Environmental Protection and the Theory of Planned Behavior

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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

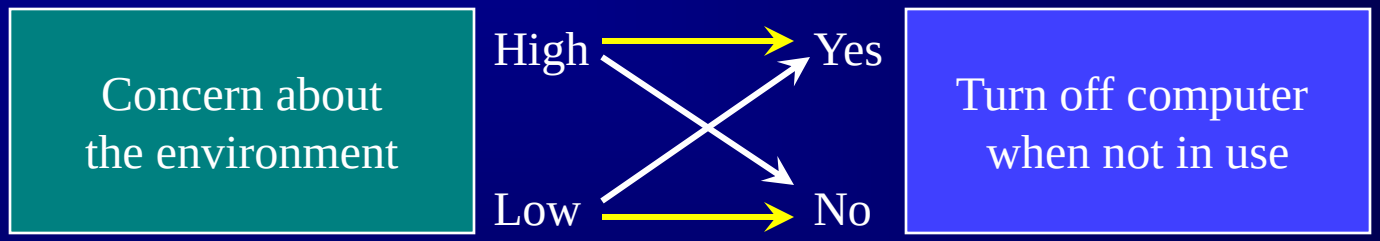
1. I walk, ride a bicycle, or take public transportation to work or school: .19
2. I use rechargeable batteries: .12
3. I wait until I have a full load before doing my laundry: .31*
4. When shopping, I ask for paper bags rather than plastic ones: .13
5. I regularly read at least one environmental journal/magazine: .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

** $p < .05$*

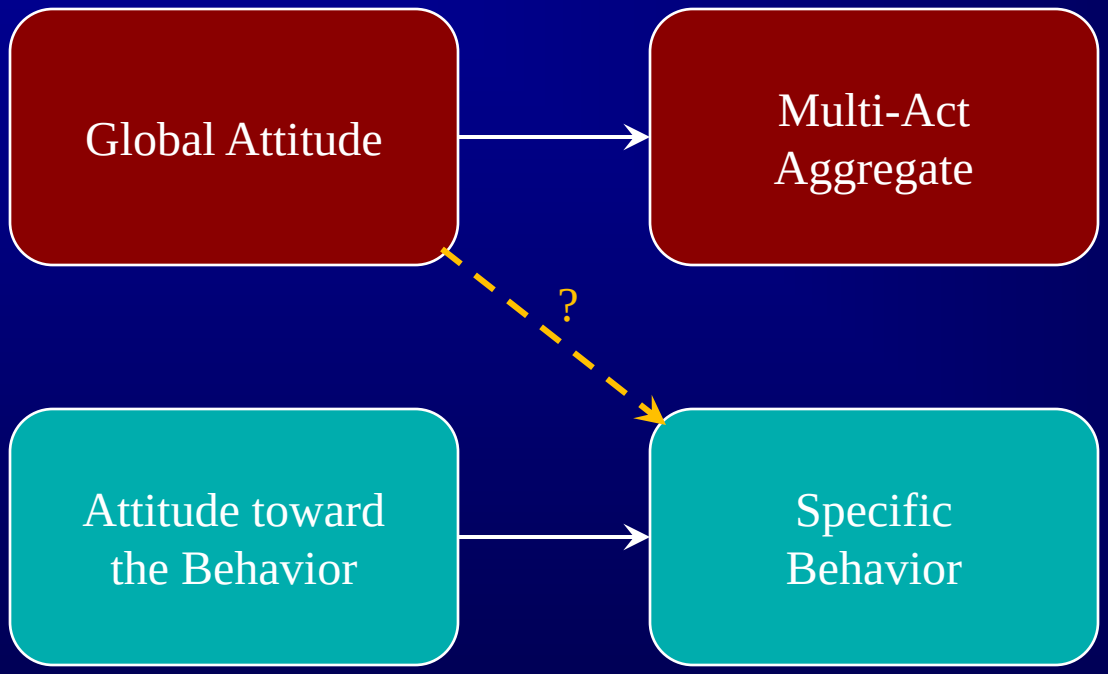
9-Item Environmental Concern Scale and Environmental Behavior in Germany (Diekmann & Preisendörfer, 2003)

