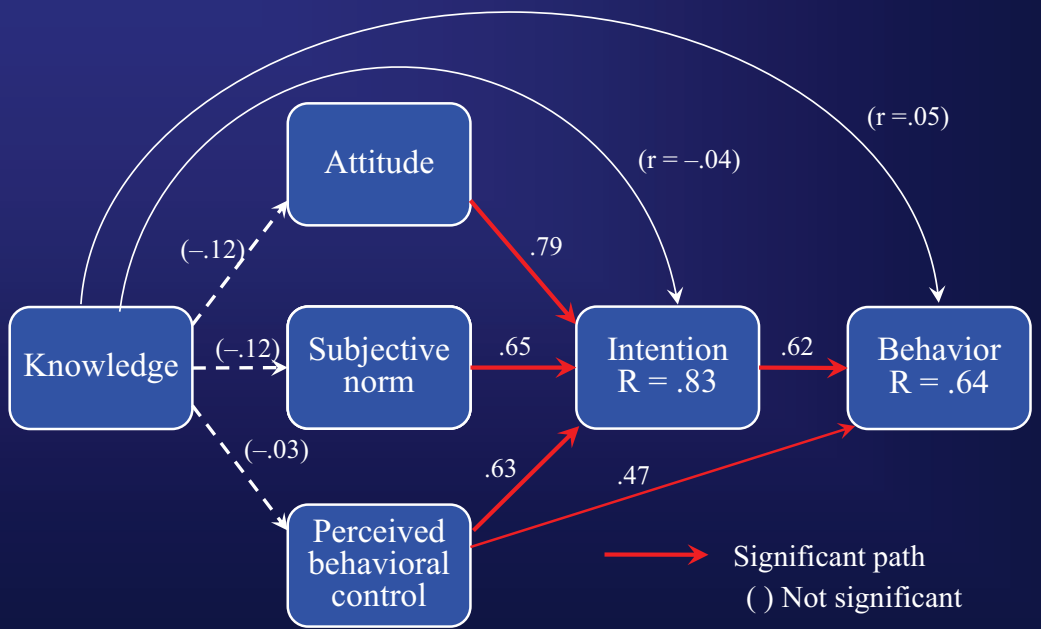
## *Prediction of Energy Saving Behavior From General Attitudes and Knowledge (N = 79)*

| | Behavior |
|---|---|
| Environmental attitude scale | .33* |

| | Knowledge |
|---|---|
| Environmental attitude scale | .14 |

| | Behavior |
|---|---|
| Knowledge | .05 |

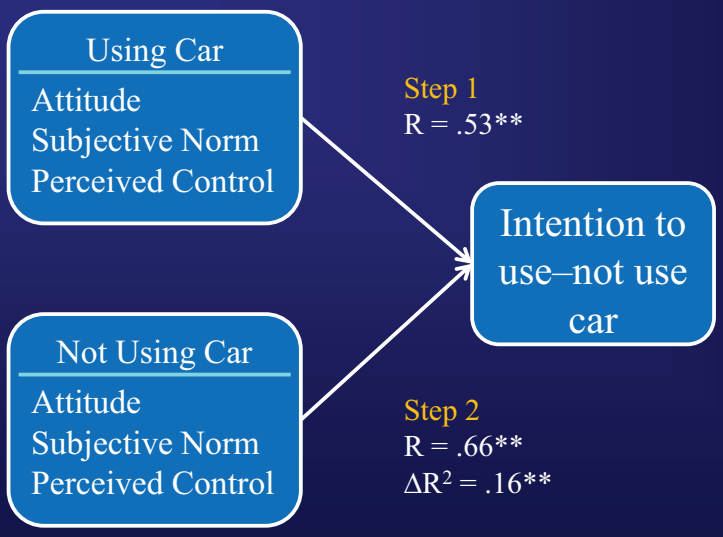
## *TPB and Environmental Knowledge: Conserving Energy*



## *Beliefs About Having – or Not Having – Another Child (Vinokur-Kaplan, 1978)*

- *Having Another Child*
  - fulfill yourself as a man or as a woman
  - give yourself to others
  - contribute to your community or society
  - feel close to your spouse
  - feel loved and surrounded by your children
- *Not Having Another Child*
  - spend time alone with your spouse
  - maintain an acceptable standard of living
  - have time for yourself
  - advance in your career
  - be able to provide for your children's education

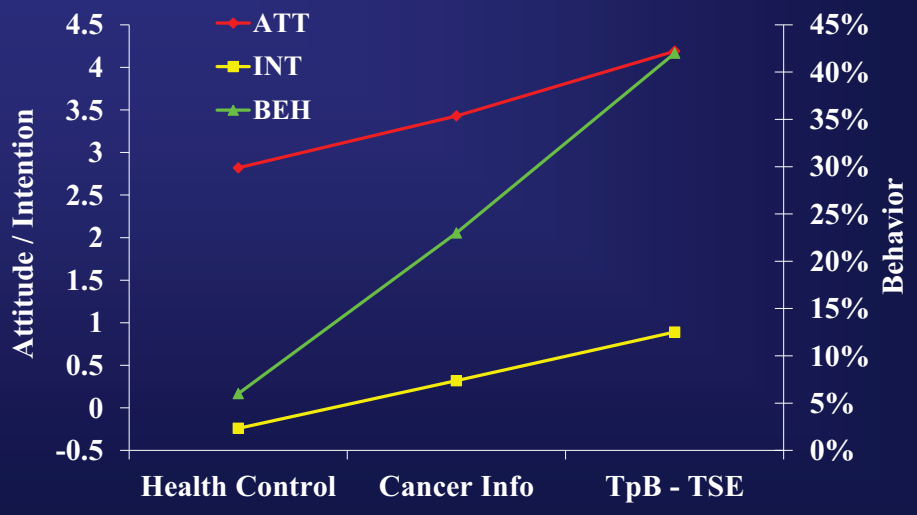
## *Using Car vs. Alternative Transportation (Gardner & Abraham, 2010)*



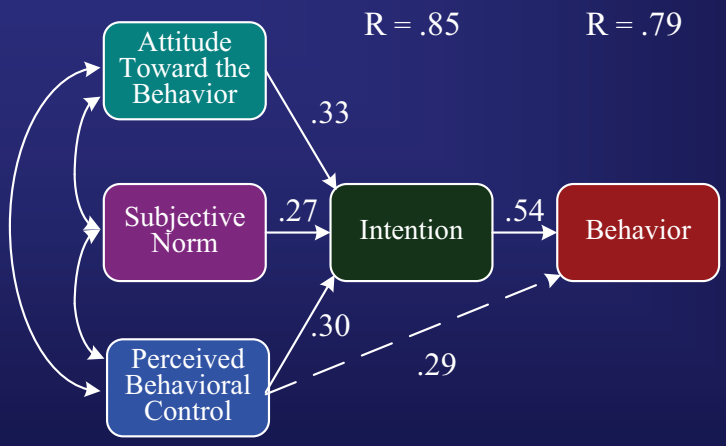
## *Testicular Self-Examination*
*(Murphy & Brubaker, 1990)*

- *Population:* 10th grade students in health classes
- *Behavior:* Self-reported TSE 4 weeks following intervention
- *Intervention:* Persuasive communication
- 3 conditions
  - *TpB-based:* 12-minute videotaped message designed to strengthen $A_B$, SN, and PBC toward performing TSE
  - *Cancer information:* Audio-visual slide presentation providing general information about testicular and other cancers
  - *Health information control:* Pamphlet about health in general

## *Testicular Self-Examination: Intervention Outcomes (Murphy & Brubaker, 1990)*



## *Using Public Transportation Prior to Relocation to Stuttgart (Bamberg, 2006)*



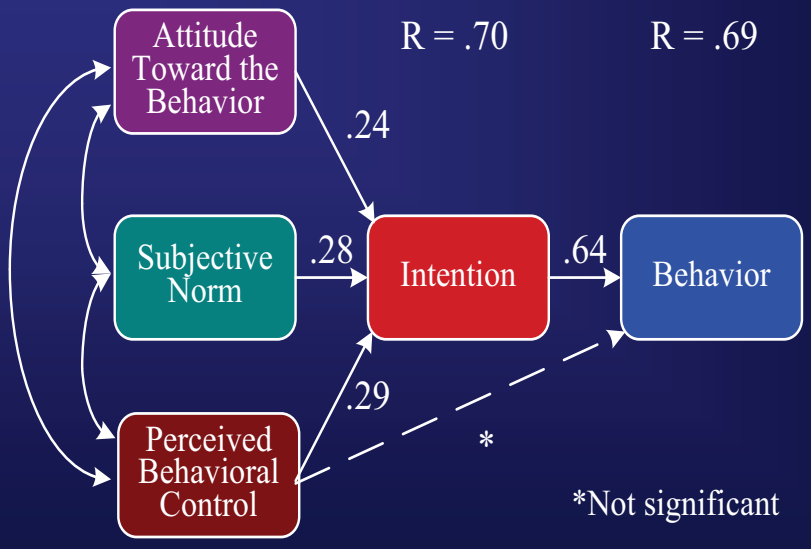

## *Using Public Transportation: Intervention Outcomes (Bamberg, 2006)*

| | Before | After |
|---|---|---|
| Attitude | 2.25 | 3.34* |
| Subjective Norm | 2.48 | 5.56* |
| Perceived Behavioral Control | 2.22 | 3.65* |
| Intention | 2.43 | 3.89* |
| Behavior (%) | 18.20 | 35.80* |

## *Taking the Bus to Campus* (Bamberg, Ajzen, & Schmidt, 2003)

- *Population:* College students at the University of Giessen, Germany
- *Behavior:* Self-reported bus use to get to the campus
- *Intervention:* Prepaid semester bus ticket, accompanied by an extensive informational campaign.

## *Taking the Bus to Campus* (Bamberg, Ajzen, & Schmidt, 2003)



## *Taking the Bus to Campus: Intervention Outcomes* *(Bamberg, Ajzen, & Schmidt, 2003)*

| | 1994 | 1995 |
|---|---|---|
| Attitude | 2.31 | 2.60* |
| Subjective Norm | 2.24 | 2.46* |
| Perceived Behavioral Control | 2.57 | 2.99* |
| Intention | 1.65 | 2.11* |
| Behavior (%) | .15 | .30* |

## *Conclusions*

- Eco-friendly behaviors are a function of compatible behavioral, normative, and control beliefs.
- Raising general knowledge about environmental issues is not an effective way to change behavior.
- To produce eco-friendly attitudes, subjective norms, perceptions of control, intentions, and – ultimately – pro-environmental actions we must change the relevant accessible behavioral, normative, and control beliefs.

# Applying the theory of planned behavior to juvenile shoplifting

September 24, 2010

Seminar on Theory of Planned Behavior,
at Charles University, Prague

Jochen Wittenberg





## Overview

- Introduction to CRIMOC
- Data
- Measurements
- Descriptive Analyses
- Testing the TPB-Model using SEM
- Alternative Estimation Procedures
- Conclusion

## Introduction to Crimoc

„Crime in the Modern City“

A longitudinal study of juvenile delinquency in Münster und Duisburg, funded by the German Research Foundation (Deutsche Forschungsgemeinschaft)

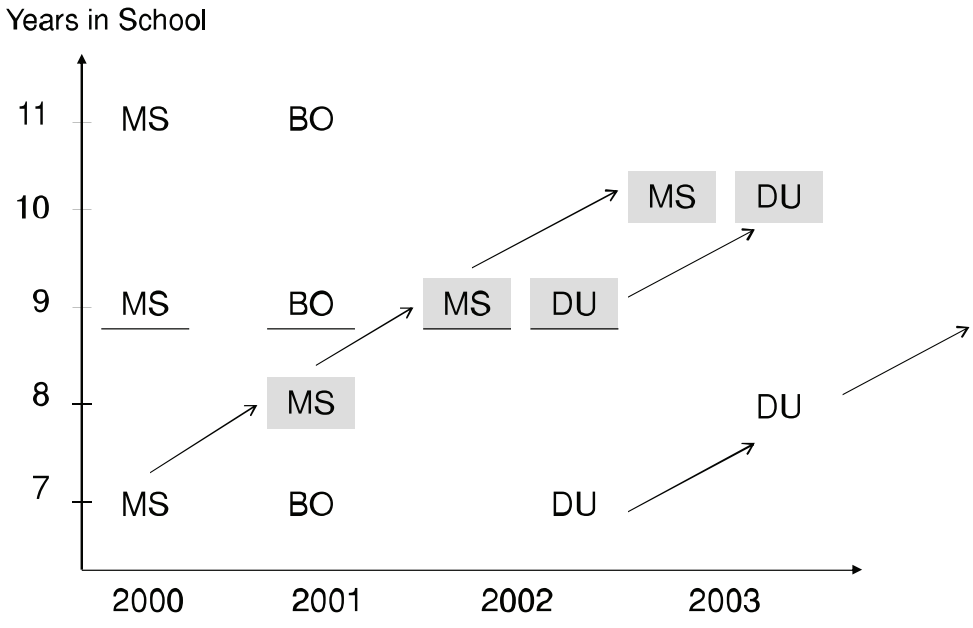
Principal Investigators:

Prof. Dr. Jost Reinecke, University of Bielefeld
Prof. Dr. Klaus Boers, University of Münster

http://www.crimoc.org







## Shoplifting

- Shoplifting is an everyday occurrence of juvenile delinquency.
- It is the most frequent committed offense among youths.
- For many juveniles it is the only crime during their youth.

## TPB and Shoplifting

Beck & Ajzen (1991)

Tonglet (2000), (2001)





## Data

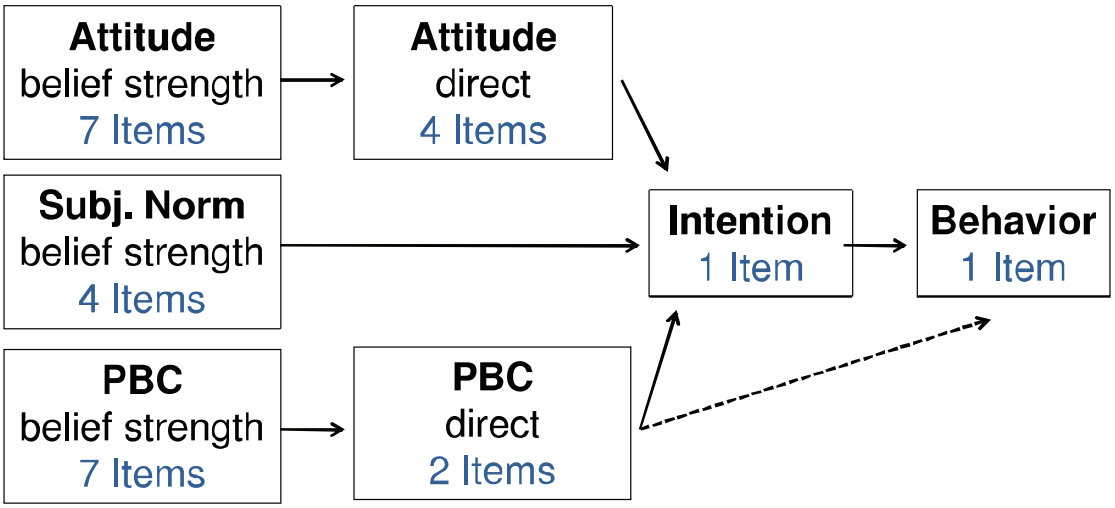
### Münster

| | | |
|---|---|---|
| 2-Wave-Panel 2001-2002 | N = 1 233 | approx. 52 % female, |
| 2-Wave-Panel 2002-2003 | N = 1 366 | 48 % male |
| 3-Wave-Panel 2001-2003 | N = 1 053 | |

### Duisburg

| | | |
|---|---|---|
| | | approx. 54 % female, |
| 2-Wave-Panel 2002-2003 | N = 1 729 | 46 % male |

## Measurements Overview (see handout)








## Measurements

### Shoplifting Behavior

*"Did you ever take something from a supermarket, shop or department store without paying for it?"*

*"How many times within the last year?"*

Incidence recoded: 0,1, …, 12, 13 and more

### Intention

*"How likely is it that you really take something from a supermarket, shop or department store without paying for it within the next 12 months?"*

1 = very likely / 6 = very unlikely

## Attitude (direct), 4 Items

*"What do you personally think about you stealing something from a supermarket, shop or big store? Taking something without to pay for it would be …"*

1 = very good / 6 = very bad
1 = harmless / 6 = harmfull
1 = profitable / 6 = non-profitable
1 = hazard-free / 6 = risky





## Attitude (belief strength), 7 Items

*"There might be different reasons for shoplifting in a super-market, shop or department store without paying for it, how likely would the following **reasons** be for you personally?"*
1 = very likely / 6 = very unlikely

- like an adventure, something to get a kick out of it
- only way to get things I like and can't afford
- doesn't hurt a large shop
- gives a feeling of success
- is like an addiction
- is like a test of courage
- something stolen can easily be sold

## Subjective norm (4 referent groups, belief strength)

*"In your opinion what would the following persons think about you taking something from a supermarket, shop or department store without paying for it?"*

1 = very likely / 6 = very unlikely

My **parents** think about shoplifting as a very bad thing.
My **friends** think about shoplifting as a very bad thing.
My **teachers** think about shoplifting as a very bad thing.
My **classmates** think about shoplifting as a very bad thing.





## Perceived Behavioral Control (7 Items, belief strength)

*"There might be different **circumstances that keep someone from stealing** from a supermarket, shop or department store. How likely is it, that these circumstances would make it difficult for you or keep you from it?"*

1 = very likely / 6 = very unlikely

- attentive shop detectives and salespersons would catch me
- safety stickers, cameras, alarm systems make it impossible
- afraid of an order to stay away from the shop
- getting caught would make me feel very embarrassed
- I'd be afraid of being reported and of the police.
- I'd have a bad conscience for a long time.
- If other persons who know me found out about it, it would have bad consequences for me.

## Perceived Behavioral Control (2 Items, direct)

*„What do you think, how difficult is it for people of your age to take something from a supermarket, shop or department store without paying for it, without getting caught.“*

1 = very difficult / 6 = not difficult at all

*„How likely do you think is it for you to take something undetected and without getting caught?“*

1 = very likely / 6 = very unlikely





## Descriptive Analyses

### Shoplifting prevalence / incidence

| | % | mean |
|---|---|---|
| Münster 2000, 7 | 16.9 | 0.72 |
| Münster 2001, 8 | 20.8 | 0.87 |
| Münster 2002, 9 | 20.3 | 1.21 |
| Münster 2003, 10 | 13.2 | 0.68 |
| Duisburg 2002, 9 | 20.9 | 0.76 |
| Duisburg 2003, 10 | 13.3 | 0.62 |

## Intentions

Intentions to shoplift are very week.

The average intention varies among the two towns and the observed time points between **5.1** and **5.5** on the 6-point-scale (6 meaning shoplifting is very unlikely).

## Attitudes

In general the attitude towards shoplifting is rather negative.

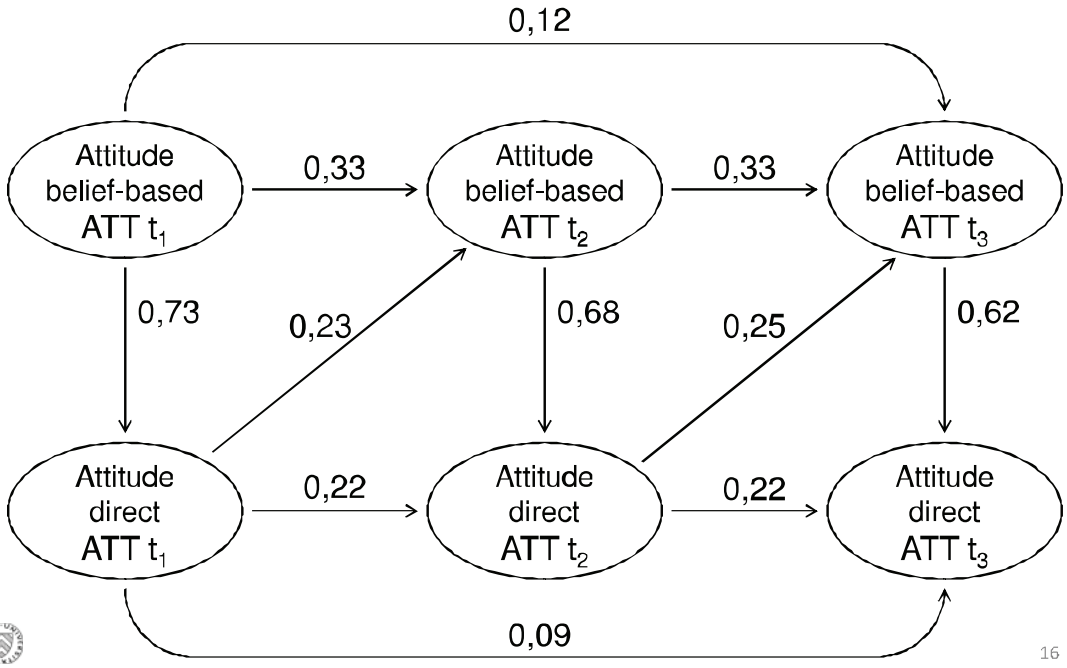
| | |
|---|---|
| mean of ‚direct' items | 4,2 – 5,2 |
| mean of belief items | 3,9 – 5,1 |

Markov-Models illustrate strong relations between different attitude measures and also stability over time.





## Measurement of Attitudes, Münster 2001-2003, stand. coefficients






Chi² 688,03 (df=316), RMSEA = .04, GFI =.94, AGFI =.93

## Subjective Norms

two groups of referents can be distinguished:

| | |
|---|---|
| adults | parents and teachers do not support shoplifting<br>means between 1.5 and 1.7<br>(„shoplifting is a very bad thing“ 1 = very likely) |
| peers | friends and classmates support shoplifting to some extend<br>means between 3.2 and 3.4 |





## Perceived Behavioral Control

Respondents think that shoplifting is easy for people in their age (means 4.0 – 4.5 / 6 = not difficult at all).

And they think that it is quite likely for themselves to commit shoplifting without being caught (means 3.5 – 3.9 / 6 = very likely).

On the other hand all the mentioned circumstances that might keep someone from shoplifting are also very likely (means 2.1 – 3.0 / 1 = very likely)

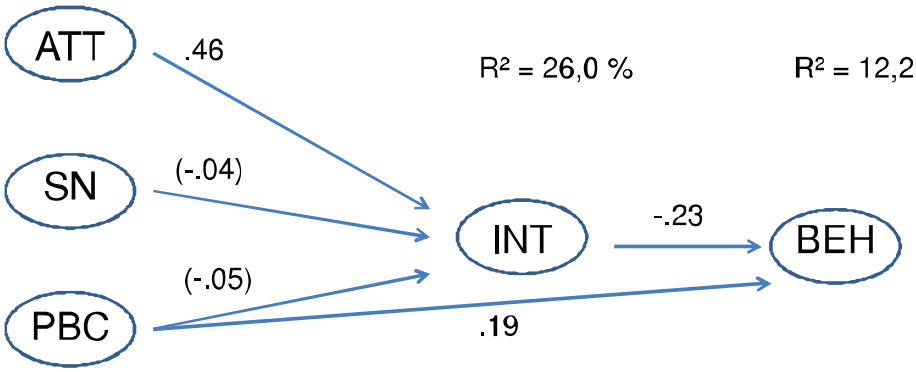
## Testing the TPB-Model using SEM

- Using a reduced set of indicators (ATT 3 items, SN 2 items, PBC 4 items, INT and BEH 1 item)
- Using covariances, pairwise deletion of missing data, ML-Estimation with LISREL 8.8
- Within 3-W-Panel the corresponding loadings of an item and also corresponding error terms are set equal over time. Corresponding error terms may correlate over time (autocovariance).
- standardized factor loadings are 0.60 and higher
- (Negative) signs of coefficients are results of coding



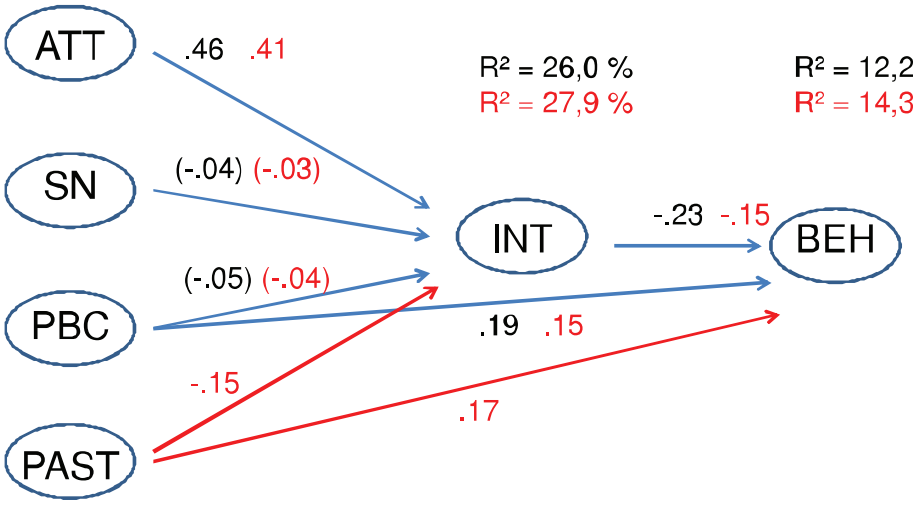


Two-Wave-Panel, Münster 2001-2002, standardized coefficients




Chi² 103.15 (df=43), RMSEA = .04, GFI .98, AGFI = .97

## Two-Wave-Panel, Münster 2001-2002, standardized coefficients

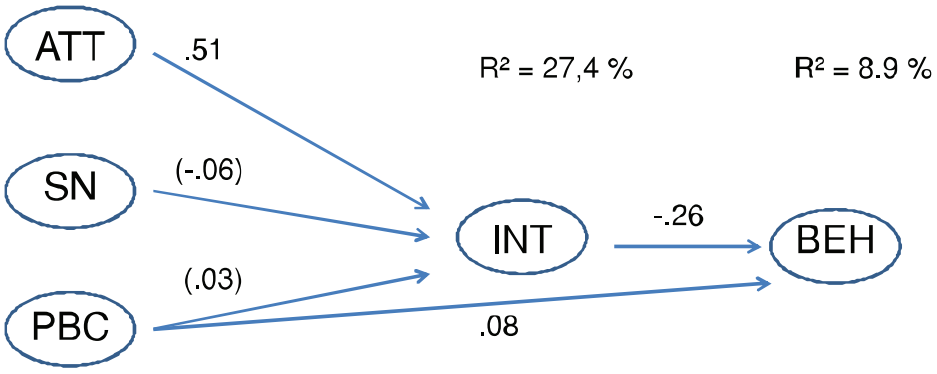



Chi² 103.15 (df=43), RMSEA = .04, GFI .98, AGFI = .97



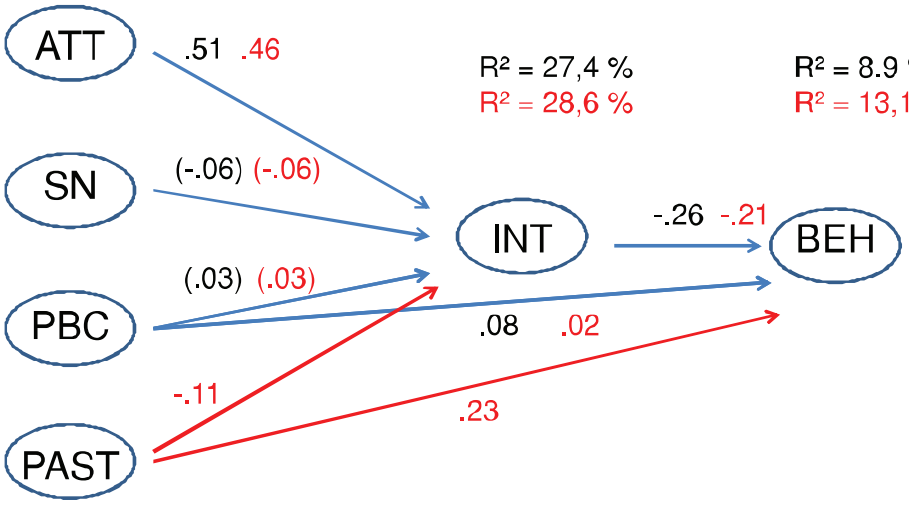


## Two-Wave-Panel, Duisburg 2002-2003, standardized coefficients




Chi² 189.50 (df=36), RMSEA = .05, GFI .97, AGFI = .95

## Two-Wave-Panel, Duisburg 2002-2003, standardized coefficients

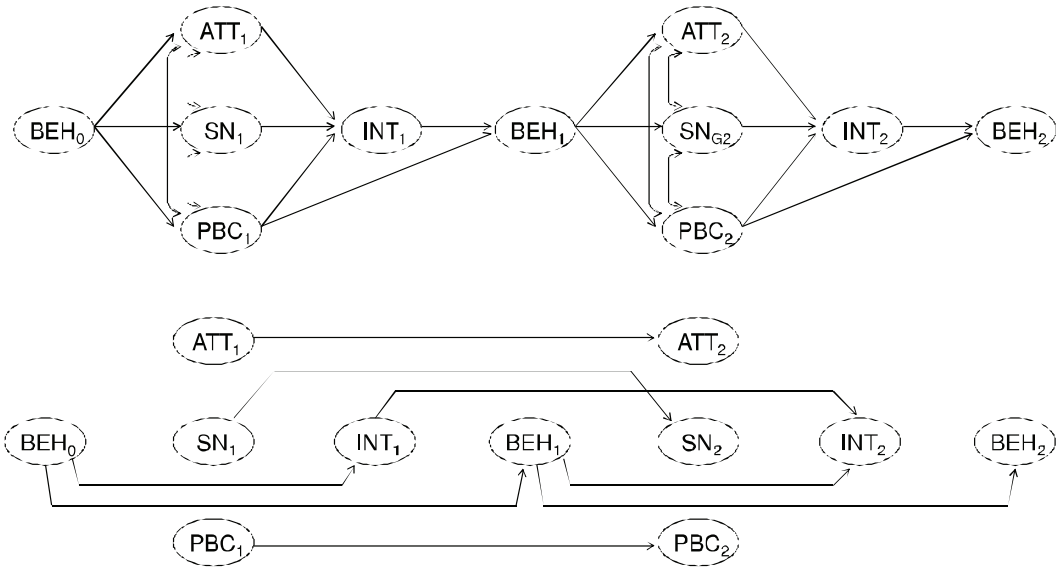



Chi² 189.50 (df=36), RMSEA = .05, GFI .97, AGFI = .95
Chi² 190.27 (df=42), RMSEA = .05, GFI .98, AGFI = .96

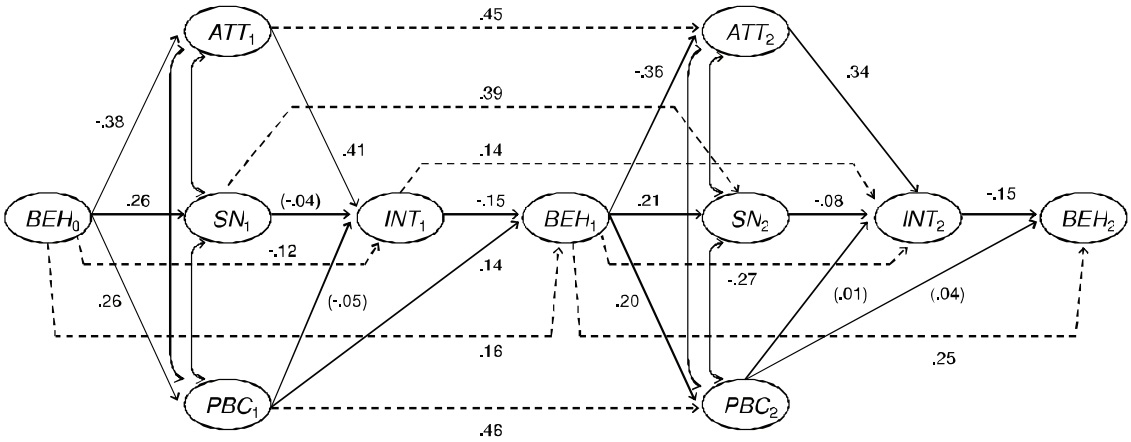




## Three-Wave-Panel, Münster 2001-2003



# Three-Wave-Panel, Münster 2001-2003








| | $BEH_0$ | $ATT_1$ | $SN_1$ | $PBC_1$ | $INT_1$ | $BEH_1$ | $ATT_2$ | $SN_2$ | $PBC_2$ | $INT_2$ | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $INT_1$ = | -.12 | .41 | (-.04) | (-.05) | | | | | | | 27.0 |
| $BEH_1$ = | .16 | | | .14 | -.15 | | | | | | 10.6 |
| $ATT_2$ = | | .45 | | | | -.36 | | | | | 40.4 |
| $SN_2$ = | | | .39 | | | .21 | | | | | 22.0 |
| $PBC_2$ = | | | | .46 | | .20 | | | | | 29.2 |
| $INT_2$ = | | | | | .14 | -.27 | .34 | -.08 | (.01) | | 37.9 |
| $BEH_2$ = | | | | | | .25 | | | (.04) | -.15 | 13.2 |

Chi² 367.70 (df=213), RMSEA = .03, GFI .96, AGFI = .95

## Alternative Estimation Procedures

Problems: item non-response (missing values)

skewed data

Procedures: pairwise deletion, ML-Estimation

listwise deletion, ML-Estimation

listwise deletion, robust ML-Estimation

listwise deletion, WLS-Estimation

Full Information Maximum Likelihood (FIML)





Results: parameters are very similar

using FIML does not change results very much

correcting for skewness is usefull, in this application robust ML works best

But the lack of multiple indicators of dependent concepts limits the comparison of estimation procedures.

## Conclusions

- respondents attitude to shoplifting are negative
- support by peers differs
- perceptions of risk differ but deterring factors are likely
- attitudes, subjective norms and perceived behavioral control are highly correlated
- shoplifting intentions are week
- attitudes predict intentions, no or very small effects of subjective norms and perceived behavoral control (no „peer pressure“, no effect of perceived deterrent factors)





## Conclusions

- intentions predict behavior
- past behavior improves explanation of intentions and behavior
- only moderate explanation of intentions ($R^2$ = 26 – 32%) and behavior ($R^2$ = 9 – 12 %)

# Thank you!





## Questions for Discussion

- What about the long time intervalls?
- Is the integration / interpretation of past behavior necessary?
- Does past behavior reflects experience or the habit of legal consuming?
- Further alternatives of estimation?

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# Condom use with casual partners in heterosexual men: extending the theory of planned behaviour by adding the socio-cultural variable somatic culture

Sibylle Niderost, Daniel Gredig
University of Applied Sciences Northwestern Switzerland
School of Social Work
Olten (CH)

**Presentation at the Seminar on Theory of Planned Behaviour**
**University of Prague, Environment Centre**
**Prague (CZ)**
**24th of September, 2010**

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## Background

**The theory of planned behaviour (TPB) has been tested in numerous studies on HIV-protection behaviour**

- it is considered to have sufficient predictive validity (Albarracin et al., 2001; Bennet & Bozionelos, 2000)

**The theory of planned behaviour meets with the criticism**

- individualistic approach built on purely cognitive variables
- based on the assumption that condom use is a rational choice by an individual faced with the danger of HIV-infection
- emotional, social and socio-cultural factors are left unconsidered (Bengel, 1993)

**Potential for further development of the TPB and advancement in explaining HIV-protection behaviour**

## Somatic culture and HIV-protection behaviour

### Somatic culture as a predictor of HIV-protection behaviour in a earlier qualitative study (Gredig, Parpan, Niderost 2002)

### Somatic culture

- describes permanent dispositions of perception, thinking and acting with regard to one's own body.
- is that part of a person's habitus, that structures how he or she deals with his or her own body (Boltanski, 1976)
- it is generated in an individual's socialization process
- individuals who share the same social conditions of existence develop a system of dispositions which generates similar modes of practice (Bourdieu, 1999).



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## Types of somatic culture

### We had identified four types of somatic culture in heterosexual men:

- Visionary type
- Ambivalent type
- Functionalistic type
- Easy-going type

## The visionary type of somatic culture

**The body is the subject of continuous conscious reflection**

**Are guided by a vision describing a self-defined ideal relationship between body and spirit (e.g. harmony of body and spirit)**

**Have very clear, well-reflected ideas with regard to their own body**

**Have a strong personal autonomy while, at the same time, they are sensitive of their body and aware of their physical sensations**

**See themselves as self-confident and self-determined individuals who take responsibility for their body and their health**



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## The ambivalent type of somatic culture

**Tension between compliance with socially transmitted internalized norms and casual, happy-go-lucky approach**

**Are of a controlling nature, so they subject their body to repeated critical tests on a regular basis to check whether it is fulfilling the norms**

**If the body does not fulfil such norms anymore, measures are taken to bring the body back to conformity (e.g. the withdrawal of nutrition). As soon as the body is back to conformity, men of this type lose interest again and control is replaced by body-related behaviour determined by careless enjoyment, comfort and the avoidance of efforts**

**No balance between opposite orientations can be found**

**Oscillating movement between control and happy-go-lucky, the body is held in low esteem**

## The functionalistic type of somatic culture

**The body is experienced in the context of the working situation and body-related behaviour is determined by work**

**The body is getting no more attention than necessary for the maintenance of fitness and for the fulfilment of one's duty in everyday life. The only take care not to exhaust their body unnecessarily, to minimize „wear and tear" and to avoid risks perceived as imminent**

**The first signs of a physical troubles are often ignored. In their present-day orientation, the future, and thus any future consequences of their present physical neglect are ignored**

**They shared idea that a state of good or poor health is largely a question of coincidence and does not fall within the responsibility or the power of the individual**



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## The easy-going type of somatic culture

**Carelessness and negligence characterize the body-related pattern of this type of somatic culture**

**Show a calm indifference and tend to forget their body quite easily. They only become aware of it if there is an urgent reason.**

**Only make a minimal effort to take care of themselves in order to comply with social norms of cleanliness and appearance.**

**Conceptions of a healthy/healthier life are of almost no importance for the practical everyday issues. Often, motivated by lust or laziness, they redefine these conceptions to justify a slackening of the reigns on their part.**

**Guided by the motto „be satisfied with what you have", there are also allusions to the fact that one's physical condition is basically unchangeable, and that to accept it is the most natural attitude to adopt.**

## Objectives of the study

**1. To test whether the theory of planned behaviour provides a suitable explanatory model for condom use with casual partners of heterosexual men between the ages of 25 and 65 living in the German-speaking part of Switzerland**

**2. To determine, whether the explanatory power of the theory of planned behaviour can be increased by adding the variable of somatic culture**

**We hypothesized, that the integration of the variable „somatic culture" as an additional predictor of intention into the theory of planned behaviour will increase the proportion of explained variance of intention to use a condom with casual partners.**



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## Participants and procedures

**Participants were 982 Swiss men between the ages of 25 and 65 of heterosexual orientation.**

**The study design was prospective**

- First wave of interviews between October and December 2002
- Second wave of interviews followed after an interval of 6 months.