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



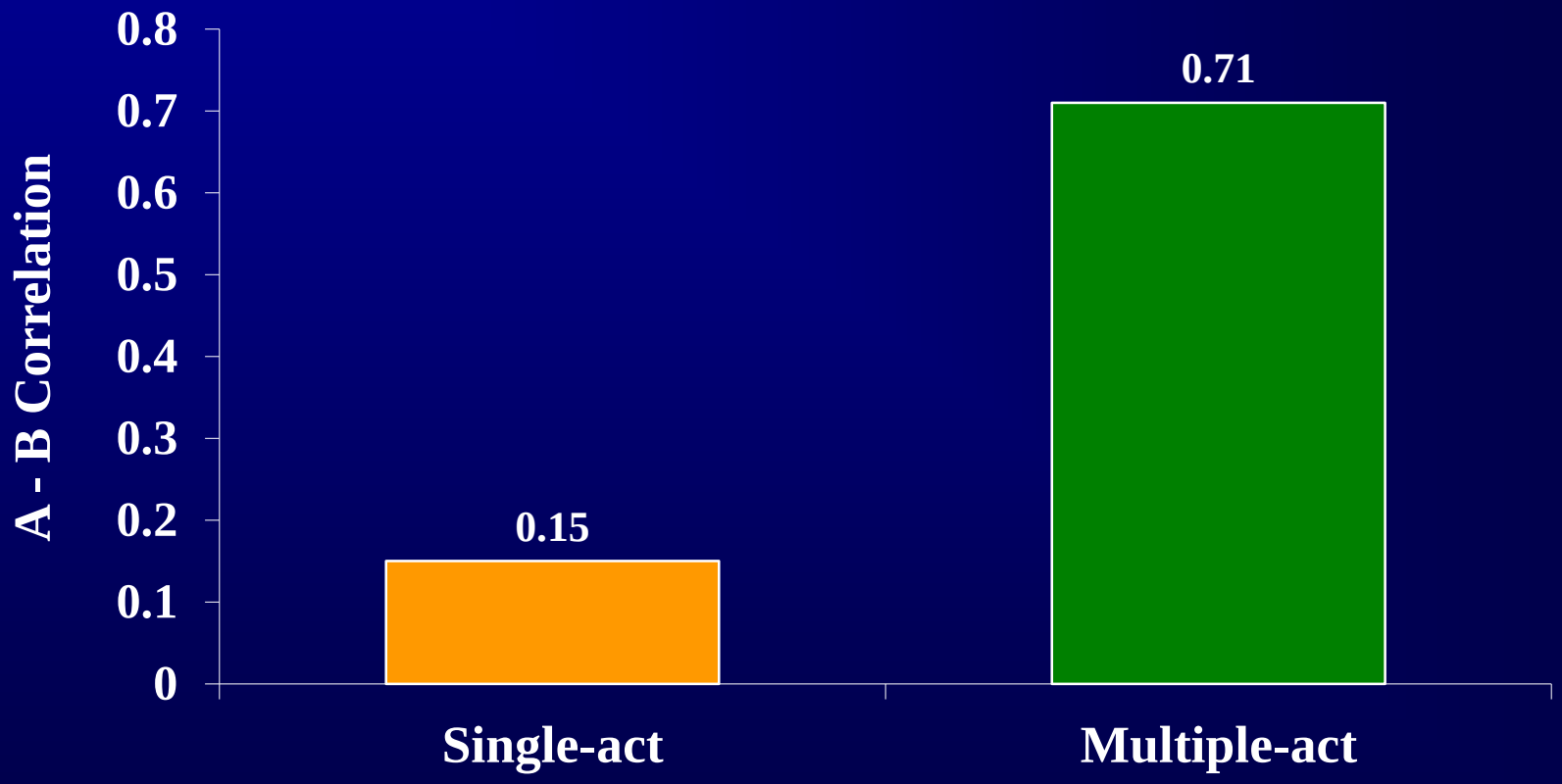
Attitude-Behavior Relations



Example: Eco-Friendly Behaviors

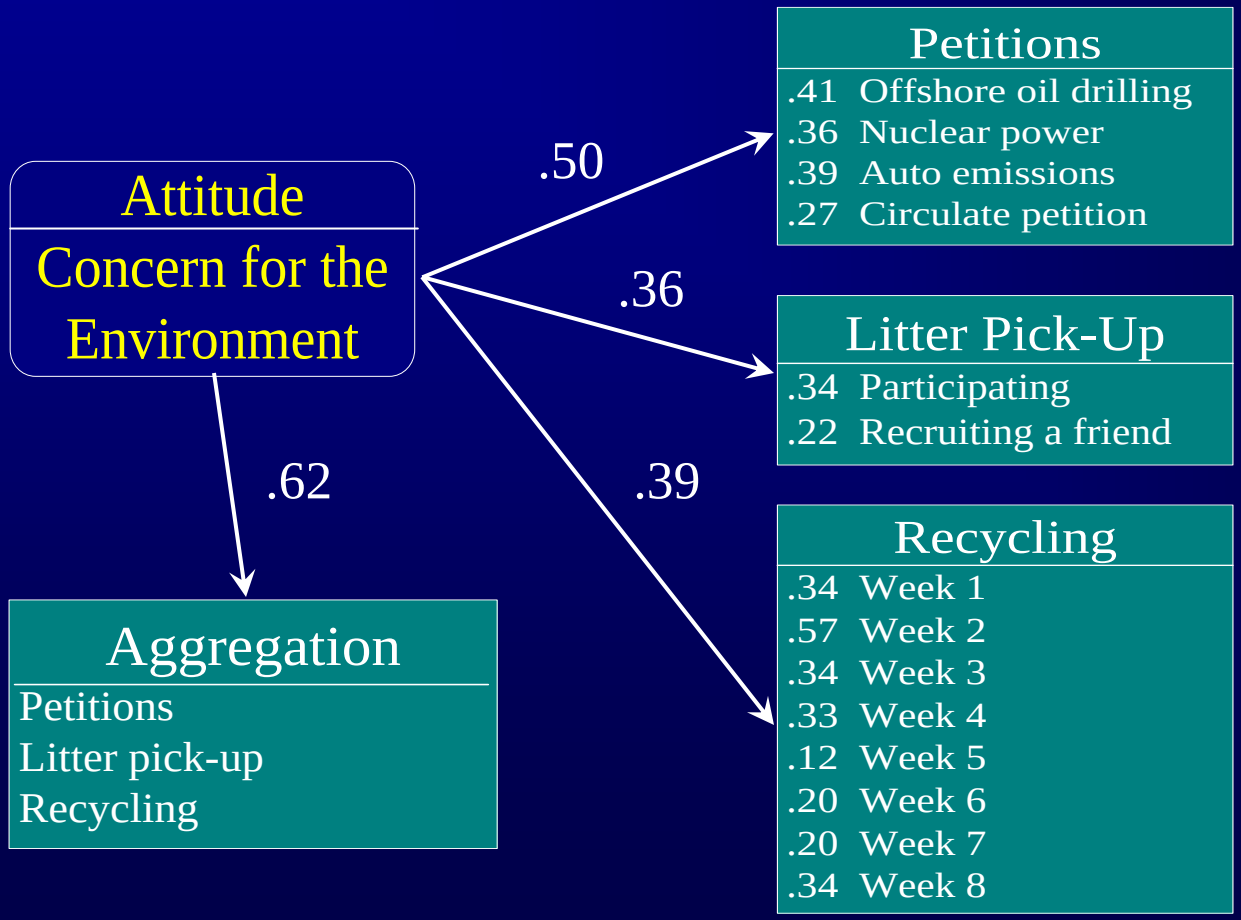
- Recycling paper and bottles
- Conserving water when taking a shower or bath
- Turning off unused lights
- Buying organic food
- Using public transportation
- Employing reusable shopping bags
- Voting for pro-environment candidates
- Contributing to an environmental protection organization
- Participating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