**Two standardized computer assisted telephone interviews (CATI)**

## Measures of TPB

**Attitude ($\Sigma$ $b_i$*$e_i$) and subjective Norm ($\Sigma$ $nb_j$*$m_j$)**

- 15 Items ranging from 0-10

**Perceived behavioural control**

- 2 Items ranging from 0-10

**Intention (1 Item) ranging from 0-10**

**Condom use last time when having sex with a casual partner during the six month under investigation (1 Item), yes/no**



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## Measures of somatic culture

**For measuring somatic culture, a 25 item-somatic culture index was developed. It based on the results of the qualitative study**

**Four subscales of somatic culture**

- Visionary type (8 Items, $\alpha$=.71)
- Ambivalent type (4 Items, $\alpha$=.58)
- Functionalistic type (6 Items, $\alpha$=.63)
- Easy-going type (7 Items, $\alpha$=.62)

## Data analysis

**1. Bivariate correlation analysis to establish the relationship between the two variables „intention“ and „condom use“**

**2. Standard multiple regression analysis to determine predictors of intention and the proportion of explained variance in intention**

**3. An analysis of covariance (ANCOVA) to test whether the variable „somatic culture“ was a predictive variable of „intention“ and in order to determine the proportion of explained variance in intention and by how much the explanatory power of the TPB can be increased**

**4. Hierarchical logistic regression analysis in order to check that the predictor variables of intention had no effect on condom use when the effect of intention was controlled for**



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## Sample description (N=81)

| | n | in % |
|---|---|---|
| **Age** | | |
| 25 to 34 years | 15 | 18.5 |
| 35 to 44 years | 30 | 37.0 |
| 45 to 54 years | 27 | 33.4 |
| 55 to 65 years | 9 | 11.1 |
| **Living situation** | | |
| Alone | 23 | 28.4 |
| With partner | 25 | 30.9 |
| With children, relatives or other persons | 33 | 40.7 |
| **Relationship status at last sexual encounter** | | |
| Married | 27 | 33.3 |
| In a steady relationship | 8 | 9.9 |
| Single | 46 | 56.8 |

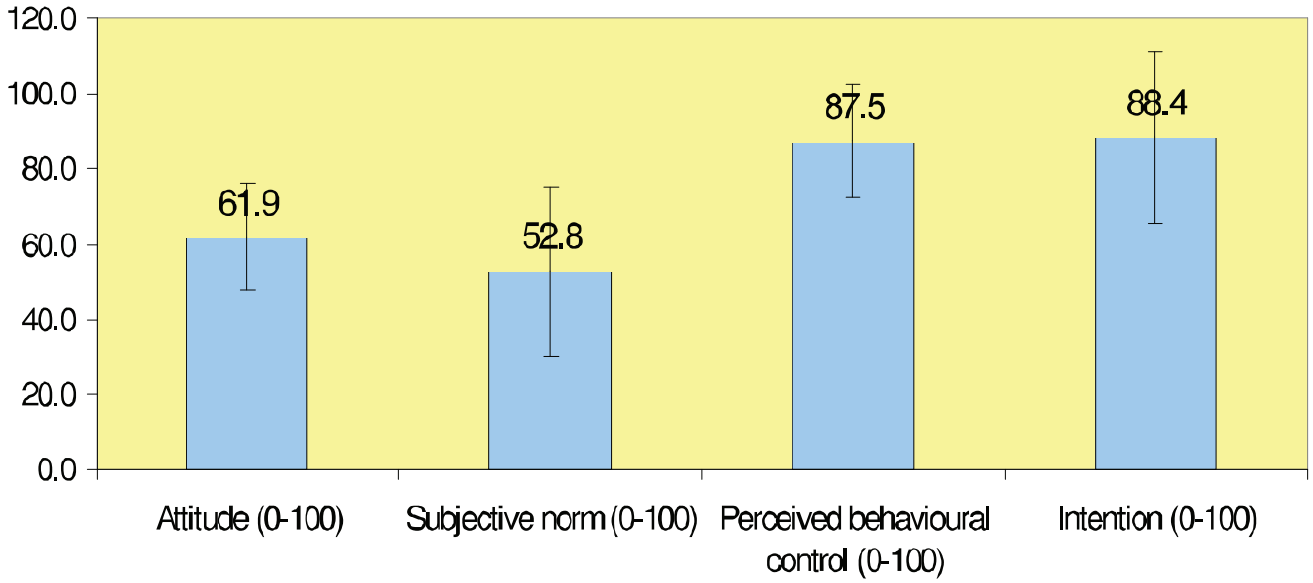
## Sample description (N=81)

| | n | in % | | n | in % |
|---|---|---|---|---|---|
| **Education** | | | **Netincome per month in EURO** | | |
| Compulsary school (8-9 years of school) | 4 | 4.9 | Less than 1666 | 3 | 3.7 |
| College, maturity, teacher's training | 7 | 8.7 | 1667-2333 | 4 | 5.0 |
| Apprenticeship | 36 | 44.4 | 2334-3000 | 5 | 6.2 |
| Vocational high school | 19 | 23.5 | 3001-3666 | 15 | 18.5 |
| University, specialised high school | 14 | 17.3 | 3667-4333 | 11 | 13.6 |
| n.a. | 1 | 1.2 | 4334-5000 | 10 | 12.3 |
| **Work-situation** | | | 5001-5666 | 7 | 8.6 |
| Regular full-time employment | 71 | 87.7 | 5667-6333 | 6 | 7.4 |
| Regular part-time employment | 4 | 4.9 | 6334-7000 | 6 | 7.4 |
| Unemployed | 2 | 2.5 | 7001-7666 | 2 | 2.5 |
| In retirement | 3 | 3.7 | More than 7667 | 7 | 8.6 |
| In education | 1 | 1.2 | n.a. | 5 | 6.2 |

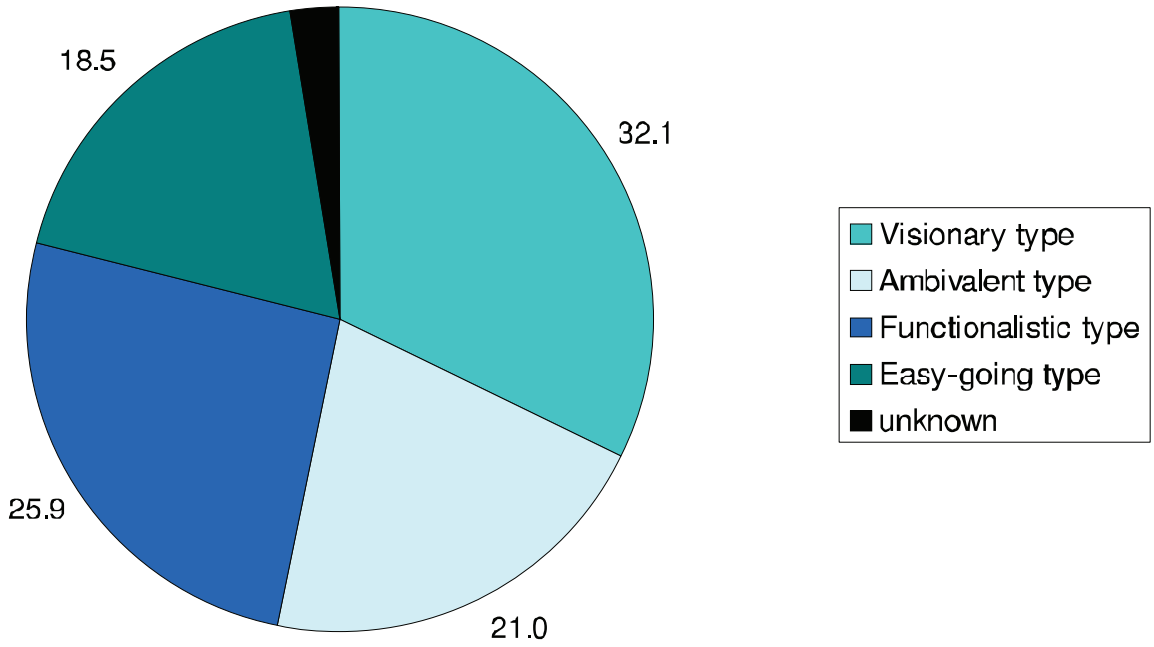




## Mean and standard deviation of the variables of TPB (N=81)



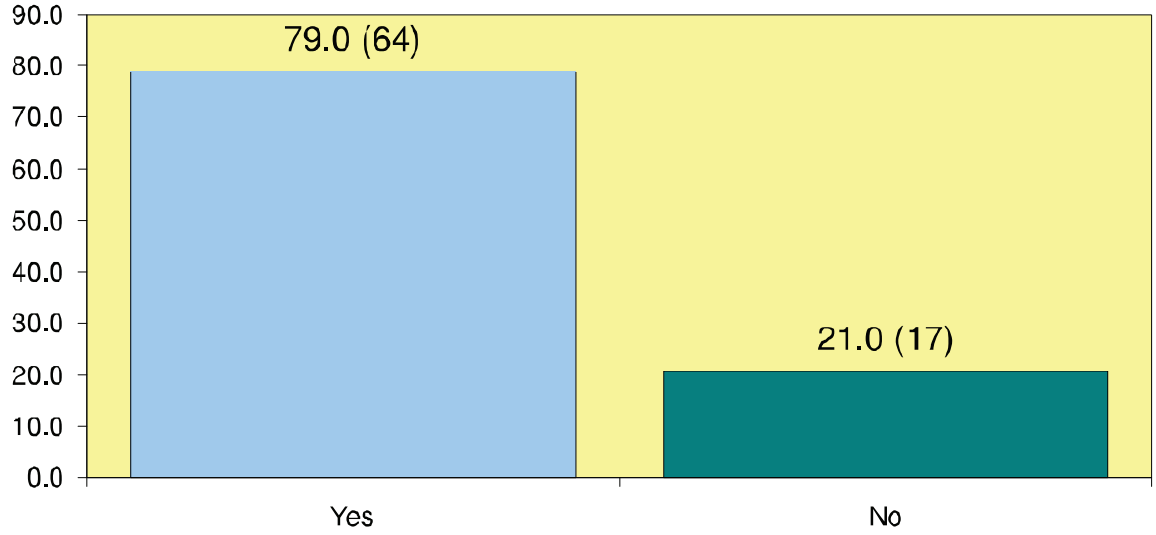
## Distribution of the types of somatic culture (in %, N=81)






Fachhochschule Nordwestschweiz
Hochschule für Soziale Arbeit

## Did you have used a condom last time you had sex with a casual partner during the past six month? (in %, N=81)



# Theory Driven Evidence based policy in the Transport sector

Prag Symposium 24.9.2010

Peter Schmidt
University of Marburg

- Meta analytic struktur equation modeling (MASEM) for theory

1. Introduction and outline
2. Observational study in Austria
3. Quasiexperimental Styudy 1: Evaluation of the Semesterticket at the University of Giessen
4. Quasi experimental study 2
5. Experimental study in Stuttgart
6. A MASEM analysis of the TOPB testing for moderator effects
7. A Masem analysis of Intervention studies using the TOPB
8. Outlook

# MIMIC- Model

- Some frame works, for instance that of Muthén (1984), include an extra $\Gamma x_{1j}$ for regressions of latent variables on observed covariates:

$$\eta_j = \alpha + \mathbf{B}\eta_j + \mathbf{\Gamma}\mathbf{x}_{1j} + \zeta_j,$$

- Where $\alpha$ is an intercept vector. Muthén specifies the model conditional on the covariates so that distributional assumptions are not required for the covariates.

- In the measurement model, the additonal term $\mathrm{K}x_{2j}$ is included by Muthén and Muthén (1998) to represent regressions of observed responses on observed covariates.

$$\mathbf{y}_j = \boldsymbol{\nu} + \boldsymbol{\Lambda}\boldsymbol{\eta}_j + \mathbf{K}\mathbf{x}_{2j} + \boldsymbol{\epsilon}_j,$$

- Where $\upsilon$ is a vector of intercepts (often $x_{1j} = x_{2j}$).

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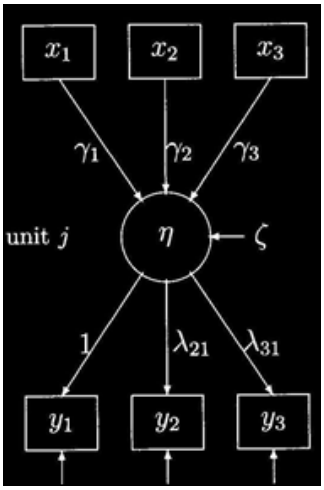
- A popular structural equation model with observed covariates is the Multiple-Indicator Multiple-Cause (MIMIC) model, a one-factor model where the factor is measured by multiple indicators and regressed on serveral observed covariates or "causes" (e.g. Zellner, 1970; Hauser and Goldberger, 1971; Goldberger, 1972). Here the structural model is simply:

$$\eta_j = \alpha + \boldsymbol{\gamma}'\mathbf{x}_{1j} + \zeta_j.$$



6

- A path diagram of a MIMIC model with three indcators and three covariates:






# Study 1 :
# An observational study in Austria (Institute of Transportation Research, BOKU Vienna) based on Hössinger/Schmidt 2010

# Description of variables and their means

- The data were provided by 229 interactive interviews and a preceding written survey. The sample includes six stakeholder groups as described in Table 2-3. Table 5-1 lists all observed variables used in the following causal models.
- The presumed key predictors, i.e., the estimates and values of the effects of the policy as well as the estimated approval rates, are listed entirely in the table, even those that didn't qualify for the model. The left column groups the variables by several categories. The personal characteristics are grouped according to the Situational Approach. Regarding the beliefs associated with the transport policy, the grouping follows the Theory of Planned Behavior.
- The middle column shows the labels used in SEM, and the right column indicates how the variables were measured. Attitudes (judgement of…) and validations (validation of…) were throughout measured on a six point Likert rating scale from 'full rejection' or 'fully unimportant' to 'full approval' or 'fully important'. The scores were then transferred into percentage of approval or importance as described in Figure 2-1.



# Description of variables and their means

- Table 5-2 shows the mean values of the variables for the total sample and also for the different stakeholders. The emphasis of this study is on policy makers. They form the main part of the sample and act as reference.
- For the five remaining groups, a variable-by-variable comparison with the policy makers was performed, using a one-factorial analysis of variance with post-hoc comparison of means and Bonferroni correction. Significant deviations are marked with ** ($P <= 0.01$) or * ($0.01 < P <= 0.05$).
- Due to the small sample, only few deviations reach the level of significance. They apply throughout to the citizens and commercial representatives, as these are the largest groups aside from policy makers.

# List of variables and their indicators used in SEM

| Category | Label in SEM | Indicator and kind of measurement |
|---|---|---|
| Objective situation | rep. of commerce | Dummy variable to distinguish representatives of commerce (1) from other respondents (0) |
| | citizens | Dummy variable to distinguish citizens selected at random (1) from other respondents (0), which were selected systematically |
| | gender | Females (0); males (1) |
| | number of PT trips | Number of days during the last calendar week (Monday to Friday) where a public means of transport was used for private or professional trips |
| | number of car trips | Number of days during the last calendar week (Monday to Friday) where a car was used for private or professional trips |
| Personal values | individual freedom | Judgement of the statement "Life in Austria is too much regulated, people should be given more freedom" |
| | merit principle | Judgement of the statement "The job performance should be more awarded in Austria in order to increase the competitiveness of Austrian's economy" |
| | support for the poor | Judgement of the statement "People living in poverty should receive more support from the state, even those who are responsible on their own. |
| | concern climate | Judgement of the risk of a large scale environmental damage due to a climate change caused by CO2 emissions |
| | concern nat resources | Judgement of the risk of a large scale environmental damage due to the excessive consumption of non-renewable resources |
| | concern landscape | Judgement of the risk of a large scale environmental damage due to the destruction of natural landscapes |
| Transport policy aims | reduce to needful trips | Judgement of the statement "The car traffic in Austria should be limited to its necessary extent in order to reduce noise and exhaust emissions" |
| | restrict private car use | Judgement of the statement "The use of private cars should be restricted by means of appropriate measures in order to reduce the car traffic in Austria" |



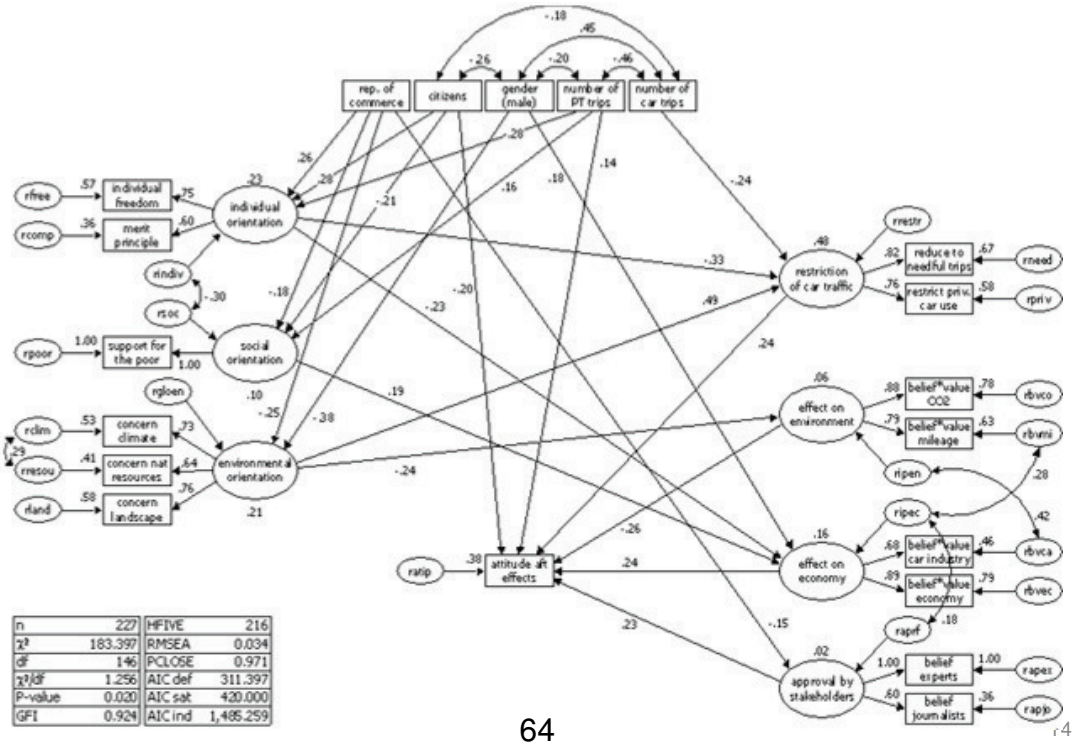
# List of variables and their indicators used in SEM (continued)

| Category | Label in SEM | Indicator and kind of measurement |
|---|---|---|
| Estimation of effects of the policy | belief mileage | Estimation of the effect of a fuel tax increase on the average annual mileage of the car traffic (in % compared to non-implementation) |
| | belief CO2 | Estimation of the effect of a fuel tax increase on the CO2 emissions of the car traffic (in % compared to non-implementation) |
| | belief accidents | Estimation of the effect of a fuel tax increase on insured and killed children on the roads (in % compared to non-implementation) |
| | belief car industry | Estimation of the effect of a fuel tax increase on the performance of the automotive industry (in % compared to non-implementation) |
| | belief economy | Estimation of the effect of a fuel tax increase on the performance of the overall Austrian economy (in % compared to non-implementation) |
| | belief unemplmt | Estimation of the effect of a fuel tax increase on the unemployment rate (in % compared to non-implementation) |
| | belief living stand | Estimation of the effect of a fuel tax increase on the living standard of people with low income (in % compared to non-implementation) |
| | belief elections | Estimation of the effect of a fuel tax increase on the gain or loss of votes of the governing party (in % compared to non-implementation) |
| Validation of effects of the policy | value mileage | Validation of the effect on the average annual mileage |
| | value CO2 | Validation of the effect on the CO2 emissions |
| | value accidents | Validation of the effect on insured and killed children on the roads |
| | value car industry | Validation of the effect on the performance of the automotive industry |
| | value economy | Validation of the effect on the performance of the overall Austrian economy |
| | value unemplmt | Validation of the effect on the unemployment rate |
| | value living stand | Validation of the effect on the living standard of people with low income |
| | value elections | Validation of the effect on the gain or loss of votes of the governing party |
| Estimation of approval to the policy | belief citizens | Estimation of the approval rate of a fuel tax increase in the total population (in %) |
| | belief experts | Estimation of the approval rate of a fuel tax increase by transport experts (in %) |
| | belief journalists | Estimation of the approval rate of a fuel tax increase by journalists (in %) |
| | belief lobbyists | Estimation of the approval rate of a fuel tax increase by representatives of commerce (in %) |
| Transport policy | attitude at beginning | Judgement of the fuel tax increase at the beginning of the interview |
| | attitude aft effects | Judgement of the fuel tax increase after estimation and validation of the effects and occupation with the provided forecast values |
| | attitude aft opinion poll | Judgement of the fuel tax increase after estimation of approval rates of stakeholders and occupation with the provided data of an opinion poll |

Sample means of the variables used in SEM in different stakeholder groups

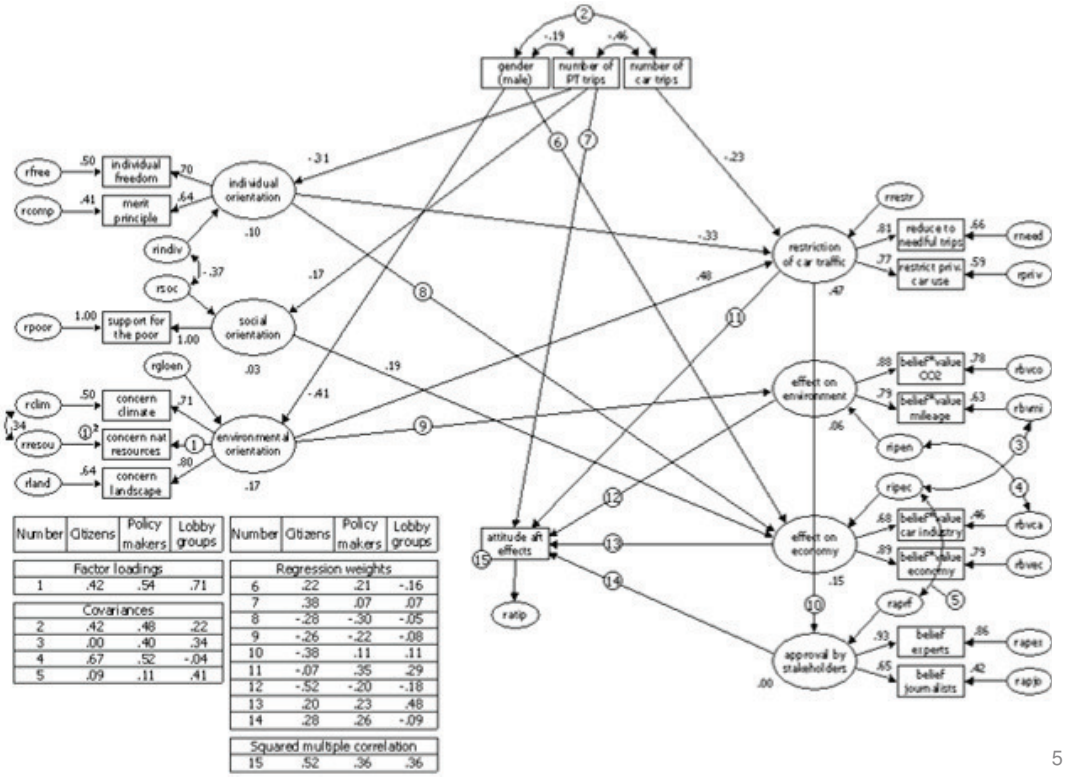
| Category | Label in SEM | Total | policy makers | citizens | representatives of... commerce | employees | car drivers | public transport |
|---|---|---|---|---|---|---|---|---|
| Sample size | | 229 | 116 | 62 | 20 | 11 | 12 | 8 |
| Objective situation | rep. of commerce (dmy.) | 0.09 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| | citizens (dummy) | 0.27 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | gender (dummy) | 0.73 | 0.77 | 0.55* | 0.94 | 0.82 | 0.83 | 0.88 |
| | number of PT trips (0-7) | 2.31 | 2.35 | 2.21 | 2.20 | 2.00 | 2.17 | 3.43 |
| | number of car trips (0-7) | 2.85 | 3.07 | 2.26 | 3.45 | 3.18 | 2.83 | 2.29 |
| Personal values | individual freedom | 64.10 | 58.28 | 74.52** | 79.00* | 43.64 | 61.67 | 62.50 |
| | merit principle | 77.77 | 77.48 | 79.35 | 86.00 | 63.64 | 78.33 | 67.50 |
| | support for the poor | 63.72 | 69.91 | 55.41* | 51.00 | 74.00 | 63.33 | 57.50 |
| | concern climate | 79.48 | 81.72 | 85.48 | 58.00** | 72.73 | 70.00 | 77.50 |
| | concern nat resources | 75.46 | 75.69 | 83.87 | 57.00* | 76.36 | 63.33 | 70.00 |
| | concern landscape | 78.08 | 77.24 | 86.45 | 65.00 | 78.18 | 71.67 | 67.50 |
| Transport policy aims | reduce to needful trips | 62.82 | 65.00 | 68.33 | 38.00** | 58.18 | 56.67 | 67.50 |
| | restrict private car use | 43.00 | 45.61 | 44.84 | 24.00 | 47.27 | 26.67 | 57.50 |
| Estimation of effects of the policy | belief milage (%) | -5.51 | -4.46 | -9.21 | -3.10 | -4.55 | -4.67 | -1.00 |
| | belief CO2 (%) | -7.98 | -7.54 | -10.20 | -6.50 | -8.45 | -4.58 | -5.00 |
| | belief accidents (%) | -5.52 | -6.03 | -5.34 | -4.74 | -4.73 | -4.83 | -4.00 |
| | belief car industry (%) | -3.67 | -2.36 | -6.95 | -2.50 | -5.00 | -5.36 | 4.13 |
| | belief economy (%) | 2.21 | 4.06 | -2.64** | 1.90 | 6.18 | 1.83 | 9.00 |
| | belief unemplmt (%) | -1.19 | -2.00 | 0.67 | -0.90 | -4.00 | -1.08 | -0.88 |
| | belief living stand (%) | -2.50 | -1.58 | -3.54 | -4.85 | -3.45 | -3.00 | 0.38 |
| | belief elections (%) | -9.07 | -7.32 | -10.39 | -13.26 | -9.73 | -12.83 | -6.63 |
| Validation of effects of the policy | value milage | 66.18 | 68.47 | 64.83 | 55.29 | 61.82 | 68.33 | 70.00 |
| | value CO2 | 78.62 | 80.73 | 80.00 | 69.41 | 78.18 | 68.33 | 75.00 |
| | value accidents | 81.31 | 84.77 | 78.97 | 78.82 | 78.18 | 71.67 | 74.29 |
| | value car industry | 53.64 | 54.16 | 52.20 | 61.11 | 47.27 | 49.09 | 55.00 |
| | value economy | 63.47 | 64.07 | 61.03 | 75.29 | 61.82 | 53.33 | 65.00 |
| | value unemplmt | 68.98 | 74.29 | 64.64 | 64.71 | 69.09 | 58.33 | 50.00 |
| | value living stand | 74.89 | 78.75 | 73.79 | 72.22 | 70.91 | 73.33 | 42.50** |
| | value elections | 47.27 | 56.88 | 36.30** | 30.00* | 48.00 | 45.00 | 27.50 |
| Estimation of approval to the policy | belief citizens (%) | 29.68 | 29.78 | 30.95 | 26.45 | 30.45 | 25.75 | 31.13 |
| | belief experts (%) | 50.96 | 53.01 | 50.31 | 41.35 | 51.00 | 44.33 | 60.25 |
| | belief journalists (%) | 40.47 | 42.00 | 38.29 | 42.10 | 40.20 | 33.83 | 41.50 |
| | belief lobbyists (%) | 25.82 | 25.05 | 31.71 | 13.15 | 22.36 | 25.67 | 27.88 |
| Transport policy | attitude at beginning | 59.39 | 67.93 | 40.32** | 66.32 | 63.64 | 55.00 | 67.50 |
| | attitude aft effects | 59.10 | 67.89 | 48.14** | 43.16* | 60.00 | 48.33 | 67.50 |
| | attitude aft opinion poll | 58.12 | 65.61 | 48.20** | 42.11* | 71.11 | 46.67 | 67.50 |

Complete model for the explanation of attitudes towards a fuel tax increase




| | | | |
|---|---|---|---|
| n | 227 | HFIVE | 216 |
| $\chi^2$ | 183.397 | RMSEA | 0.034 |
| df | 146 | PCLOSE | 0.971 |
| $\chi^2$/df | 1.256 | AIC def | 311.397 |
| P-value | 0.020 | AIC sat | 420.000 |
| GFI | 0.924 | AIC ind | 1,485.259 |

Model for the comparison of different stakeholders regarding the determining factors of the attitudes towards a fuel tax increase




| Number | Citizens | Policy makers | Lobby groups |
|---|---|---|---|
| Factor loadings | | | |
| 1 | .42 | .54 | .71 |
| Covariances | | | |
| 2 | .42 | .48 | .22 |
| 3 | .00 | .40 | .34 |
| 4 | .67 | .52 | -.04 |
| 5 | .09 | .11 | .41 |

| Number | Citizens | Policy makers | Lobby groups |
|---|---|---|---|
| Regression weights | | | |
| 6 | .22 | .21 | -.16 |
| 7 | .38 | .07 | .07 |
| 8 | -.28 | -.30 | -.05 |
| 9 | -.26 | -.22 | -.08 |
| 10 | -.38 | .11 | .11 |
| 11 | -.07 | .35 | .29 |
| 12 | -.52 | -.20 | -.18 |
| 13 | .20 | .23 | .48 |
| 14 | .28 | .26 | -.09 |
| Squared multiple correlation | | | |
| 15 | .52 | .36 | .36 |

5

# Quasi experimental study 1

**Theory-Driven Subgroup-Specific Evaluation of an Intervention to Reduce Private Car Use[1]**

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*Center for Survey Research and Methodology (ZUMA)*
*Mannheim, Germany*

http://eab.sagepub.com/content/38/6/820.abstract

# Study Design and Research a quasi experimental study

- In the context of a 2-wave panel study, we used Ajzen's (1991) theory of planned behavior (TPB) as the theoretical framework for deriving and systematically testing hypotheses as to how an intervention (a "free" ticket for public transportation) influences the travel mode choice of students.
- The empirical results show that this intervention caused a drastic decrease in students' car use. The effect of the intervention on behavior is mediated by the causal chain postulated by the TPB.
- In the second step, we analyzed whether there were subgroup-specific reactions to the intervention. Surprisingly, the subgroup analysis shows that students with more negative attitudes toward policy measures restricting car use reacted more strongly to the intervention than did students with a more positive attitude.

# The Introduced Intervention

- The intervention "semester ticket" consists of an innovative concept for financing the collective good "public transportation." It is based on the solidarity principle that all students must pay a contribution so that the individual burden is small.
- In exchange, the possession of a valid student identification card entitles all students to use public transportation "free of charge." In Giessen, the semester ticket entitles the students to use all means of public transportation (buses and trains) within a radius of approximately 50 km and it costs students an additional 38 DM (approximately $22) to their normal university fees for one semester.
- This represents a drastic price reduction because the normal bus user must pay the same amount of money for the ordinary monthly ticket valid for the community buses in Giessen alone. Furthermore, the semester ticket facilitates the use of public transportation because it is no longer necessary to purchase a bus ticket.

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# The Introduced Intervention

- Taken together, we hoped that the drastic price reduction and the simplification of public transportation use would create such a drastic situational change that habitual nonusers of public transportation would be motivated to reevaluate their behavioral choice.
- The semester ticket was introduced in May 1994. Prior to that, the student representatives had organized a vote in which the students themselves decided whether or not the semester ticket should be introduced. Among the participating students, 65% voted in favor of the semester ticket plan.



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# Action Intervention Hypotheses

- **Intervention Hypothesis 1.** The introduction of the semester ticket will increase the subjective probability with which students associate the behavioral belief "cheap" with the use of public transportation for university routes. We assume that the drastic price reduction caused by the semester ticket will motivate former non-bus-users to test public transportation.
- Through this test they acquire information about the bus system (e.g., timetable, bus routes, bus stops), which facilitates the use of public transportation. Thus, the second intervention hypothesis postulates the following:
- **Intervention Hypothesis 2.** The introduction of the semester ticket will increase the subjective probability with which students think that they possess knowledge about timetables or existing bus connections (control beliefs), which are necessary prerequisites for the use of public transportation for university routes.

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# Action Intervention Hypotheses

- **Intervention Hypothesis 3.** Because of the intensive public discussion and the subsequent vote about the introduction of the semester ticket, the perceived social expectations of significant others to use public transportation for university routes will increase following the introduction of the semester ticket.
- **Intervention Hypothesis 4.** The changes in the probabilities of these behavioral, normative, and control beliefs caused by the introduction of the semester ticket in their turn change the attitude, subjective norm, and PBC toward using public transportation for university routes in the same direction. Changes in attitude, subjective norm, and PBC should cause an increase in the actual use of public transportation for university routes via intention.



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# Participants

- The study was conducted as a longitudinal panel study. The data collection of the first panel wave took place during the second week of February 1994, before the introduction of the semester-ticket intervention.
- Over a period of 8 working days, a questionnaire was distributed to 3,491 randomly selected students. Of these 3,491 questionnaires, 1,874 (53.7%) were completed and returned. Participants in the first panel wave were 41.l% male and ranged in age from 20 to 37 years, with a mean age of 24.4 years.
- As 19,902 students (without the first semesters) were enrolled in the summer semester 1994, this corresponds to 9.4% of all registered university students. The second panel wave was conducted in the first week of February 1995, 10 months after the introduction of the semester ticket.
- Because of residential mobility and a change in the student registration system, only 1,316 students received the questionnaire a second time. The response rate in the second wave was 78.8%, resulting in a sample of 1,036 students.



Table 1

*Stability and Change of Travel-Mode Decisions Between 1994 and 1995*

| Travel mode 1995 | Travel mode 1994 | | | | 1995 |
|---|---|---|---|---|---|
| | CAR 1994 | BIKE 1994 | BUS 1994 | PEDE 1994 | |
| CAR 1995 | 167 | 23 | 8 | 6 | 204 (30.0%) |
| BIKE 1995 | 24 | 168 | 12 | 14 | 218 (32.1%) |
| BUS 1995 | 88 | 31 | 77 | 13 | 209 (30.8%) |
| PEDE 1995 | 17 | 14 | 7 | 10 | 48 (7.1%) |
| 1994 | 296 (43.6%) | 236 (34.8%) | 104 (15.3%) | 43 (6.3%) | 679 (100%) |

*Note.* $N = 679$. BUS = public transportation, PEDE = pedestrians.

Table 2

*Means and Standard Deviations of TPB Variables for Bus Use Before (1994) and After Introduction of the Semester Ticket (1995)*

| | 1994 before | | 1995 after | | *p*-value of no difference* |
|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | |
| Evaluation of behavioral beliefs | | | | | |
| Fast | 1.42 | 0.83 | 1.46 | 0.76 | n.s.** |
| Comfortable | 0.50 | 1.06 | 0.59 | 1.11 | .05 |
| Without stress | 0.95 | 1.00 | 1.03 | 0.96 | n.s. |
| Cheap | 1.42 | 0.86 | 1.47 | 0.84 | n.s. |
| Ecological | 1.26 | 1.14 | 1.22 | 1.08 | n.s. |
| Subjective probability of behavioral beliefs | | | | | |
| Fast | -1.19 | 1.01 | -1.07 | 1.05 | <.05 |
| Comfortable | -0.10 | 1.28 | -0.02 | 1.29 | n.s. |
| Without stress | -0.26 | 1.22 | -0.33 | 1.26 | n.s. |
| Cheap | -0.84 | 1.23 | 0.78 | 1.47 | <.01 |
| Ecological | 0.23 | 1.18 | 0.40 | 1.00 | <.01 |
| Evaluation of control beliefs | | | | | |
| Good bus connection | 0.05 | 1.54 | -0.66 | 1.42 | <.01 |
| Departure knowledge | -0.36 | 1.61 | 0.14 | 1.65 | <.01 |
| Subjective probability of control beliefs | | | | | |
| Good bus connection | 0.05 | 1.54 | -0.66 | 1.42 | <.01 |
| Departure knowledge | -0.36 | 1.61 | 0.14 | 1.65 | <.01 |
| Indicators of latent constructs: attitude, norm, perceived behavioral control (PBC), and intention | | | | | |
| Attitude 1 | -0.65 | 1.10 | -0.34 | 1.21 | <.01 |
| Attitude 2 | -0.73 | 1.06 | -0.51 | 1.12 | <.01 |
| Norm 1 | -0.67 | 1.18 | -0.39 | 1.27 | <.01 |
| Norm 2 | -0.87 | 1.13 | -0.76 | 1.20 | <.05 |
| PBC 1 | -0.49 | 1.49 | -0.16 | 1.61 | <.01 |
| PBC 2 | -0.39 | 1.57 | 0.10 | 1.63 | <.01 |
| Intention 1 | -1.39 | 1.14 | -0.97 | 1.46 | <.01 |
| Intention 2 | -1.38 | 1.15 | -0.89 | 1.49 | <.01 |

*Note.* The means are based on those subjects ($N = 622$) who participated in both waves and have no missing values in the variables. All response scales range from -2 to +2. The labels "Attitude 1," "Attitude 2," etc. refer to the two items measuring each TPB-construct (Appendix A).

*$p$ refers to the result of a $t$-test comparing the mean at wave 1 with that at wave 2.

**n.s. = not significant; $p > .05$.

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# Quasi experimental study 2

Generalization of the „Semesterticket“ effects to all German universities

## Semesterticket: Diffussion of an innovation

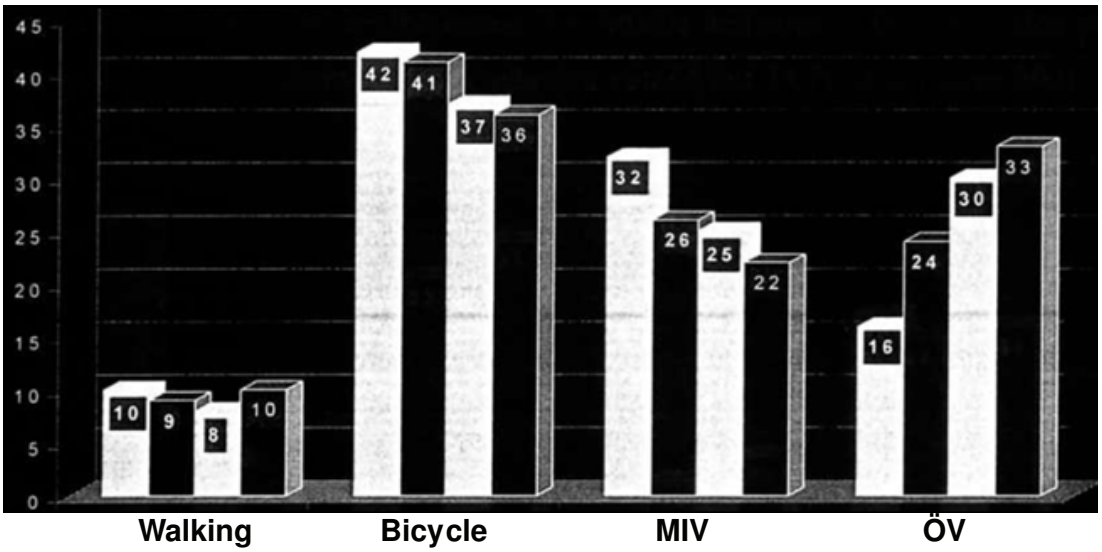
- The first Semesterticket was introduced at the Darmstadt University of Applied science in 1991 .
- Then followed the universities of Kaiserslautern and Gießen.
- Target group were all 1,9 Million german students.
- 2010 approx. 1.6 miliion students have a semester ticket.

# German Student Survey (Sozialerhebung)

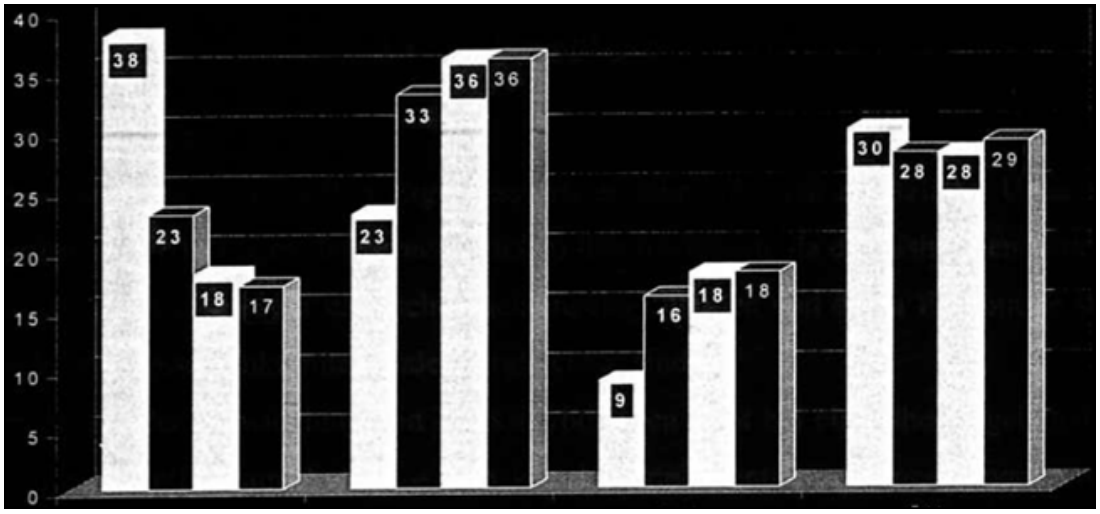
| Nr. | Year | Universities | Net sample | Respons Rate |
|---|---|---|---|---|
| 13 | 1991 | All Universities | 26.525 | 48% |
| 14 | 1994 | | 27.535 | 50% |
| 15 | 1997 | | 20.533 | 37% |
| 16 | 2000 | | 12.573 | 27% |



# Development of Travel Mode Choice in West-German Universitys 1991 - 2000

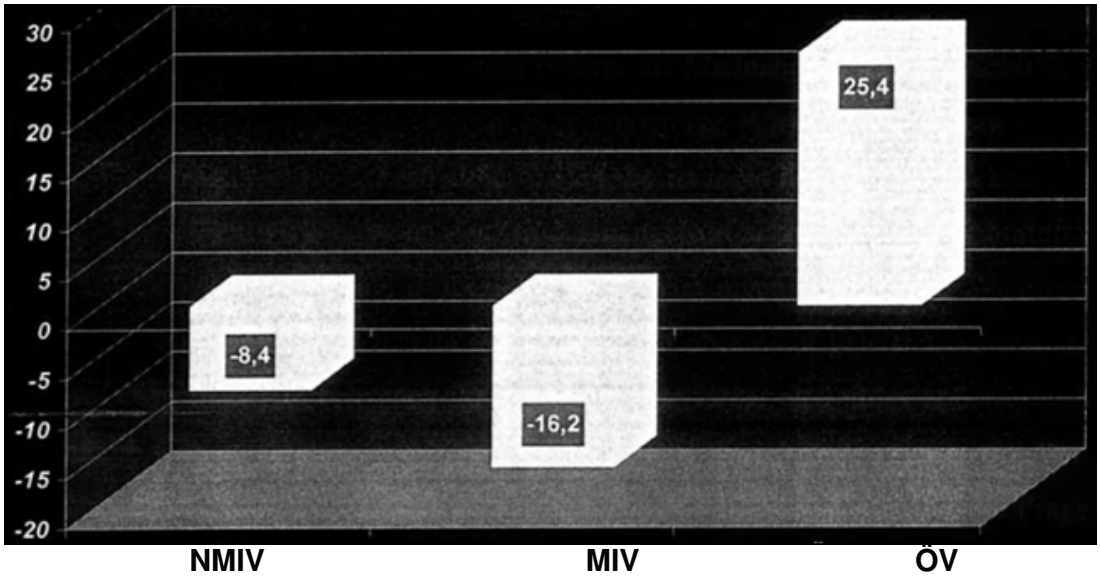


# Development of Travel Mode Choice in East-German Universitys 1991 - 2000




31

# Change of Model Split between 1991 and 2000 for Universities which introduced the component Semesterticket



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# Experimental study in Stuttgart

**Is a Residential Relocation a Good Opportunity to Change People's Travel Behavior? Results From a Theory-Driven Intervention Study**

Sebastian Bamberg

*Environment and Behavior* 2006 38: 820
DOI: 10.1177/0013916505285091



http://eab.sagepub.com/content/38/6/820.abstract

# Abstract

- This article presents an experimental, theory-driven evaluation of the effectiveness of an intervention that combines a free public transportation ticket and personal schedule information on the subsequent use of public transportation in an urban area.
- The time point when participants received this intervention is unusual. It was delivered to them shortly after a residential relocation. It is assumed that such a situation increases people's responsiveness to the intervention. At their new living place, the intervention group shows a strong increase in public transportation use.
- The intervention effect on the individual choice process is modeled via Ajzen's theory of planned behavior. Besides a main effect on intention, results indicate interactions between the intervention and the change intention existing prior to the move and higher objective public transport service quality after the move.