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

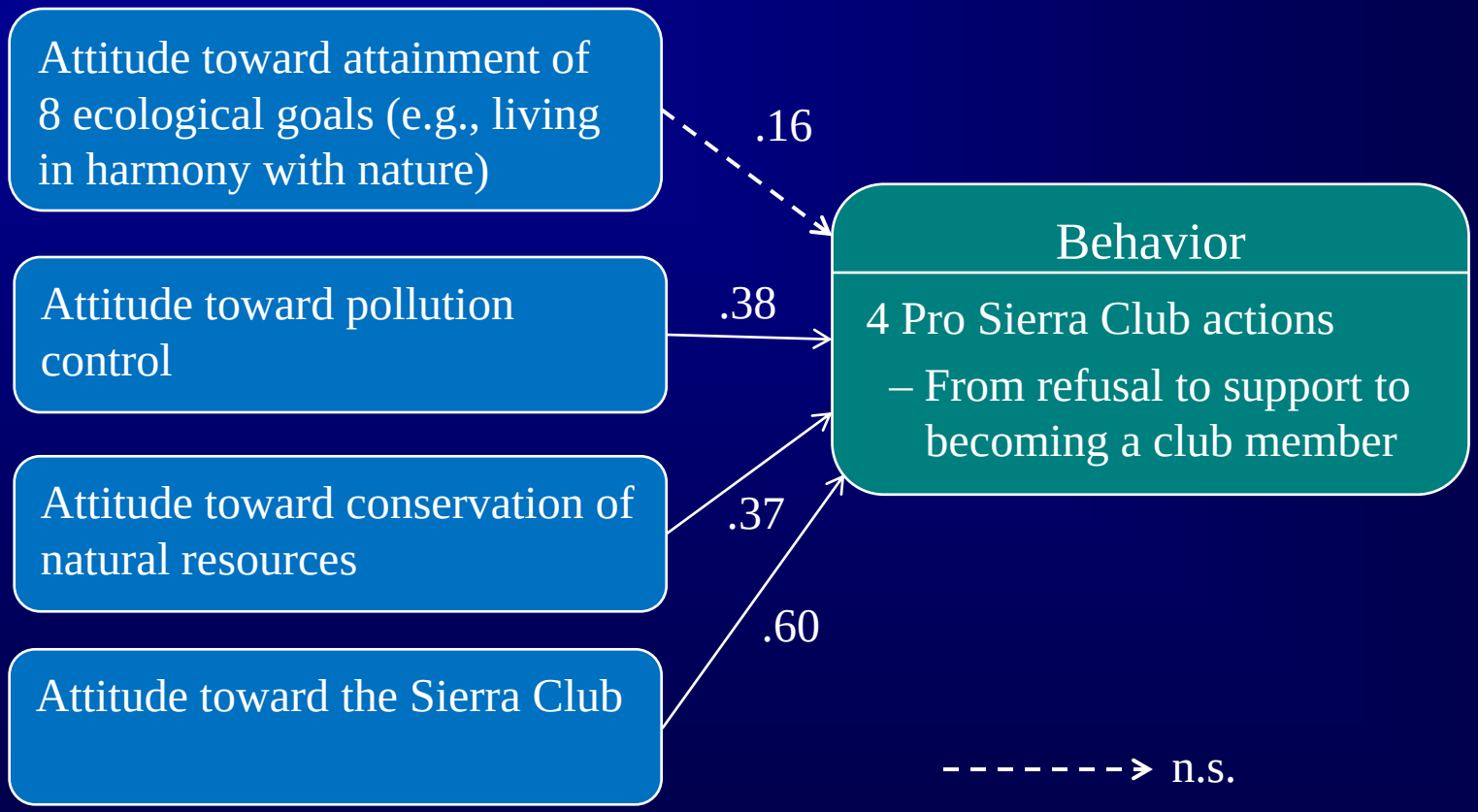


Environmental Attitudes and Behavior

(Weigel & Newman, 1976)



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



Predicting Single Behaviors: TACT Elements

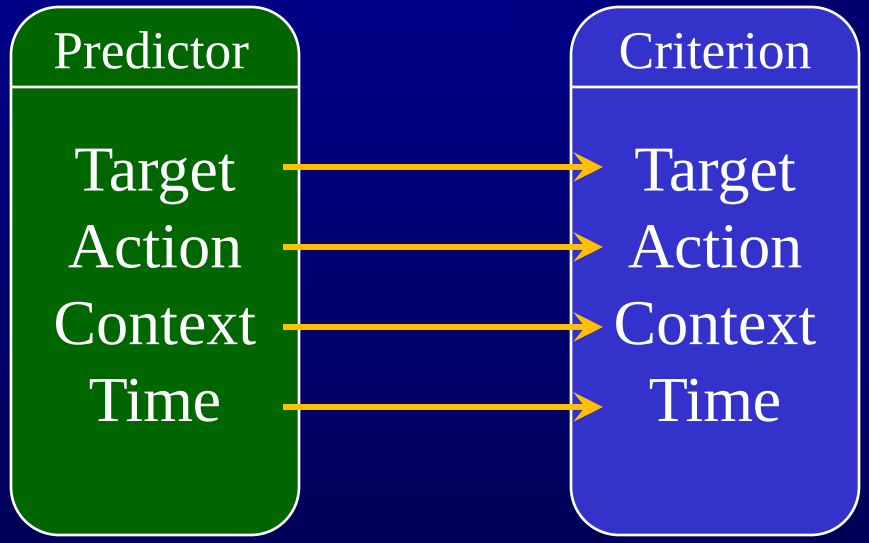
Target – Action – Context – Time

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

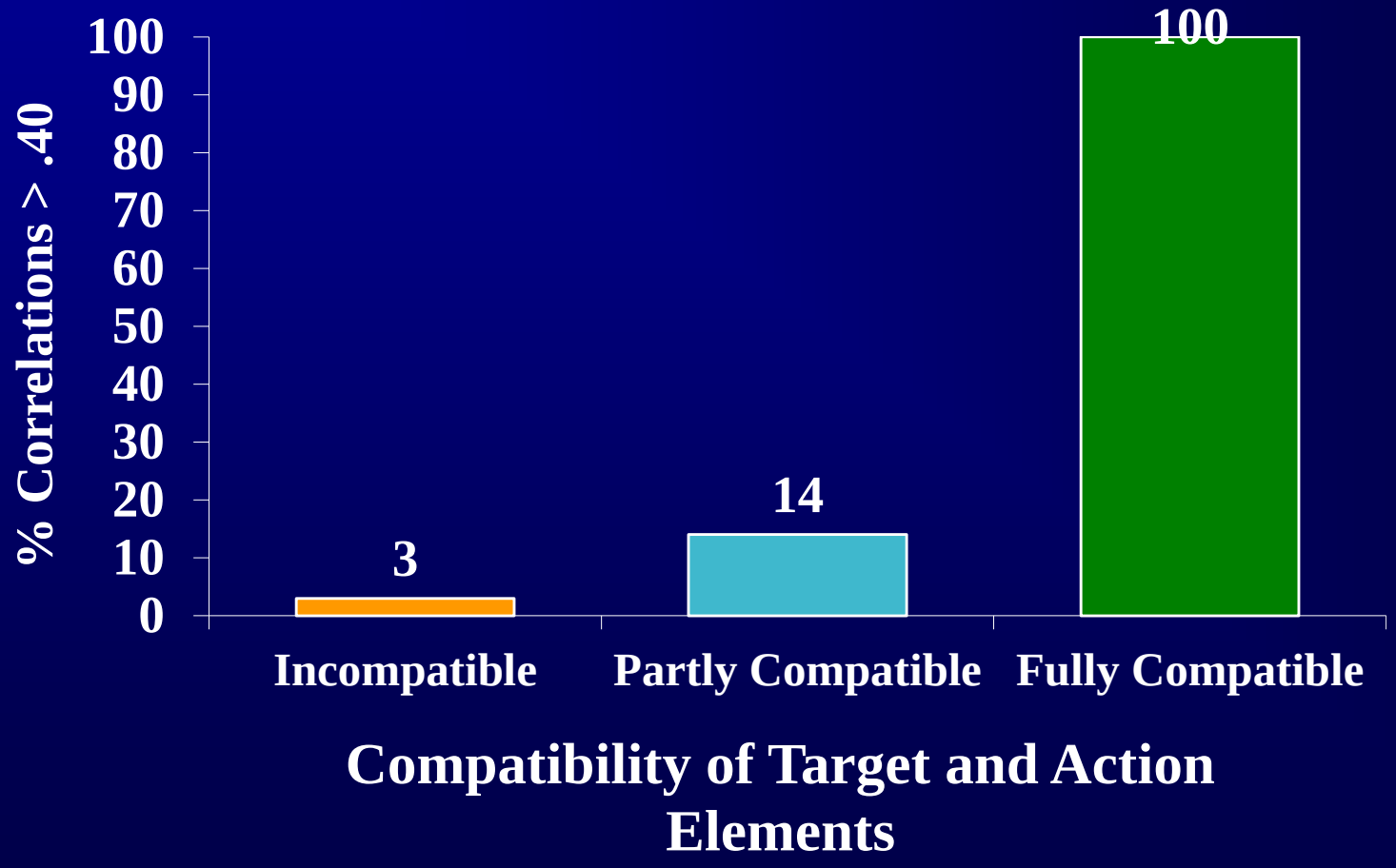
Option 2: Using (action) public transportation (target) to commute to work (context) – no time element.