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# In the present study

- The systematic review of intervention outcomes is an important first step toward a more evidence-based judgment of what might work in motivating people to reduce their car use. But summarizing and comparing average intervention effects per se provides little insight into the conditions and mechanisms mediating these effects. Thus, the goal of the present study is not only to evaluate the effect of an intervention on people's car use but also to model and test the causally mediating mechanisms of this effect.
- In the present study, an intervention that combines a small material incentive (a 1-day free ticket for PT) with personally tailored PT services and schedule information is evaluated. An unusual point is the situation in which this intervention was delivered. It was given to a group of people about 6 weeks after their relocation to a new residence.



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# In the present study

- Such a move marks a deep biographical cut that forces people to deliberately reorganize their daily lives in general and their daily travel behavior. It is assumed that the first weeks after the move may create a sensitive phase when people are motivated to pay more attention to information about other mobility alternatives to the car and are more willing to actually test these alternatives.
- As a consequence, the intervention may be more effective in such a sensitive phase than in stable contexts.

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# Study design and participants

- The study was a randomized controlled trial designed to assess the efficacy of the intervention and involved the three stages of baseline measurement before the move, intervention implementation after the move, and measurement after the intervention. Participants who planned to move to Stuttgart within a 6-month period were recruited by post, e-mail, and telephone; addresses and numbers were obtained from rent advertisements appearing in Stuttgart newspapers.
- A lottery with attractive monetary prizes was used as an incentive to participate. To reduce self-selection and strategic reasoning, participants were not informed that they were participating in an experimental intervention study. Instead, the study was presented as a university research project aimed at analyzing the impact of a residential relocation on daily mobility patterns.



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# Study design and participants

- From the about 800 persons contacted in this way at their old residence prior to their move, 535 signaled interest in participating in the study and received the first questionnaire. Of these 535 persons, 241 actually completed the first questionnaire and sent it back to us.
- The mean age of these 241 participants was 28.6 years (ranging from 17-58 years), 53% were male, 41% reported that they had a university degree, 98% had a driving license, and 66% reported that they could always use a car.



# Study design and participants

- These 241 participants were randomly assigned to a control (*n = 123) and* experimental group (*n = 118). Six months after completing the first questionnaire,* 191 (99 in the control and 92 in the experimental group) of the 241 participants had actually moved to Stuttgart and were recontacted at their new residence.
- Those 92 participants assigned to the experimental group received the intervention via mail about 6 weeks after the move. As an additional measure to reduce the reactivity of our design, the intervention was sent to the participants by the local transport company, which did not make any reference to our research project. By this procedure, we tried to prevent people from associating the questionnaires with the received intervention. About 12 weeks after their move, all 191 participants received a second questionnaire via mail.

# Study design and participants

- Of these 191 participants, 169 completed the second questionnaire (90 in the control and 79 in the experimental group). To check whether a systematic self-selection process occurs between Wave 1 (*n = 241) and Wave 2 (n = 169), a logistic regression analysis was* conducted with participation in Wave 2 as the dependent variable. Entering sociodemographic variables, the TPB variables, and travel behavior measured at the old residence as predictors provide no empirical evidence for a systematic self-selection process.



**TABLE 1**
**Means and Standard Deviations of Travel Behavior, the Theory of Planned Behavior Variables, and Habits Before and After the Move**

| | *Before Move* | | *After Move* | |
|---|---|---|---|---|
| | M | SD | M | SD |
| Public transport (PT) use | 18.20 | 0.39 | 35.80*** | 0.48 |
| Car use | 51.50 | 0.50 | 39.40** | 0.49 |
| Bicycle riding | 11.50 | 0.32 | 7.30 | 0.26 |
| Walking | 15.80 | 0.37 | 17.50 | 0.38 |
| PT attitude | 2.25 | 2.36 | 3.34*** | 2.60 |
| PT subjective norm | 2.48 | 2.62 | 3.56*** | 2.85 |
| PT perceived behavioral control (PBC) | 2.22 | 2.63 | 3.65*** | 2.96 |
| PT intention | 2.43 | 3.52 | 3.89*** | 3.86 |
| Car attitude | 5.11 | 3.11 | 4.60* | 2.90 |
| Car subjective norm | 4.65 | 3.33 | 4.02* | 3.17 |
| Car PBC | 5.28 | 3.40 | 4.58* | 3.39 |
| Car intention | 4.74 | 4.11 | 4.02* | 3.97 |
| Car availability | 7.34 | 4.13 | 6.73* | 4.36 |
| PT habit | 0.64 | 1.13 | 0.90* | 1.49 |
| Car habit | 2.70 | 2.30 | 2.07*** | 2.06 |

NOTE: Significance of before or after move differences were tested by dependent *t* tests.
*$p < .05$. **$p < .01$. ***$p < .001$.

**TABLE 2**
**Means and Standard Deviations of Behavior, the Theory of Planned Behavior Constructs, and Contextual Factors Before and After the Move for Control Group and Experimental Group Separately**

| | *Before Move* | | | | *After Move* | | | | *Before-After Comparison* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Control Group*[a] | | *Experimental Group*[b] | | *Control Group*[a] | | *Experimental Group*[b] | | *Control Group*[a] | *Experimental Group*[b] |
| *Variable* | M | SD | M | SD | M | SD | M | SD | p | p |
| Public transport (PT) use | 0.18 | 0.39 | 0.18 | 0.39 | 0.25 | 0.44 | 0.47** | 0.50 | | *** |
| Car use | 0.55 | 0.50 | 0.50 | 0.50 | 0.45 | 0.50 | 0.33 | 0.47 | | * |
| PT intention | 2.56 | 3.46 | 2.28 | 3.62 | 3.17 | 3.45 | 4.70** | 4.14 | | *** |
| PT attitude | 2.35 | 2.30 | 2.15 | 2.43 | 3.01 | 2.33 | 3.71 | 2.84 | * | *** |
| PT subjective norm | 2.74 | 2.53 | 2.18 | 2.70 | 3.42 | 2.69 | 3.71 | 3.02 | * | *** |
| PT perceived behavioral control (PBC) | 2.47 | 2.69 | 1.95 | 2.56 | 3.22 | 2.66 | 4.13* | 3.20 | * | *** |
| Car intention | 4.76 | 4.05 | 4.71 | 4.20 | 4.45 | 4.00 | 3.54 | 3.91 | | * |
| Car attitude | 4.84 | 3.10 | 5.40 | 3.12 | 4.80 | 2.89 | 4.36 | 2.90 | | * |
| Car subjective norm | 4.30 | 3.15 | 5.05 | 3.51 | 4.01 | 3.08 | 4.04 | 3.28 | | * |
| Car PBC | 5.15 | 3.25 | 5.42 | 3.57 | 4.71 | 3.41 | 4.44 | 3.37 | | * |
| PT habit strength | 0.57 | 1.18 | 0.72 | 1.08 | 0.68 | 1.24 | 1.15* | 1.70 | | * |
| Car habit strength | 2.79 | 2.31 | 2.69 | 2.29 | 2.10 | 2.05 | 2.03 | 2.09 | ** | * |
| Car availability | 7.25 | 4.12 | 7.44 | 4.17 | 6.94 | 4.31 | 6.49 | 4.44 | | * |
| Change motivation | 0.85 | 1.26 | 0.88 | 1.26 | — | — | — | — | | |
| Old residence size | 243.60 | 296.60 | 208.10 | 456.80 | — | — | — | — | | |
| PT quality new residence | — | — | — | — | 31.30 | 47.80 | 44.50 | 45.60 | | |

a. $n = 90$.
b. $n = 79$.
*$p < .05$. **$p < .01$. ***$p < .001$.

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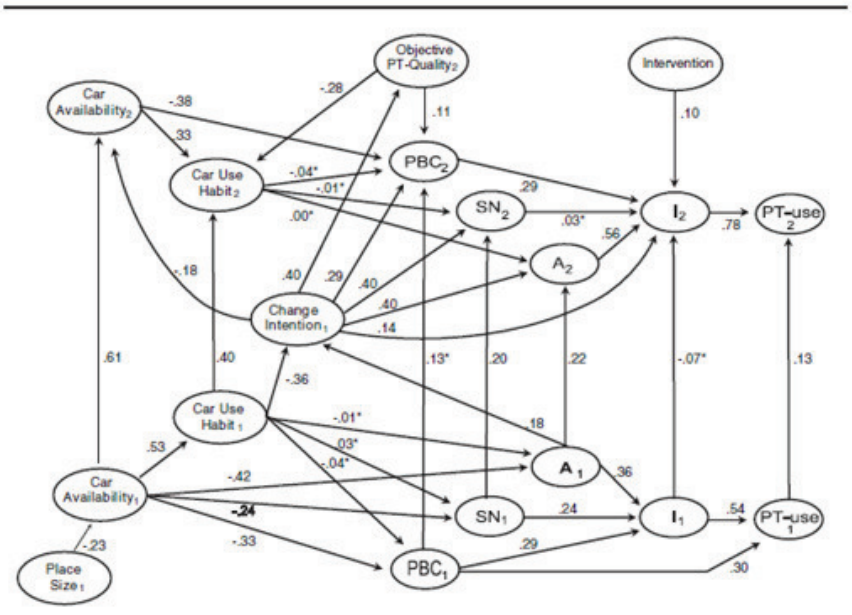


**Figure 1: Graphical Presentation of the Estimated Structural Model**
NOTE: A = attitude toward Public transport (PT) use; SN = subjective norm toward PT use; PBC = perceived behavioral control over PT use; I = intention to use PT. The subscripts 1 and 2 refer to Wave 1 (before) and Wave 2 (after the move). Completely standardized coefficients are reported.
*Not significant at $p < .05$.



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# Limitations of the study

- This reasoning directly leads to one weakness of the present study. It allows only an indirect analysis of the impact of a residential relocation. Comparing the intervention effects in a sample of people moving to Stuttgart with a sample of people already living in Stuttgart would allow a more direct test of the sensitive phase hypothesis.
- A lack of later follow-up measurements of participants'travel behaviors is another weakness. I am a little skeptical about how sustainable the drastic behavioral change was and expect that a later measurement would have shown a reincrease in car use. But as is often the case in evaluation research, time and money constraints have impaired the use of a more adequate research design.

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# Meta analytic structure equation modeling (MASEM) for theory

# Meta-Analysis of the Theory of Planned Behavior

based on: S. Timptner: A Metaanalytic Structural Equation Approach for the TOPB: Testing for Moderator Effects.

# Steps of Meta-Analysis

- *Integration of single findings*
  - Single findings has to be transformed in standardized effect sizes
  - Computing mean effect sizes
- *Examining the variance*
  - Testing for homogeneity
  - Empirical examination of moderator effects

# Test of homogeneity

- The homogeneity test Q examines the assumption that all effect sizes are estimating the same population value.
- *Homogenous distribution*: Effect sizes differ from population mean only by sampling error.
- *Heterogeneous distribution:* Effect sizes does not estimate a common population mean.

(Lipsey & Wilson, 2001)

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# Moderator analysis

- Exploring sources of heterogeneity
- Examining effect sizes concerning different study characteristics:
  - Methodological moderators
  - Conceptual moderators
- Statistical control
- Subgroup analysis



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# Hypothesis

- *H1:* The strength of the relationships between the TpB-constructs depends on the kind of behavior.
- *H2:* The correction for attenuation leads to higher correlations between the TpB-constructs.
- *H3:* The correlations between intention and behavior are higher when the behavior is measured by self-report, and lower when the behavior is measured by observation.

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# Hypothesis

- *H4:* The correlations between intention and behavior are higher when the behavior is measured at the same time as the other TpB- constructs, and lower when the behavior is measured at a later time.
- *H5:* The correlations between the TpB-constructs are higher when the principle of compatibility is adhered to and lower if it's not.



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# Selection of relevant studies

- Literature research result: 651 references dealing with the TpB.
- 369 studies could be obtained online and for free over the OPAC of the University of Gießen.
- From these, correlations for 350 behaviors could be found.
- Because coding and a second data check is very time consuming, this meta-analysis is based on 132 studies, published from 1986 – 2007.

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# Meta-analytic structural equation modeling (MASEM)

- Testing the causal relationships in the comprehensive TpB-Model.
- Does the theoretical model fit to the data?
- Calculating a MASEM-Model for each subgroup by using AMOS, based on the mean effect sizes.
- Comparing the model fits, standardized path coefficients and explained variances for detecting moderator effects.



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# Mean effect sizes: All studies included

| | Observed mean effect sizes | Mean effect sizes corrected for attenuation | N effect sizes | N sample sizes |
|---|---|---|---|---|
| Attitude - S.Norm | 0,39 | 0,56 | 102 | 23140 |
| Attitude - Control | 0,33 | 0,51 | 109 | 23785 |
| Attitude - Intention | 0,55 | 0,70 | 121 | 25375 |
| Attitude - Behavior | 0,37 | 0,44 | 83 | 16764 |
| S.Norm - Control | 0,23 | 0,32 | 103 | 23007 |
| S.Norm - Intention | 0,42 | 0,57 | 112 | 23852 |
| S.Norm - Behavior | 0,29 | 0,36 | 77 | 15627 |
| Control - Intention | 0,45 | 0,65 | 119 | 24650 |
| Control - Behavior | 0,29 | 0,39 | 84 | 16589 |
| Intention - Behavior | 0,55 | 0,64 | 83 | 16136 |

All effect sizes significantly different from zero ($p = 0,00$)
All Q-statistics significant ($p = 0,00$)

55

# Mean effect sizes: Environmental behavior

| | Observed mean effect sizes | Mean effect sizes corrected for attenuation | N effect sizes | N sample sizes |
|---|---|---|---|---|
| Attitude - S.Norm | 0,23 | 0,42 | 6 | 1212 |
| Attitude - Control | 0,35 | 0,90 | 6 | 1212 |
| Attitude - Intention | 0,52 | 0,95 | 5 | 1148 |
| Attitude - Behavior | 0,49 | 0,80 | 3 | 750 |
| S.Norm - Control | 0,16 | 0,30 | 6 | 1212 |
| S.Norm - Intention | 0,27 | 0,43 | 5 | 1148 |
| S.Norm - Behavior | 0,23 | 0,34 | 4 | 814 |
| Control - Intention | 0,45 | 0,90 | 5 | 1148 |
| Control - Behavior | 0,41 | 0,72 | 4 | 814 |
| Intention - Behavior | 0,57 | 0,75 | 3 | 750 |

All effect sizes significantly different from zero ($p = 0,00$)
All Q-statistics significant ($p < 0,05$)



56

# Mean effect sizes: Traffic behavior

| | Observed mean effect sizes | Mean effect sizes corrected for attenuation | N effect sizes | N sample sizes |
|---|---|---|---|---|
| Attitude - S.Norm | 0,67 | 0,93 | 8 | 2413 |
| Attitude - Control | 0,59 | 0,82 | 8 | 2413 |
| Attitude - Intention | 0,70 | 0,90 | 8 | 2413 |
| Attitude - Behavior | 0,54 | 0,66 | 8 | 2413 |
| S.Norm - Control | 0,53 | 0,68 | 8 | 2413 |
| S.Norm - Intention | 0,69 | 0,91 | 8 | 2413 |
| S.Norm - Behavior | 0,54 | 0,66 | 8 | 2413 |
| Control - Intention | 0,67 | 0,88 | 8 | 2413 |
| Control - Behavior | 0,56 | 0,76 | 8 | 2413 |
| Intention - Behavior | 0,78 | 0,93 | 8 | 2413 |

All effect sizes significantly different from zero ($p = 0,00$)
All Q-statistics significant ($p < 0,05$)

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# Mean effect sizes: Self-reported behavior vs. observed behavior

| | Mean effect sizes | N effect sizes | N sample sizes |
|---|---|---|---|
| Intention - Self-reported behavior | 0,58 | 69 | 14168 |
| Intention - Observed behavior | 0,36* | 14 | 1968 |

Alle Effektstärken sind mit $p = 0,00$ signifikant von null verschieden
* Homogenitätstest mit $p = 0,24$ signifikant



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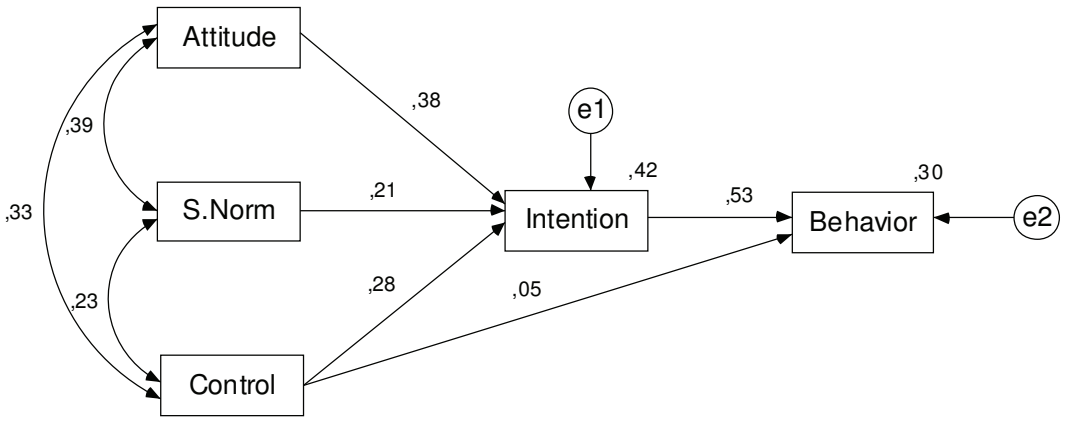
## Mean effect sizes: Behavior measurement at a later time vs. behavior measurement at the same time

| | Mean effect sizes | N effect sizes | N sample sizes |
|---|---|---|---|
| Intention - Behavior measurement at a later time | 0,52 | 52 | 8345 |
| Intention - Behavior measurement at the same time | 0,59 | 31 | 7791 |

Alle Effektstärken sind mit p = 0,00 signifikant von null verschieden
Alle Homogenitätstest mit p = 0,00 signifikant

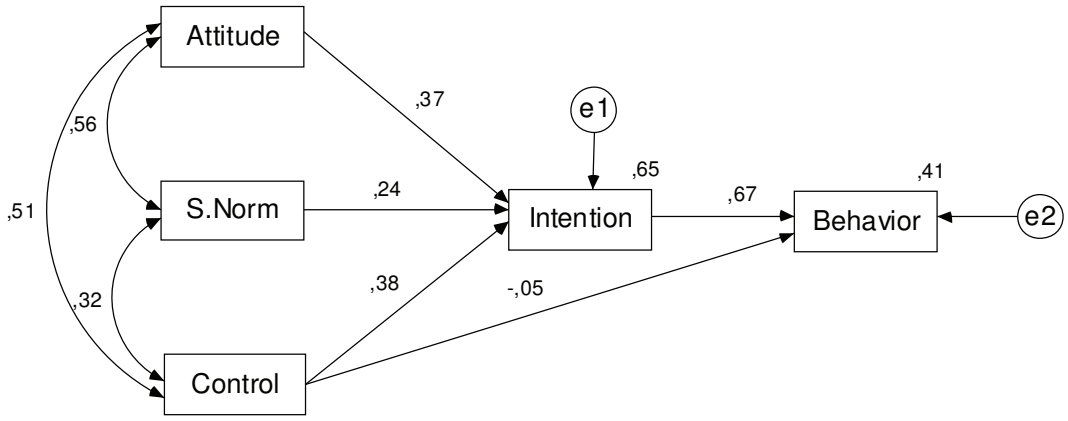


# MASEM




Model 1 - MASEM all studies included, without correction for attenuation
(N = 20140)
CFI = ,990
87

# MASEM




Model 2 - MASEM all studies included, with correction for attenuation
(N = 20140)
CFI = 1,000

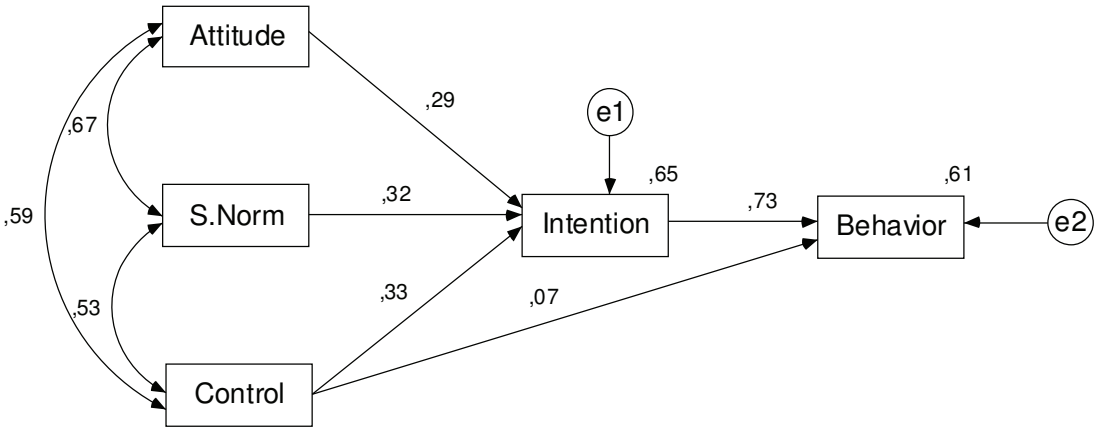


# Mean effect sizes: Traffic behavior

| | Observed mean effect sizes | Mean effect sizes corrected for attenuation | N effect sizes | N sample sizes |
|---|---|---|---|---|
| Attitude - S.Norm | 0,67 | 0,93 | 8 | 2413 |
| Attitude - Control | 0,59 | 0,82 | 8 | 2413 |
| Attitude - Intention | 0,70 | 0,90 | 8 | 2413 |
| Attitude - Behavior | 0,54 | 0,66 | 8 | 2413 |
| S.Norm - Control | 0,53 | 0,68 | 8 | 2413 |
| S.Norm - Intention | 0,69 | 0,91 | 8 | 2413 |
| S.Norm - Behavior | 0,54 | 0,66 | 8 | 2413 |
| Control - Intention | 0,67 | 0,88 | 8 | 2413 |
| Control - Behavior | 0,56 | 0,76 | 8 | 2413 |
| Intention - Behavior | 0,78 | 0,93 | 8 | 2413 |

All effect sizes significantly different from zero (p = 0,00)
All Q-statistics significant (p < 0,05)

# MASEM




Model 11 - MASEM Traffic Behavior
(N = 2413)
CFI = 1,000

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# Meta analytic structure equation modeling (MASEM) for theory and intervention

**Behaviour Theory and Soft Transport Policy Measures**

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**Satoshi Fujii**
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**Margareta Friman**
Karlstad University, Sweden

**Tommy Gärling**
Karlstad University and University of Gothenburg, Göteborg, Sweden



# Abstract

- The aim is to propose a theoretical grounding of soft transport policy measures to promote voluntary reduction of car use. A general conceptual framework is first presented to clarify how hard and soft transport policy measures impact on car-use reduction.
- Two different behavioural theories that have been used to account for car use and car-use reduction are then integrated in a self-regulation theory that identifies four stages of the process of voluntarily changing car use: setting a car-use reduction goal, forming a plan for achieving the goal, initiating and executing the plan, and evaluating the outcome of the plan execution.
- A number of techniques are described that facilitate the different stages of the process of voluntary car-use reduction and which should be used in personalized travel planning programs.

# Evidence for the effectiveness of soft transport policy measures

- Several narrative reviews (Brög et al., 2009; Cairns et al., 2008; Richter et al., 2010a; Taylor, 2007) have concluded that soft transport policy measures are effective. Two meta-analyses (a technique that provides quantitative estimates of treatment effects, see e.g. Lipsey & Wilson, 2001) of previous research results have also been conducted. In one of these meta-analysis Möser and Bamberg (2008) synthesised the results of 141 studies evaluating the car-use reduction effects of workplace travel plans (44 studies), school travel plans (25 studies), and travel awareness campaigns/marketing of public transport (72 studies).
- Across all 141 studies a significant standardised mean effect size of 0.15 (Cohen's *h*) was found, corresponding to a 11% decrease of the proportion of trips conducted by car (from 61% to 54%). However, all studies used a quasi-experimental single treatment group before-after test design that fails to control for several factors that reduce the internal validity of causal inferences (Fujii et al., 2009; Stopher et al., 2009). Furthermore, external validity or generalizability of the results is threatened by the fact that most of the synthesised evaluation results were based on non-representative samples.



# Evidence for the effectiveness of soft transport policy measures

- In the second meta-analysis Fujii et al. (2009) used data from evaluation studies of 15 Japanese PTP programs (referred to as "travel feedback programs"). The methodological quality of these studies is higher because they incorporated comparison or control groups in a before-after test design, which increases internal validity. A standardised mean effect size of 0.17 (Cohen's *d*) was calculated. This corresponds to a decrease in the average number of weekly car trips from 6.9 to 5.7.
- However, the total number of studies was small and most of them were based on small non-representative samples. Furthermore, at least some of the studies seem to have used non-equivalent treatment and comparison groups, thus making it difficult to rule out alternative explanations for the reported before-after test differences.
- One recognized research priority is longitudinal panel studies that examine the time course of changes in travel.

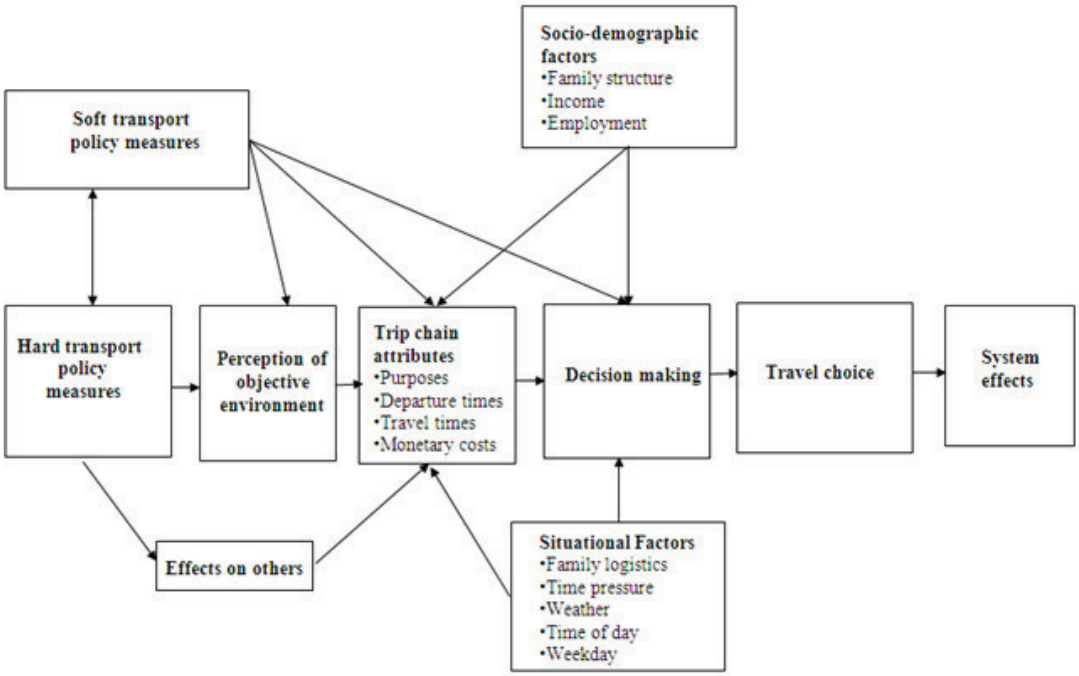
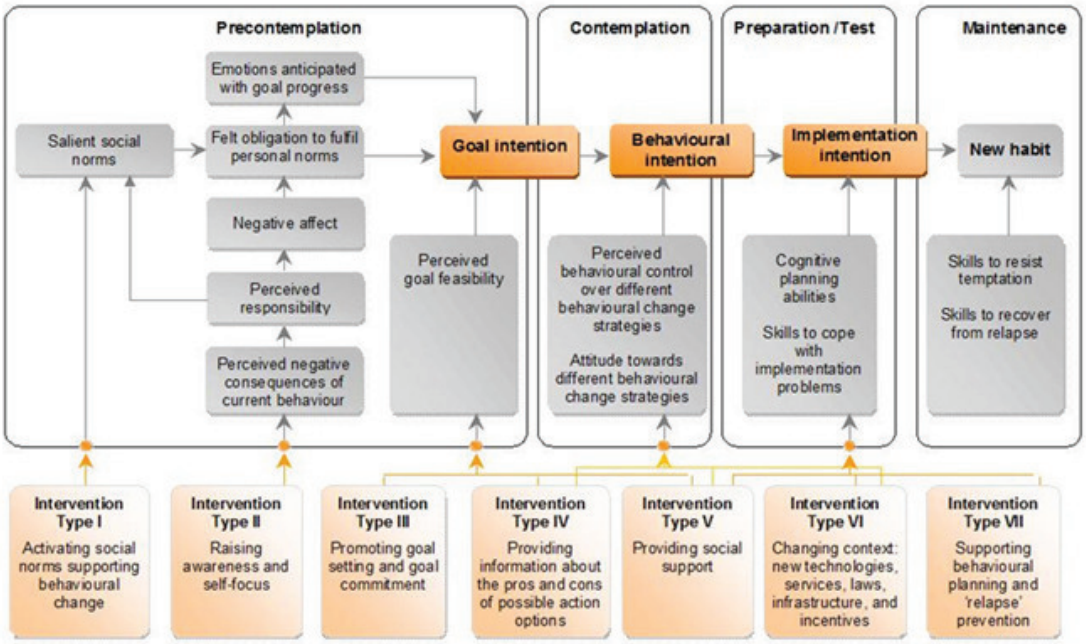



Fig. 1. A general conceptual framework





# What is needed

1. Explicit theoretical approaches like the TOPB instead of Black Box evaluations.
2. longitudinal intervention studies with strong quasiexperimental or if possible experimental designs to test the most promising policy measures.
3. Generalized latent variable models like implemented in MPLUS software to take into account random measurement error, nonrandom measurment error,different scale levels, indirect and total effects, mediated and moderated effects, contextual effects and taking into account heterogeneity of Samples.
4. Metaanalyses for summarising the theoretical knowledge and interventuion results using structural equation modeling for developing adequate policy measures and integrating the knowledge.

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# MOTIVATION TOWARDS BLOOD DONATION BASED ON THE THEORY OF PLANNED BEHAVIOUR

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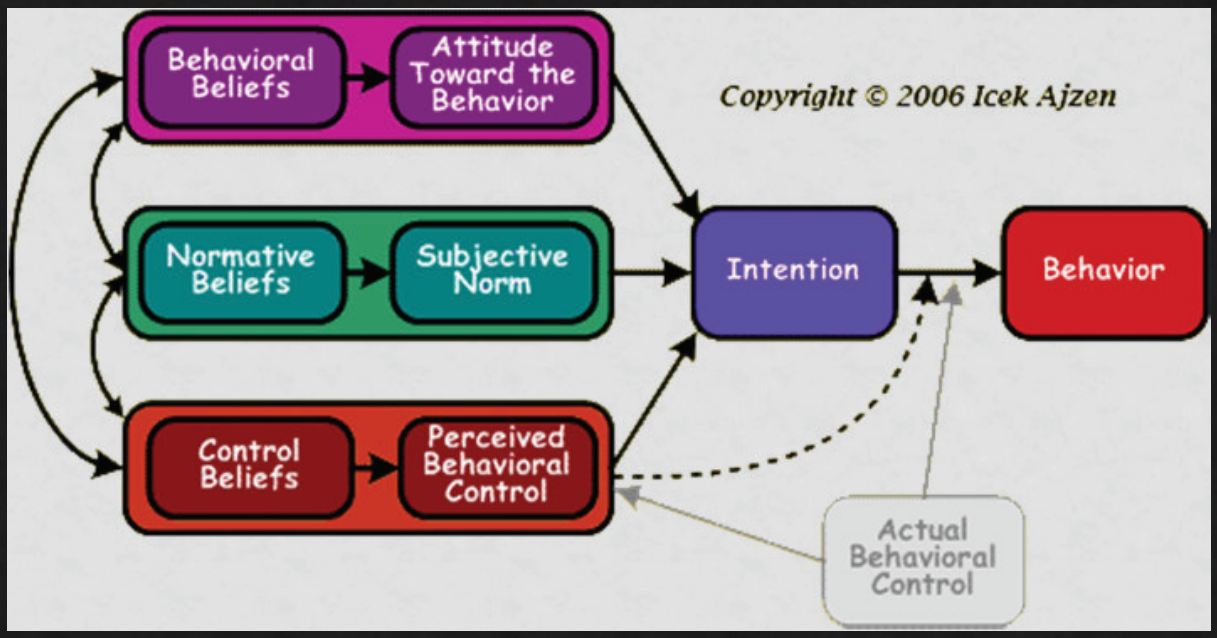
INSTITUTE OF APPLIED PSYCHOLOGY

PRAHA 24.9.2010

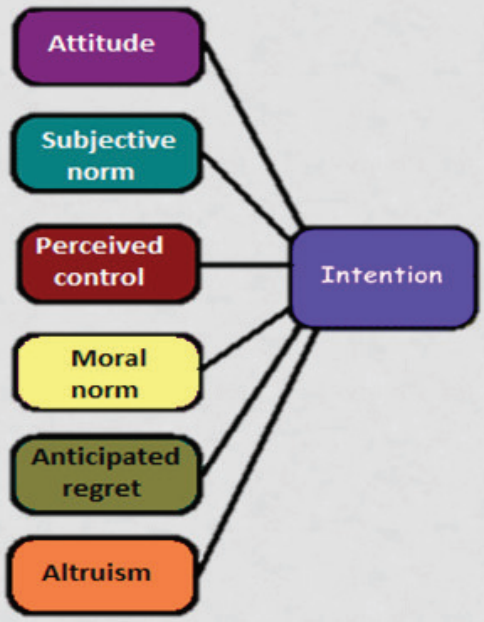
# INTRODUCTION

- Research target
  - To compare factors of motivation between regular donors, first-time donors and nondonors
  - To examine for relation between intention to blood donation and altruism
- Theory of planned behaviour (Fishbein & Ajzen, 1975)
  - Effectivity of TPB model in blood donation (Masser et al., 2008)
    - Intention: 31 – 72%
    - Behaviour: 54 – 56%
- Altruism




**Theory of planned behaviour**

(http://www.unix.oit.umass.edu/~aizen/index.html)




**Adapted model of Theory of planned behaviour**

# ALTRUISM

- Blood donation is "perhaps the purest example of altruistic behaviour" (Elster in Healy, 2000, p.1633)
- Considering nondonors to be less altruistic then others is very easygoing (Healy, 2000)
- Sojka (2007); Glynn et al. (2002)
  - Regular donors – altruistic motives
  - First-time donors – support from their family, friends, colleagues
- TPB & altruism (Lemmens et al., 2009)
  - Altruism was related with moral norm and anticipated affect
  - No prediction of intention

# EXPERIMENTAL QUESTIONS AND HYPOTHESIS

- 1. area of hypothesis & experimental questions
  - Predictions about differences among participants in achieved levels of TPB variables
- 2. area of hypothesis
  - Relations between TPB variables and intention among participants
- 3. area of hypothesis
  - Predictive power of TPB model
- 4. area of experimental questions
  - Differences among participants in achieved levels in altruism and its relations to TPB variables

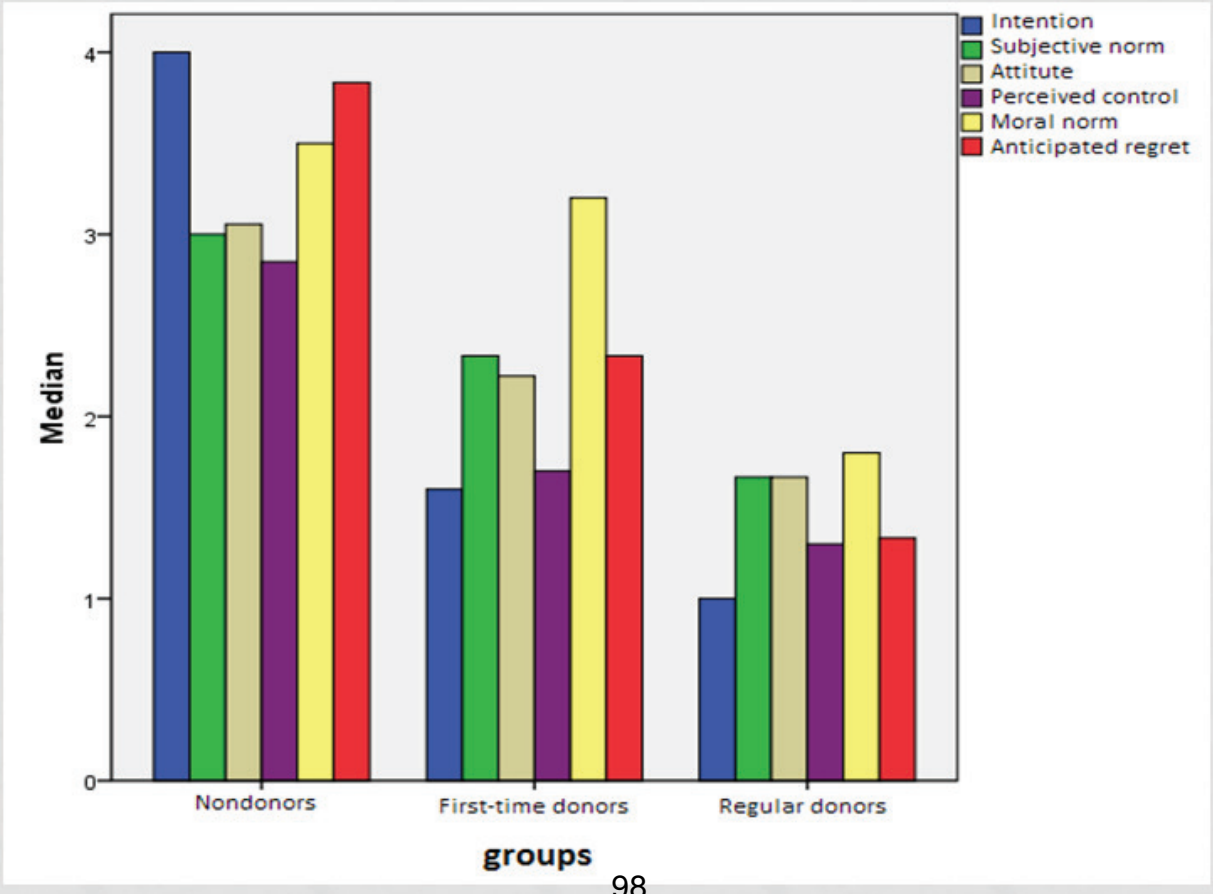
# METHOD

- Population
  - 48 regular donors – 31,85 year, 32 men, 16 women
  - 30 first-time donors – 20,43 years, 15 men, 15 women
  - 45 nondonors – 27,55 years, 11 men, 34 women
- Sample selection
- Methodics a technics
  - Structured questionnaire – 4 partial questionnaires
    - Socio-demographical – also donor status
    - Questionnaire based on TPB
    - Helping attitude scale (Nickell, 1998)
    - Prosocial personality battery (Penner, Fritszche, Craiger & Freifeld,1995).
    - 7-point & 5-point Likert scales

- Pilot study
- Variables
  - **Dependent** – intention, attitude, subjective norm, perceived control of behaviour, moral norm, anticipated reget, altruism
  - **Independent** – donation status
- Experimental plan
  - Basic, authentication, comparator & correlated
- Procedure of data collection
- Procedure of data analysis

# RESULTS

- 1.area of hypothesis – medians, comparison
- 2.area of hypothesis
  - Nondonors – subjective norm the most ($r_s$=0,552)
  - First-time & regular donors – intention constant on one level (regular donors: PCB & intention $r_s$=0,419)
- 3.area of hypothesis
  - Predictors of intention
    - Whole population: PCB 45,9%, MN 10,6%, AR 4,9%; together **61,4%**
    - Nondonors: PCB 29,3%, MN 20,8%, SN 8,8%; together **58,8%**
    - Regular donors: AR **11,9%**
    - First-time donors: **no** predictors
- 4. area of experimental questions




Graph 1.: Comparison of medians between groups by bar graph

## 1. area of hypothesis – comparison of medians

| | | | | | |
|---|---|---|---|---|---|
| intention | First-time donors | Nondonors | per.control | First-time donors | Nondonors |
| Regular | U=459,50;p=0,006 | U=44,50;p<0,001 | Regular | U=630,50;p=0,294 | U=360,00;p<0,001 |
| donors | $r_m$=0,289 | $r_m$=0,890 | donors | $r_m$=0,063 | $r_m$=0,565 |
| First-time | | U=84,50;p<0,001 | First-time | | U=213,50;p<0,001 |
| donors | | $r_m$=0,738 | donors | | $r_m$=0,565 |
| | K-W(2)=76,933; p<0,001 | **PARTLY CONFIRMED** | | K-W(2)=36,055; p<0,001 | **PARTLY CONFIRMED** |
| attitude | First-time donors | Nondonors | moral n. | First-time donors | Nondonors |
| Regular | U=483,00;p=0,047 | U=323,00;p<0,001 | Regular | U=265,50;p<0,001 | U=357,50;p<0,001 |
| donors | $r_m$=0,198 | $r_m$=0,584 | donors | $r_m$=0,508 | $r_m$=0,580 |
| First-time | | U=318,00;p=0,001 | First-time | | U=588,00;p=0,633 |
| | | $r_m$=0,409 | donors | | $r_m$=0,056 |
| | K-W(2)=31,990; p<0,001 | **UNCONFIRMED** | | K-W(2)=36,168; p<0,001 | **CONFIRMED** |
| subj. n. | First-time donors | Nondonors | ant.regret | First-time donors | Nondonors |
| Regular | U=390,00;p=0,001 | U=510,50;p<0,001 | Regular | U=525,00;p=0,270 | U=434,50;p<0,001 |
| donors | $r_m$=0,198 | $r_m$=0,439 | donors | $r_m$=0,221 | $r_m$=0,515 |
| First-time | | U=527,50;p=0,155 | First-time | | U=402,00;p=0,001 |
| donors | | $r_m$=0,122 | donors | | $r_m$=0,345 |
| | K-W(2)=19,402; p<0,001 | **UNCONFIRMED** | | K-W(2)=25,953; p<0,001 | **UNCONFIRMED** |