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

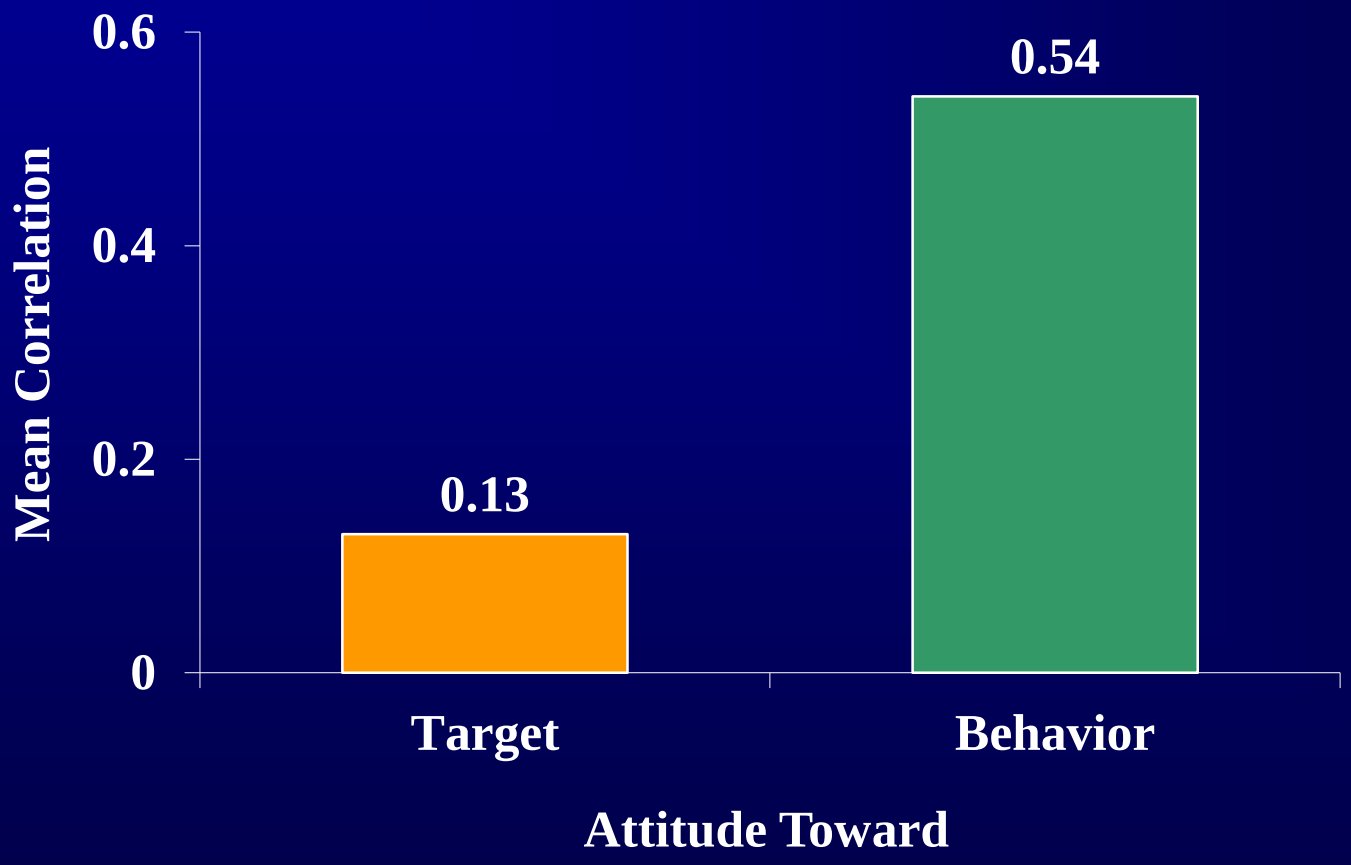
Principle of Compatibility



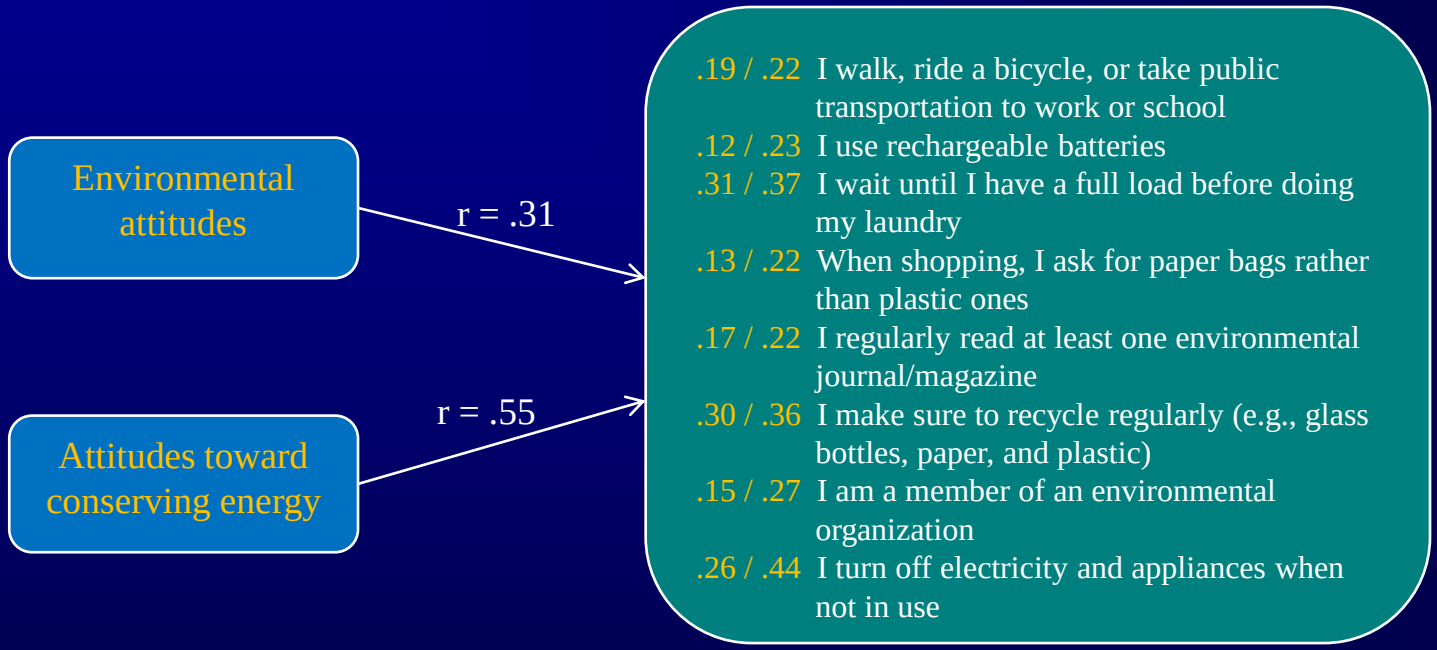
Attitude-Behavior Relations as a Function of Compatibility (K=142) (Ajzen & Fishbein, 1974)