## 4. okruh hypotéz – úrovne altruizmu a jeho súvislosti

Report

| groups | | HAS altruism | Social responsibility | PPB altruism | Empathy |
|---|---|---|---|---|---|
| Nondonors | N | 44 | 45 | 42 | 45 |
| | Median | 33,50 | 14,00 | 37,00 | 12,00 |
| First-time donors | N | 30 | 30 | 28 | 30 |
| | Median | 30,00 | 15,00 | 37,00 | 12,00 |
| Regular donors | N | 47 | 45 | 45 | 48 |
| | Median | 29,00 | 14,00 | 37,00 | 11,00 |
| Total | N | 121 | 120 | 115 | 123 |
| | Median | 30,00 | 14,00 | 37,00 | 12,00 |

HAS altruism
RD – N: U=788,00; p=0,023, $r_m$=0,315
FTD – N: U=470,00; p=0,036, $r_m$=0,245

Empathy
RD – N: U=788,00; p=0,023, $r_m$=0,236

**Correlations**

- Nondonors:

Intention ↔ HAS altruism $r_s$=0,419
Attitude ↔ HAS altruism $r_s$=0,331
Attitude ↔ Soc. respons. $r_s$=0,330
Attitude ↔ PPB altruism $r_s$=0,402
Subj. norm ↔ Soc. respons. $r_s$=0,406
Ant. regret ↔ PPB altruizmus $r_s$=0,390

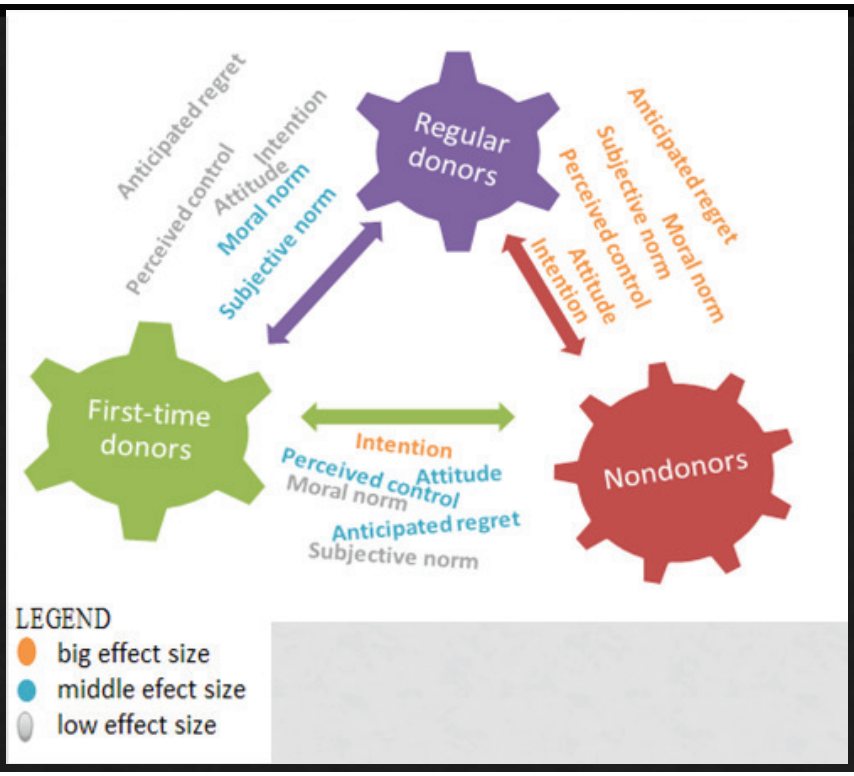
- Prvodarcovia:

Attitude ↔ HAS altruism $r_s$=0,596
Attitude ↔ PPB altruism $r_s$=0,459
PCB ↔ HAS altruism $r_s$=0,483
Ant. regret ↔ HAS altruism $r_s$=0,545
Ant. regret ↔ Soc. respons. $r_s$=0,524
Ant. regret ↔ Empathy $r_s$=0,436

- Viacnásobní darcovia

Attitude ↔ Soc. respons. $r_s$=0,368
Attitude ↔ PPB altruism $r_s$=0,335
Subj. norm ↔ HAS altruism $r_s$=0,376
Mor. norm ↔ HAS altruism $r_s$=0,487
Ant. regret ↔ HAS altruism $r_s$=0,415
Ant. regret ↔ Empathy $r_s$=0,358
Ant. regret ↔ PPB altruism $r_s$=0,352

# DISCUSSION




# DISCUSSION

- Altruism
  - Statistical significant difference in HAS altruism
  - Relation with intention – only nondonors
  - First-time donors – relation with attitude and anticipated regret
  - Regular donors – relation with moral norm
  - No difference in achieved levels – Healy (2000), McVittie(2006)
  - Social desirability
- Consequences for praxis
  - Confirming the TPB model
  - Recruitment of new donors – increasing perceived control of behaviour
- Limitations
  - No selection by randomization
  - Combination of sample selection
  - No standardized questionnaire + items order & Likert scale
- Recommendations

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## THANK YOU FOR YOUR ATTENTION!

NOW, YOU CAN ASK YOUR QUESTIONS...

# Determinants of organic food consumption

Iva Zvěřinová
*Charles University Environment Center*

Seminar on Theory of Planned Behavior: Recent Developments and Applications on Pro-environmental Behavior
Prague, 24th September 2010

## Objectives

- analyze empirically determinants of organic food consumption
- test empirically the strength of relationships based on proposed conceptual model
- The conceptual model is the extension of the Theory of planned behaviour (TPB)
- support further development of TPB

## Structure of the presentation

- Overview of modifications and extensions of the TPB
- The conceptual model (hypotheses)
- Data collection
- Results
- Conclusion
- Discussion

## Overview of modifications and extensions of the TPB

1) *Significant causal path from subjective norms to attitudes*
2) *Self-efficacy, or perceived difficulty instead perceived control*
3) *Self-predictions, or desire instead intention*
4) *The addition of belief salience measures*

## Overview of modifications and extensions of the TPB

*The inclusion of …*

- *'personal norms'*
- *'descriptive norms'*
- *moral norms*
- *self-identity*
- *affect*
- *egoistic, altruistic and biospheric concerns*
- *environmental concern*

## Overview of modifications and extensions of the TPB

*The inclusion of …*

- *past behavior and habit*
- *moderator variables*
- *risk perception*
- *TRA/TPB as part of The Motivation-Opportunity-Ability Model*

## Risk perception

- Two-component model (Cunningham, 1967)

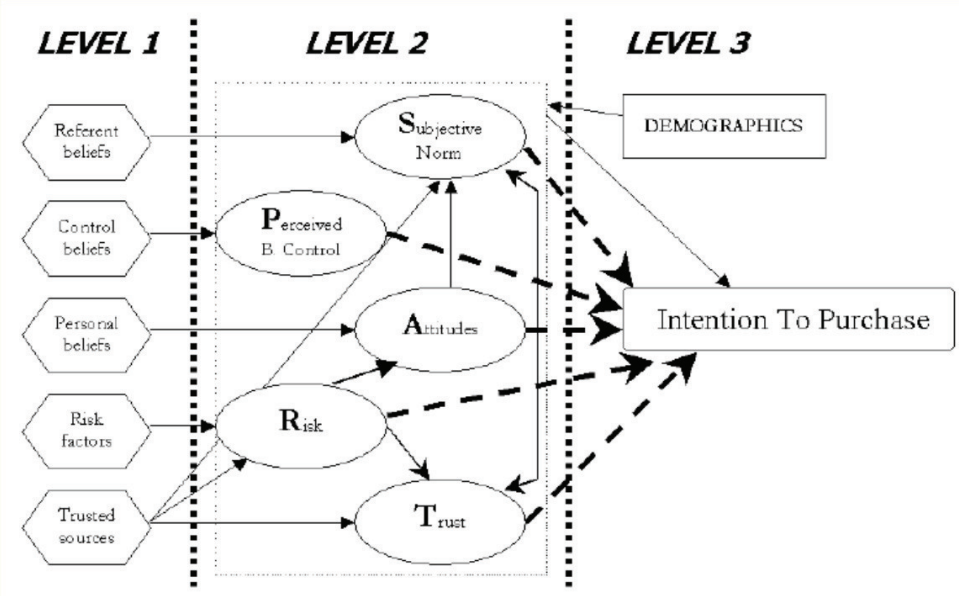
- Risk = probability of negative x Importance of consequences occuring negative consequences (multiplicative versus additive model) (Joag et al., 1990)

- Complex risk perceptions models

- inherent and handled risk, the acceptable risk level (Dowling and Staelin, 1994)

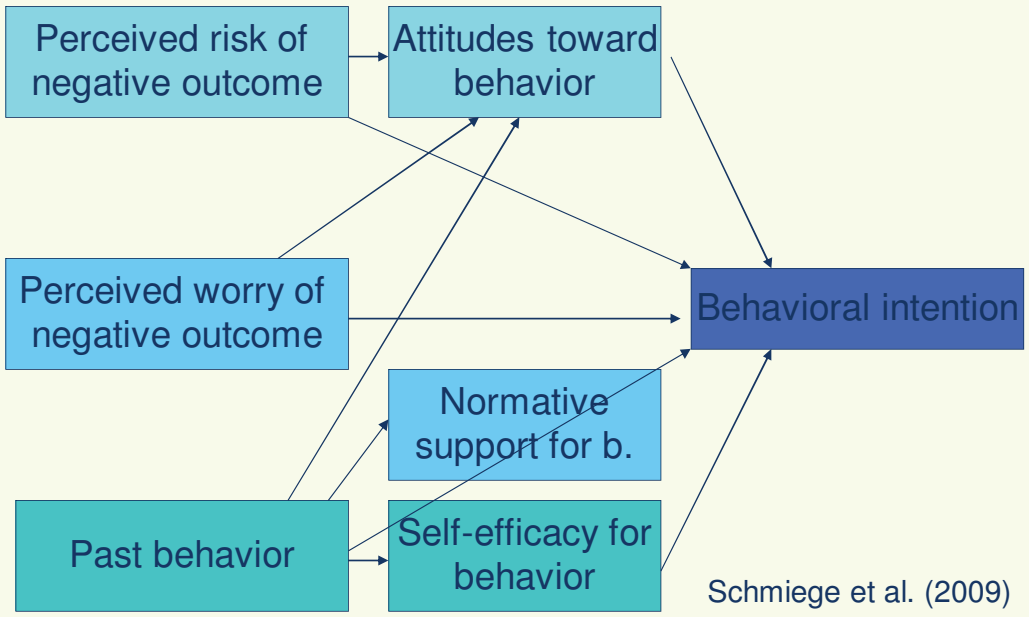
- Deering and Jacoby´s model (1972)

## The SPARTA model



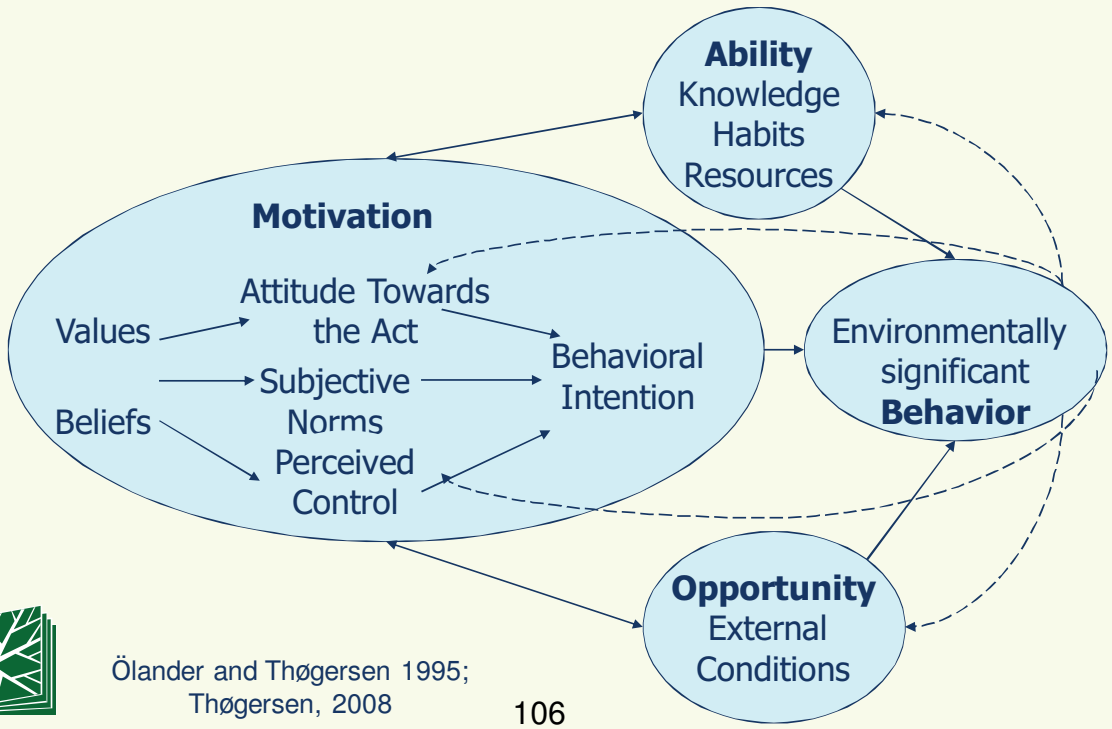

Mazzocchi et al. (2005)

# Integration of worry and risk into the TPB



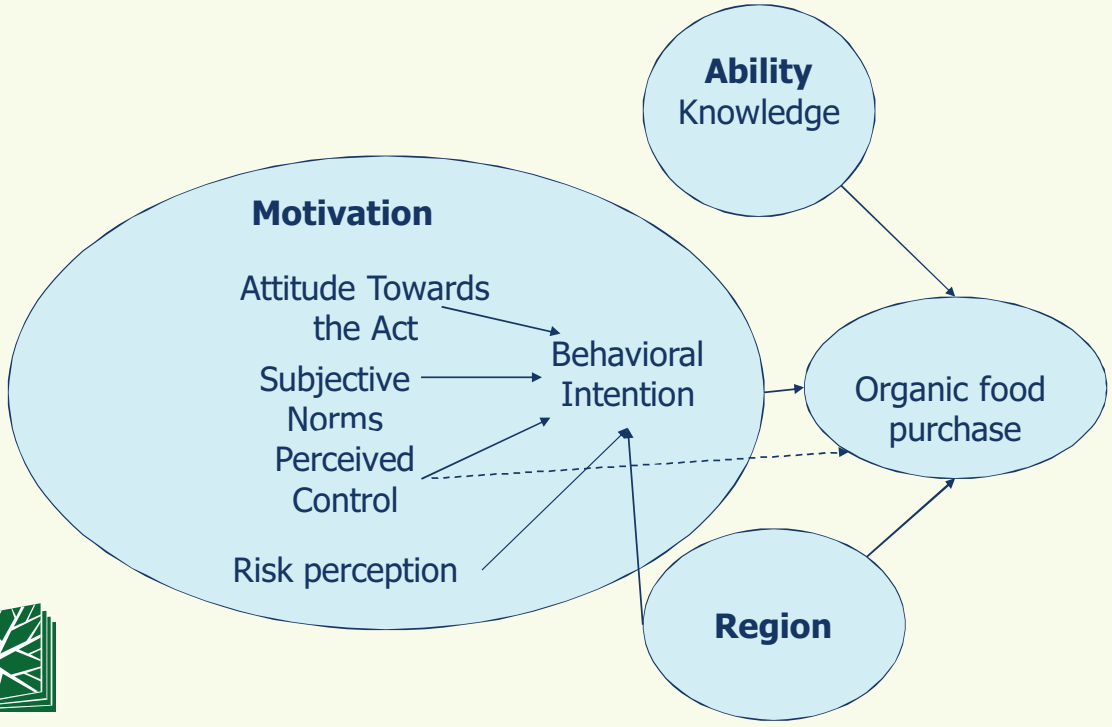

Schmiege et al. (2009)

# The Motivation-Opportunity-Ability Model




Ölander and Thøgersen 1995; Thøgersen, 2008

## The proposed conceptual model (modification of the Motivation-Opportunity-Ability Model)



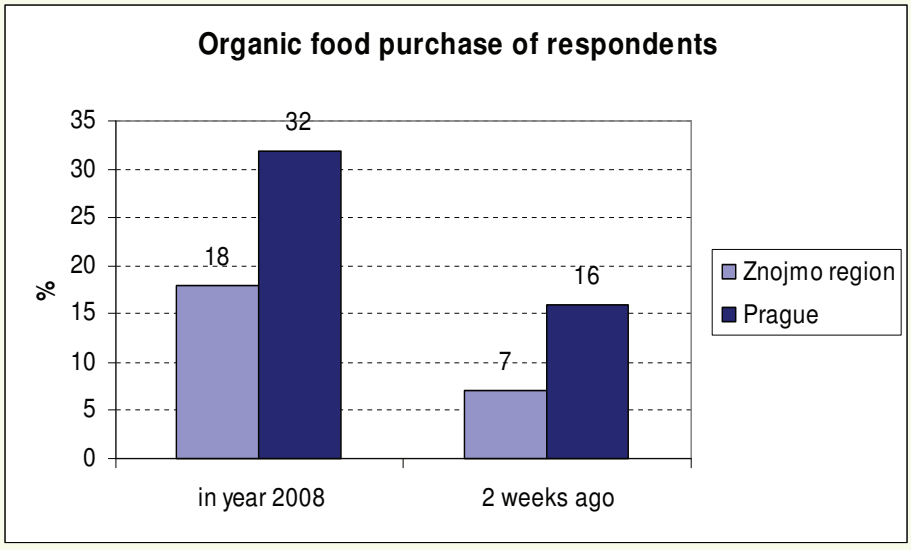

## Data collection

- Original qualitative survey conducted in summer 2008 (21 interviews)- to elicit commonly held beliefs
- Original quantitative survey conducted in October and November 2008
- Adult population (18-79 years old) of Prague and Znojmo region

## Data collection and corroboration

- Main reason for selection od these locations: the potential differences in attitude and behaviour between the inhabitants of a large city and those of provincial town and countryside (cp. Von Alvensleben, 1998)
- Quota sampling (age, gender, area, education)
- Representative sample of population of Prague (N= 330) and Znojmo region (N=354)

## Descriptives




Prague (N= 330) and Znojmo region (N=354)

# Binary logistic regression
# Organic food purchase (0/1)

| Variables | Estimate | Sig. | Estimate | Sig. |
|---|---|---|---|---|
| Intention2 | 2,007 | *** | 1,965 | *** |
| Intention3 | 4,386 | *** | 4,391 | *** |
| Intention4 | 5,303 | *** | 5,280 | *** |
| bar_price | -0,044 | | | |
| bar_availability | -0,04 | | | |
| bar_grocery | -0,044 | | | |
| bar_supermarket | 0,032 | | | |
| knowledge | 0,502 | • | 0,518 | • |
| znojmo | -0,569 | * | -0,551 | * |
| PBC | | | -0,023 | |
| *Nagelkerke R2* | *0,615* | | *0,611* | |

***sig.<0.001; **sig.<0.01; *sig.<0.05; • sig.<0.1

# Ordinal regression (logit)
# Intention to buy organic food

| Variables | Estimate | Sig. | Estimate | Sig. |
|---|---|---|---|---|
| SUBJECTIVE NORMS | 0,014 | *** | 0,016 | *** |
| ATTITUDES | 0,044 | *** | 0,039 | *** |
| PERCEIVED BEHAVIOURAL CONTROL | 0,003 | | 0,010 | |
| ZNOJMO=0 | 0,777 | *** | 0,727 | *** |
| RISK_PEST | | | 0,122 | ** |
| RISK_GMO | | | -0,005 | |
| *Nagelkerke R2* | 0,255 | | 0,263 | |

***sig.<0.001; **sig.<0.01; *sig.<0.05; • sig.<0.1

# Ordinal regression (logit)
# Intention to buy organic food

| Variables | Estimate | Sig. |
|---|---|---|
| attitude_trick | 0,085 | *** |
| attitude_mock | -0,003 | |
| attitude_trendy | -0,002 | |
| attitude_env | 0,006 | |
| attitude_health | 0,078 | ** |
| attitude_quality | 0,079 | ** |
| attitude_taste | 0,032 | • |
| sn_partner | 0,043 | ** |
| sn_parents | 0,04 | * |
| sn_childern | 0,034 | * |
| sn_friends | 0,024 | |
| sn_coworkers | 0,012 | |
| PBC | 0,004 | |
| znojmo=0 | 0,717 | *** |

| | |
|---|---|
| *Nagelkerke R2* | 0,255 |

*** sig.<0.001
** sig.<0.01
* sig.<0.05
• sig.<0.1

# Conclusions

- Lower probability that inhabitants of Znojmo region will purchase organic food in comparison with inhabitants of Prague
- Attitudes and subjective norms have the positive effect on intention to purchase organic food
- Risk perception of pesticides increases probability of buying organic food

## Conclusions

- The proposed modified model of the MOAB model explained more variance in organic food purchase
- The inclusion of pesticide risk perception significant
- The amount of variance added to the prediction of behavior was small (1%)

## Discussion

- limitations of multiple regression - application of structual equation modelling to the proposed modified model of the MOAB might be more appropriate (possibility to assess the whole model in one analysis, the extent to which model fits the dataset, ...)
- most estimation procedures of SEM asume multivariate normality

## Discussion

- the way of the inclusion of risk perception – need for further research (risk perception-attitudes or/and risk perception-intention)
- measurment of risk perception (two component model, perceived risk of negative outcome, the SPARTA model, etc)

## Thank you for your attention

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# Acknowledgements

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We also gratefully acknowledge support from Ministry of Education, Youth and Sports of the Czech Republic, Grant No. 2D06029 "Distributional and social effects of structural policies" funded within National Research Program II and from “Specific research 2008” grant provided by Faculty of Arts of Charles University (GRANTY/2008/551).