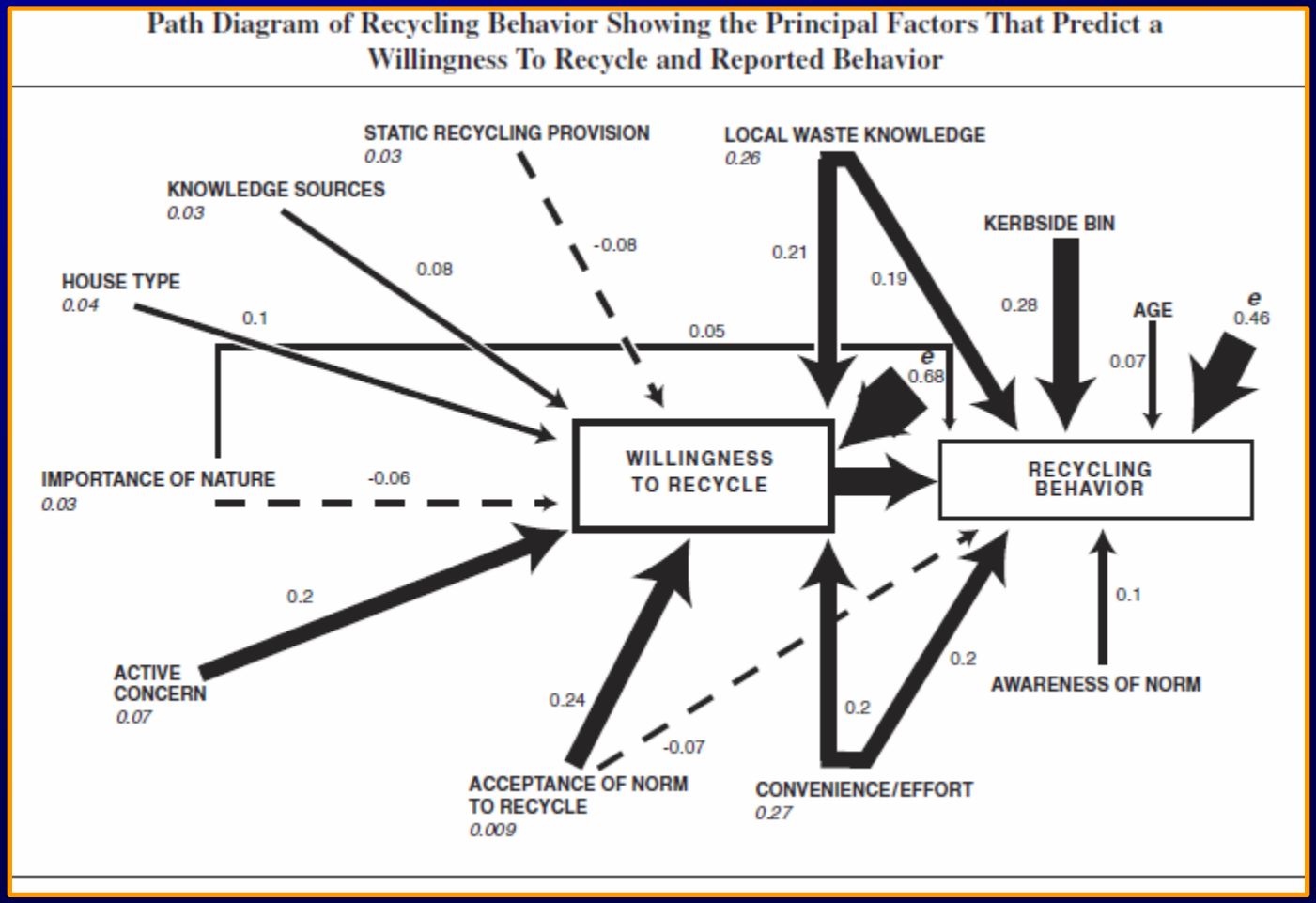
Predicting Specific Behaviors: Meta-Analysis (K = 8) (Kraus, 1995)



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

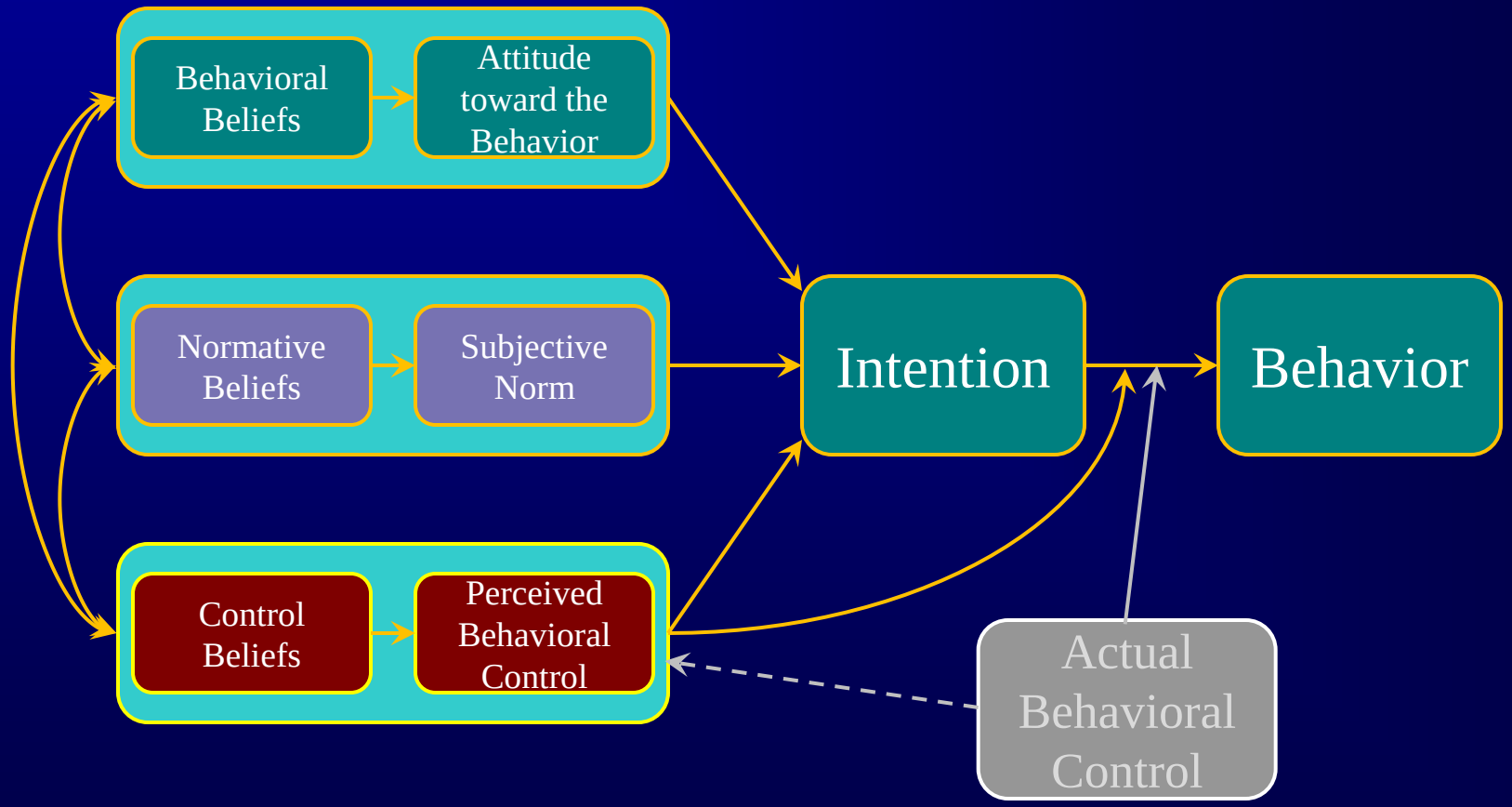


Model of Recycling (Barr, 2007)



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

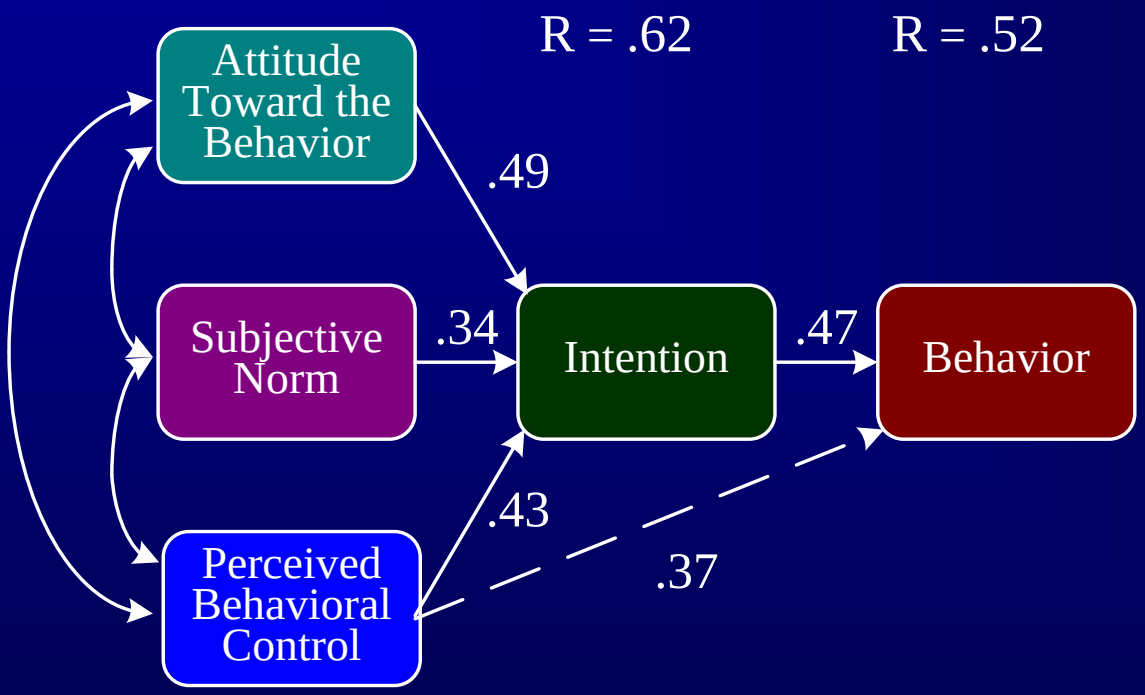
Causal Effect of PBC on Behavior: Empirical Evidence

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)



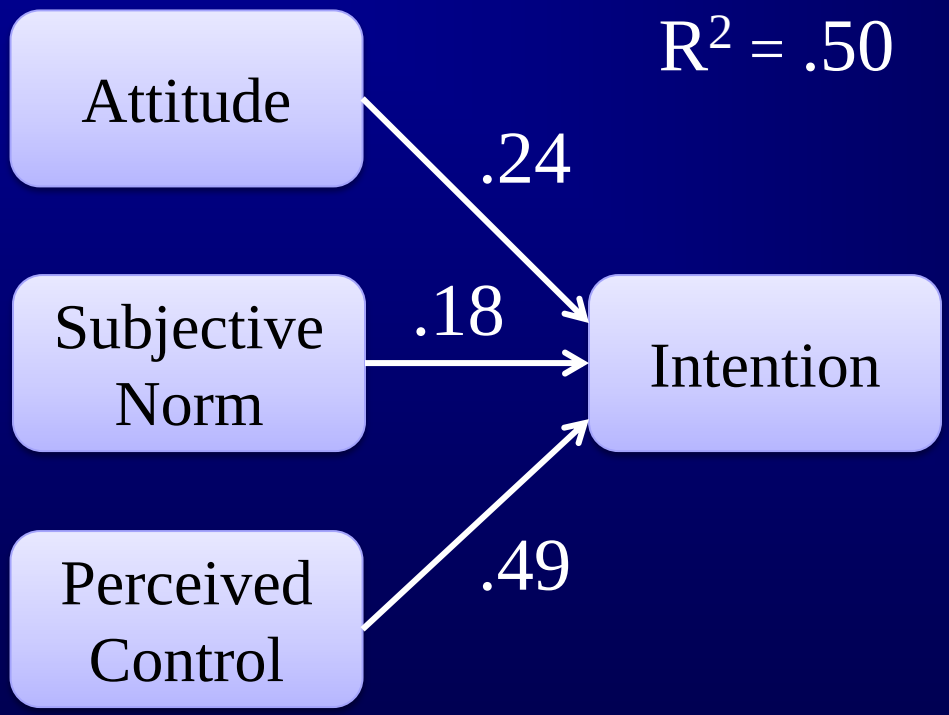
Environmental Intentions and Behavior (Schwenk & Möser, 2009)