# Factors of proenvironmental behavior of university students

Jan Urban, *Charles University Environment Center*

Seminar on the theory of planned behavior
Prague, September 24, 2010

## Motivation

- Present result of an empirical study on proenvironmental behavior of university students
- Discuss further ways to go

## Target population

- Students living in student dormitories Koleje 17. listopadu
- 1400 students, 2 buildings, different study backgrounds

## Target behaviors

1. Proenvironmental behaviors with non-negligible/ measurable effect in terms of energy consumption
2. Behaviors that are neglected

Out of list of 15 behaviors, these turned out to be good candidates in pre-survey:

- Defrosting of the refrigerator
- Turning off the stand-by mode of electric appliances
- Cooking with the remaining energy after the element has been switched off

# Survey and the data

- Pre-survey 1
  - October 2009
  - Cca 50 structured self-administred questionnaires
- Pre-survey 2
  - November 2009
  - Cca 30 semi-structured interviews
  - Elicitation of relevant salient beliefs
- Main wave of data collection
  - January 2010
  - Sample
    - Self-administred questionnaire
    - Random sampling
    - 247 usable observations
  - Approx. 10 min.

# Measurment of TPB constructs

- Indirect measurement of AT, SN, PBC
  - target some of the beliefs by an intervention campaign
- We assumed no direct effect of PBC on behavior
- Scales
  - **Behavioral beliefs** – unipolar (unlikely - likely
  - **Evaluation of BB** – unipolar (unimportant - important)
  - **Normative beliefs** – bipolar (would not approve – would approve)
  - **Motivation to compy** – unipolar (would not follow his advice – would follow his advice)
  - **Control beliefs** – bipolar (disagree - agree)
  - **Perceived power** of control factor - bipolar (disagree - agree)
  - **Intention** – unipolar (unlikely-likely)
  - **Behavior** – cardinal scale, interval-censored

# Scoring of TPB constructs

$$A = \sum_{i=1}^{n} b_i e_i$$

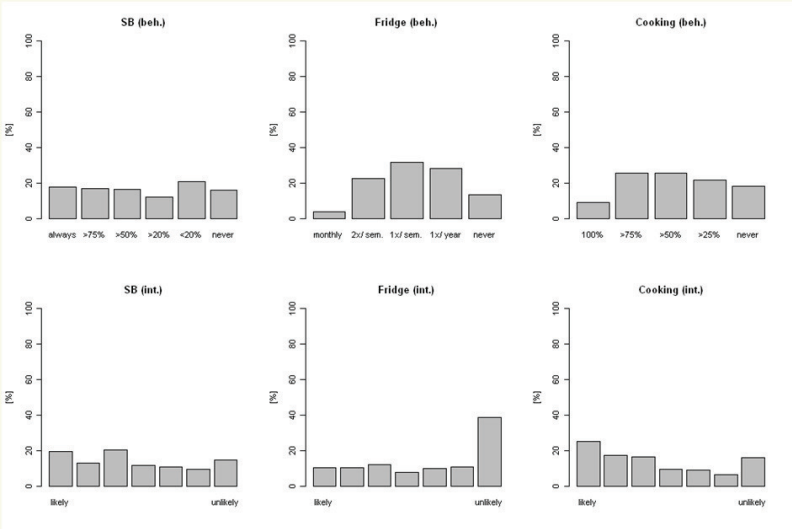
$$PBC = \sum_{k=1}^{n} b_k p_k$$

$$SN = \sum_{j=1}^{n} b_j m_j$$

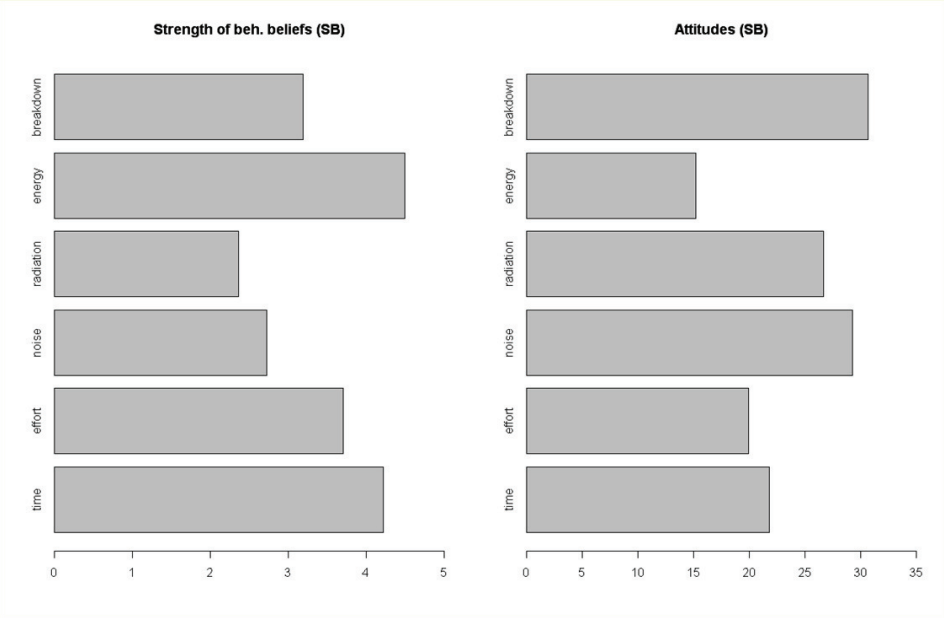
$INT = \beta_1 A + \beta_2 SN + \beta_3 PBC + \varepsilon_1$

$BEH = \beta_4 INT + \varepsilon_2$

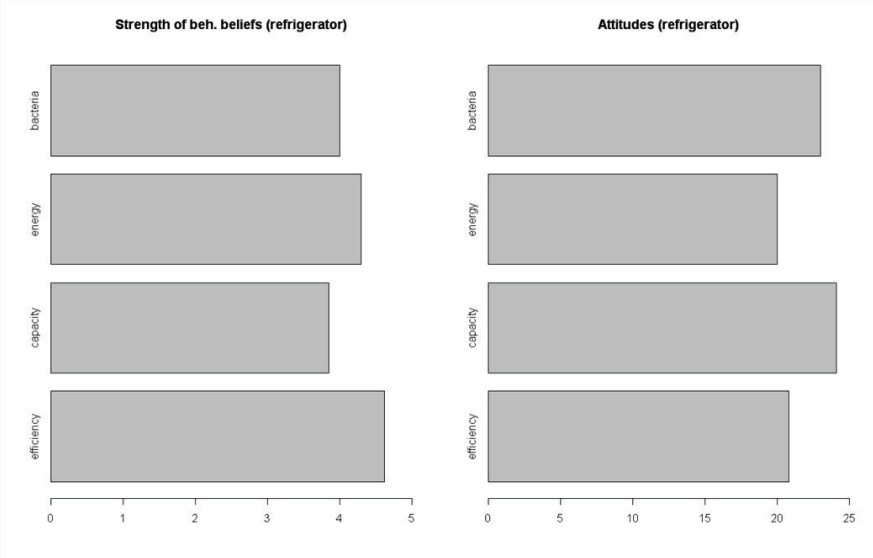
# Results: behavior and intention



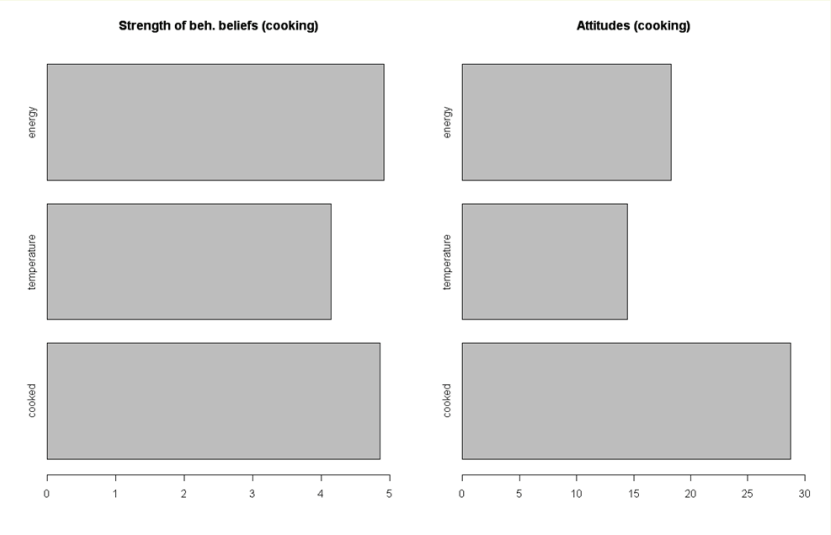
# Beh. bel. and attitudes (stand-by)



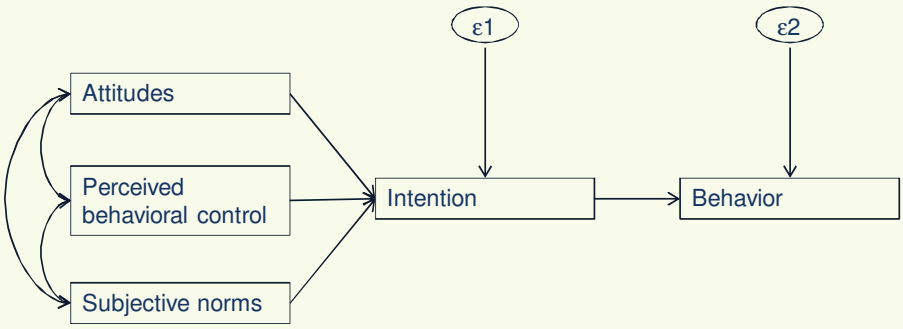

# Beh. bel. and attitudes (defrosting)



# Beh. bel. and attitudes (cooking)




# The model



# Estimation of the model

- Formal expression of the model:

  $INT=\beta_1 A+ \beta_2 SN+\beta_3 PBC + \varepsilon_1$

  $BEH=\beta_4 INT+\varepsilon_2$

- Path analysis

  $\Sigma = \Sigma(\theta)$

  - Full information estimation
- Model is overidentified
  - Fix regression weights of etas to 1
  - Recursive model
  - no latent variabels
  - 15 nonredundant elements - 12 parameters = 3 df
- The data are not multivariate normal - platicurtic distribution of INT and BEH
  - We use assymptotically distribution-free method

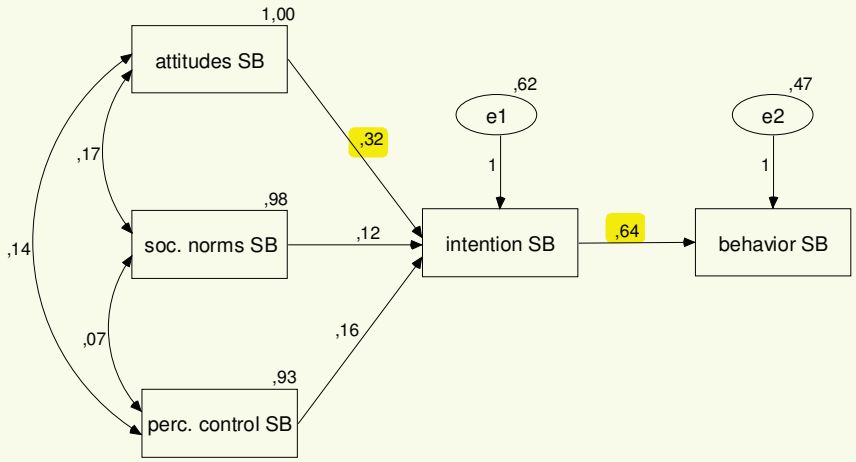
# Model fit

| Model | N | Chi-square | Df | P-value | RMSEA | RMSEA HI (90) | R2 Intention | R2 behavior |
|---|---|---|---|---|---|---|---|---|
| Cooking | 225 | 6.416 | 3 | 0.093 | 0.071 | 0.149 | 0.276 | 0.561 |
| Defrosting | 192 | 7.371 | 3 | 0.061 | 0.087 | 0.169 | 0.133 | 0.168 |
| Stand-by | 227 | 2.32 | 3 | 0.509 | 0.000 | 0.102 | 0.217 | 0.406 |

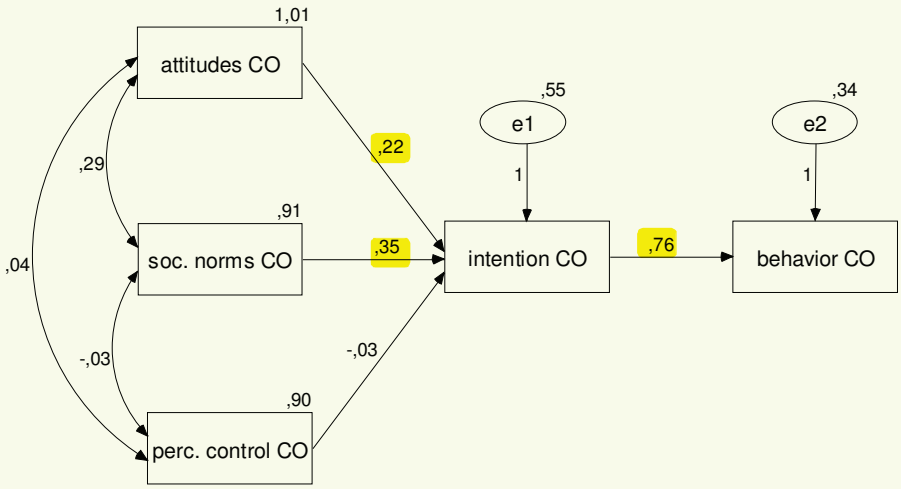
# Fit of the models in detail

- Inspection of residual matrix
  - Models seem to be empirically well specified
    - Except for the residual covariance PBC*BEH, which is between 1.2 and 1.6
    - Direct effect of PBC on B should be probably included (but chi-square test indicates no improvement in the fit)

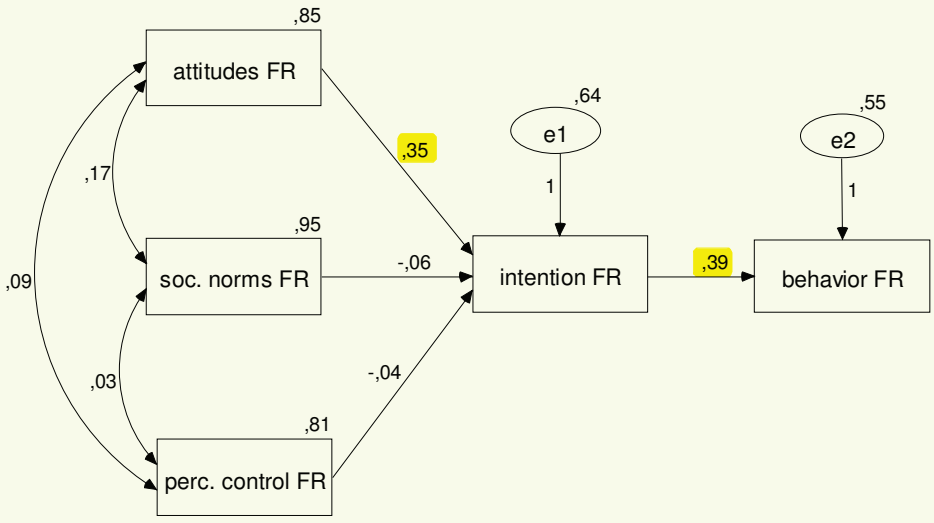
# Parameter estimates (stand-by)




# Parameter estimates (stand-by)




# Parameter estimates (defrosting)



## Conclusions 1

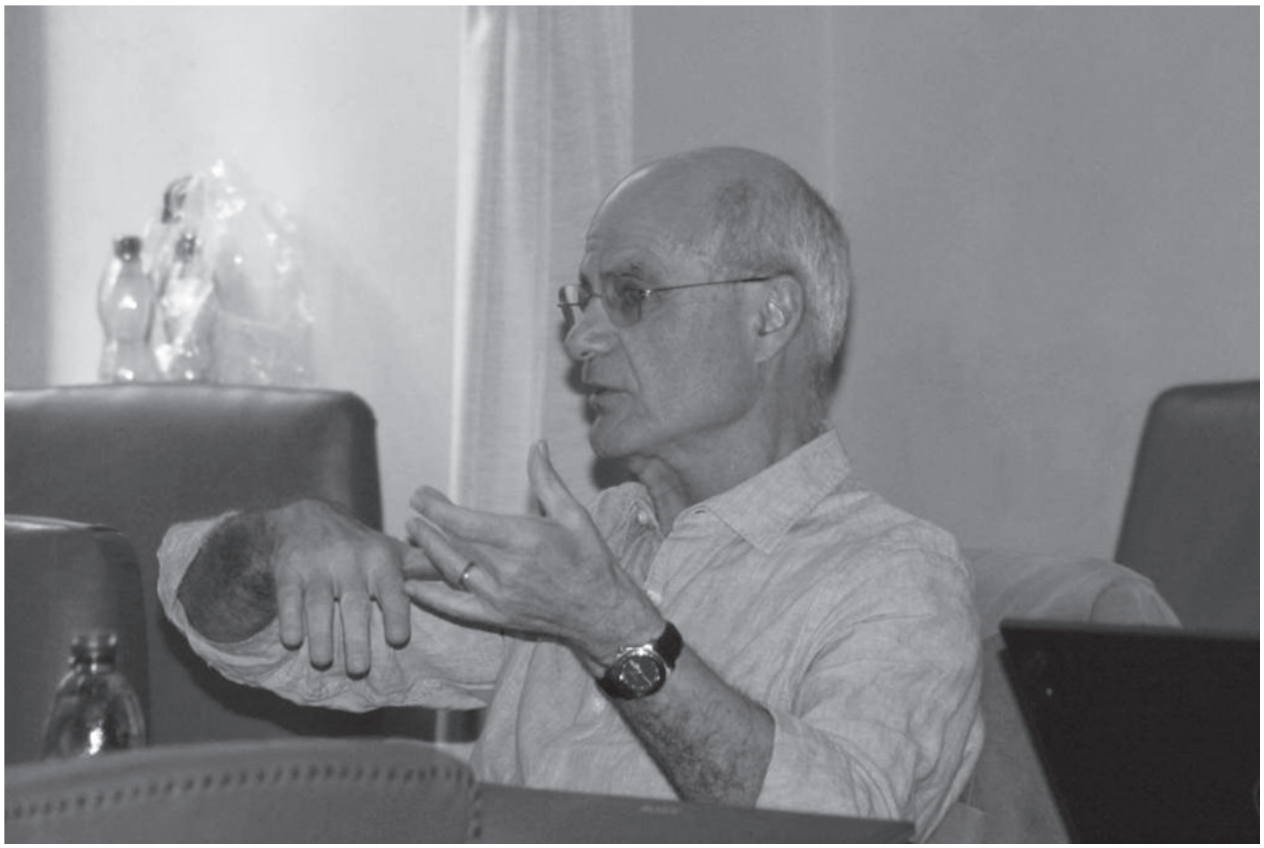
1. From the empirical point of view, the model specified on the basis of TPB has not been rejected by our data
2. The explanatory power of the model has been quite high, with R2 in the range of
   - 0.133 and 0.276 for intention
   - 0.168 and 0.561 for behavior
3. Strength of energy-related behavioral beliefs is quite high, but their evaluation is not that positive, resulting in weak energy-related behavioral attitudes

## Conclusions 2

1. Attitudes are always significant predictor of intention
2. Social norms are significant predictor only in case of cooking
3. PBC is not significant predictors for neither of the 3 behaviors

## Acknowledgement


- This research was supported by National Czech Foundation GAČR No. 403/08/1694, „Application of the model of environmentally significant behavior in the Czech Republic“.


1. Introduction and outline
2. Observational study in Austria
3. Quasiexperimental Study 1: Evaluation of the
Semesterticket at the University of Giessen
4. Quasi experimental study 2
5. Experimental study in Stuttgart
6. A MASEM analysis of the TOPB testing for moderat
7. A Masem analysis of intervention studies using the
8. Outlook

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