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

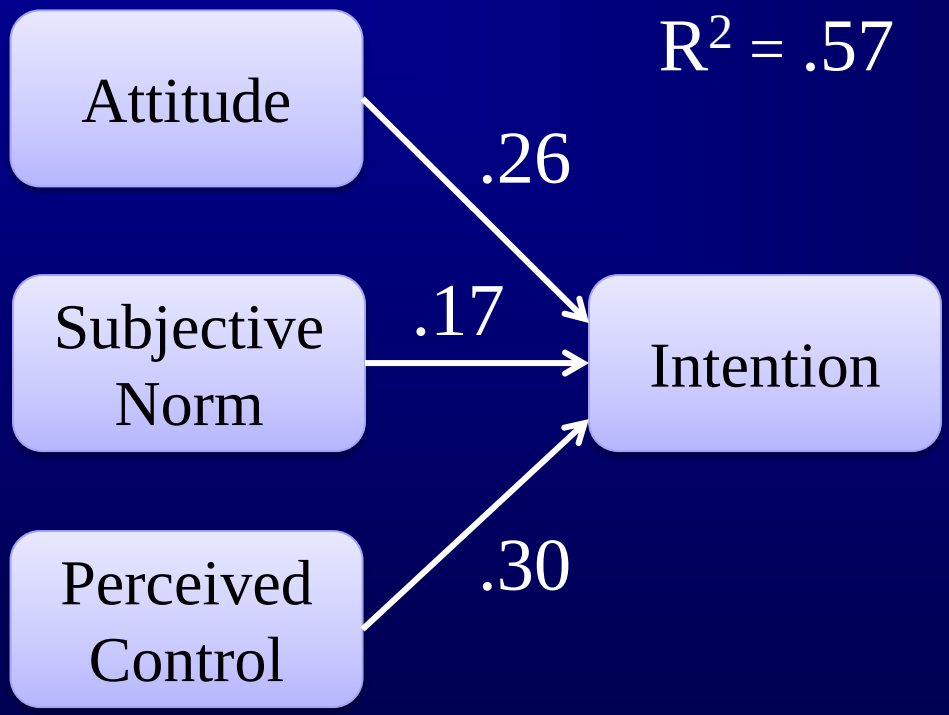
Mean r = .54; w/o Staats et al., mean r = .62

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

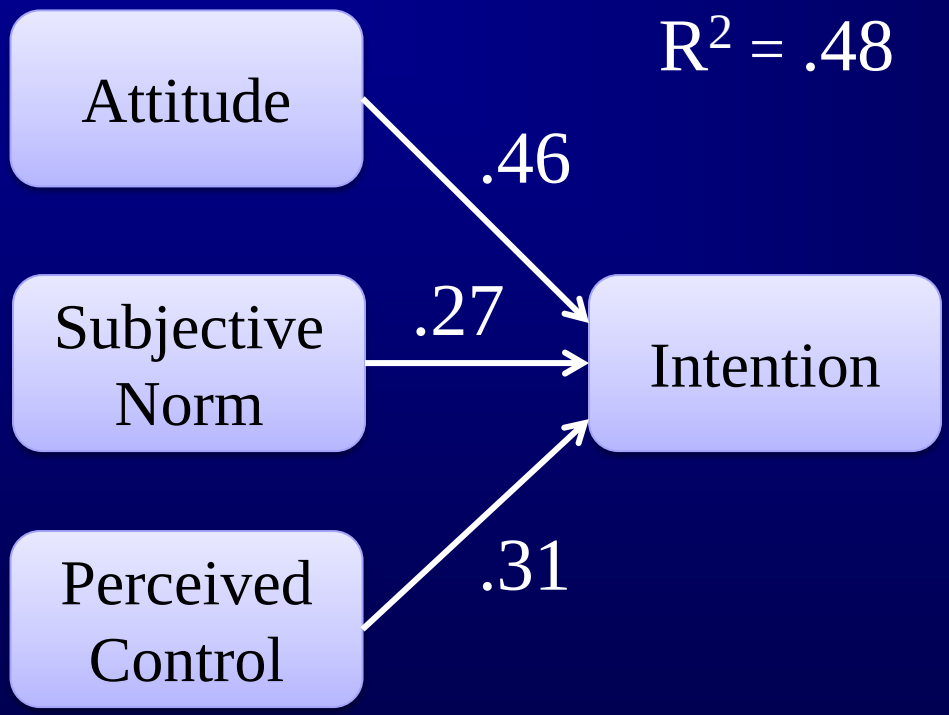


Intention to Recycle Household Waste

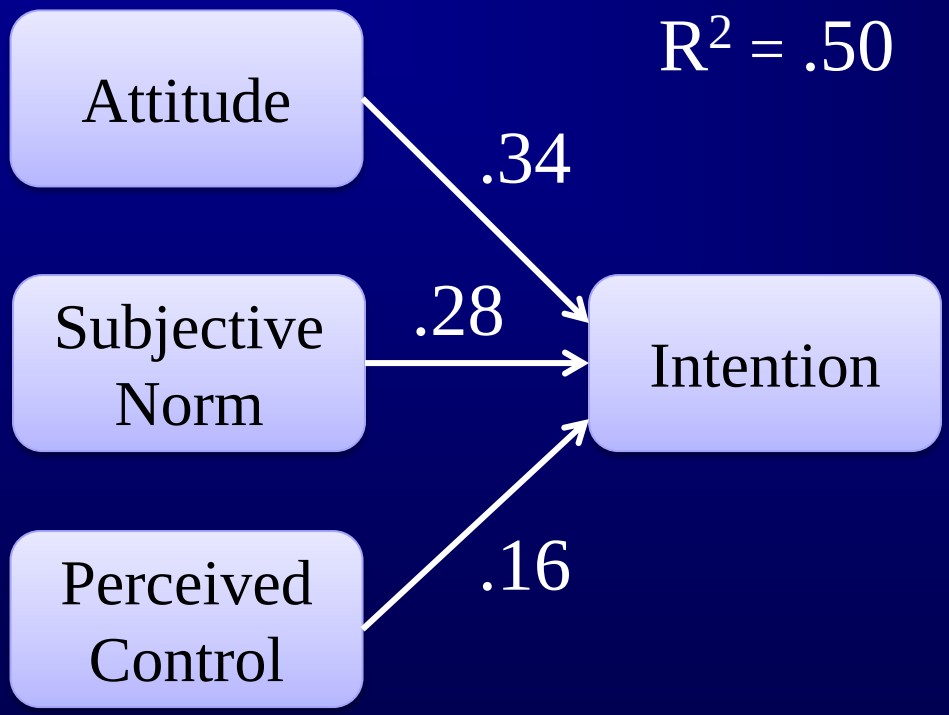
(Mannetti, Pierro, & Livi, 2004)



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

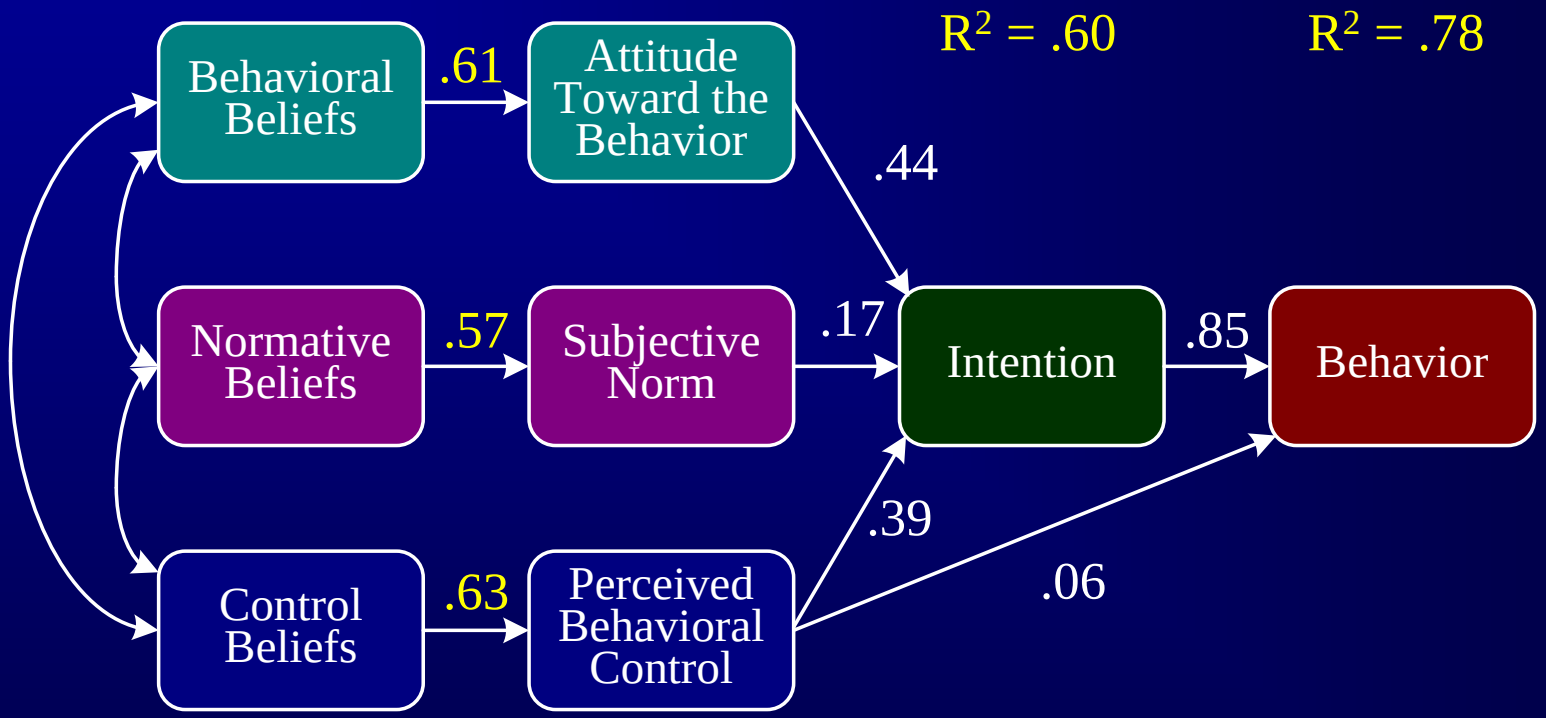
Note. Belief scores from 1 (extremely uncertain) to 10 (extremely certain). All correlations significant at $p < .05$.

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

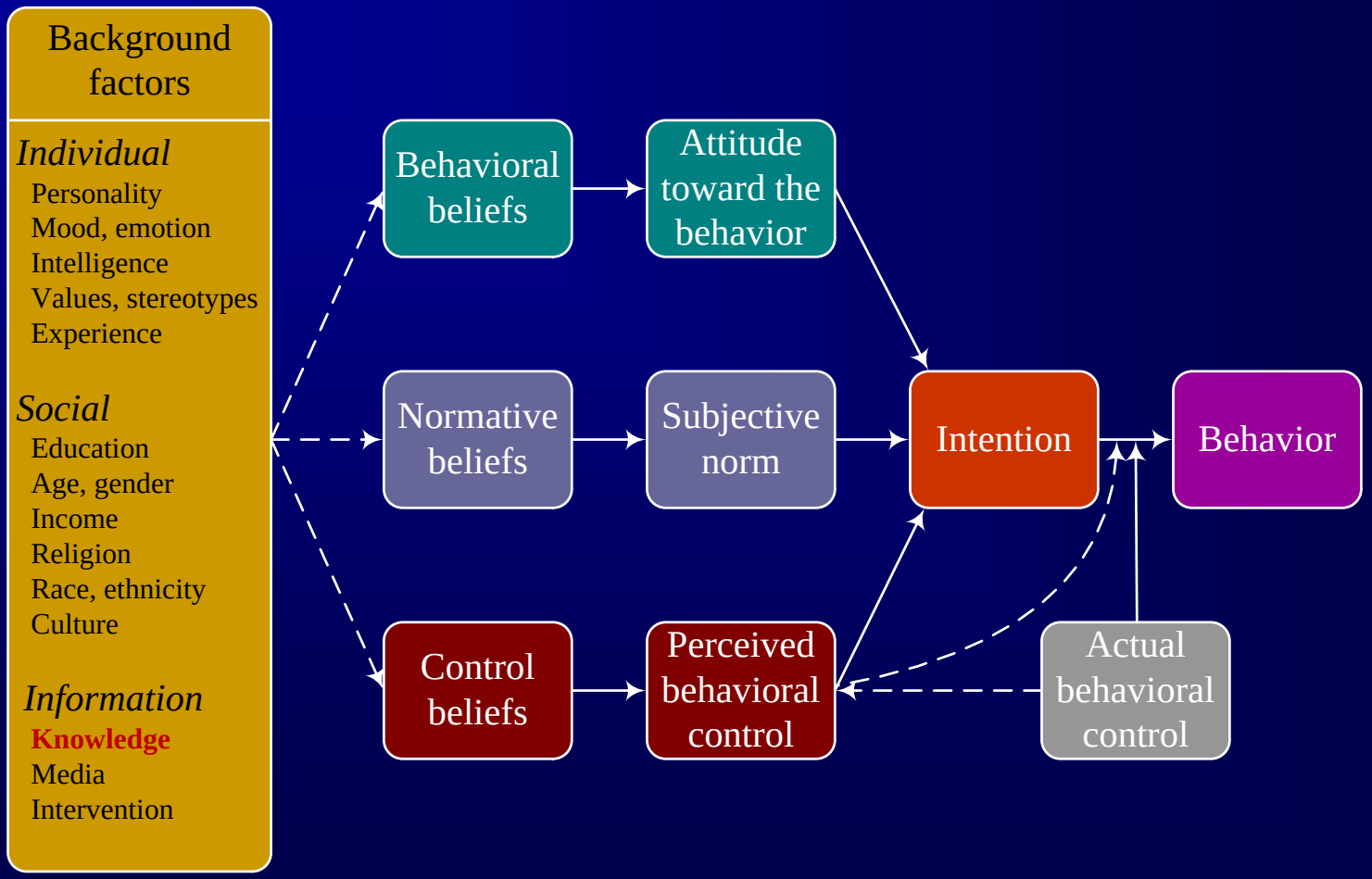
Glass Recycling in Trash vs. Public Bins: Normative Beliefs (Lüdemann, 1995)

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)

$\alpha = .73 - .97$

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. $\alpha = .77$.

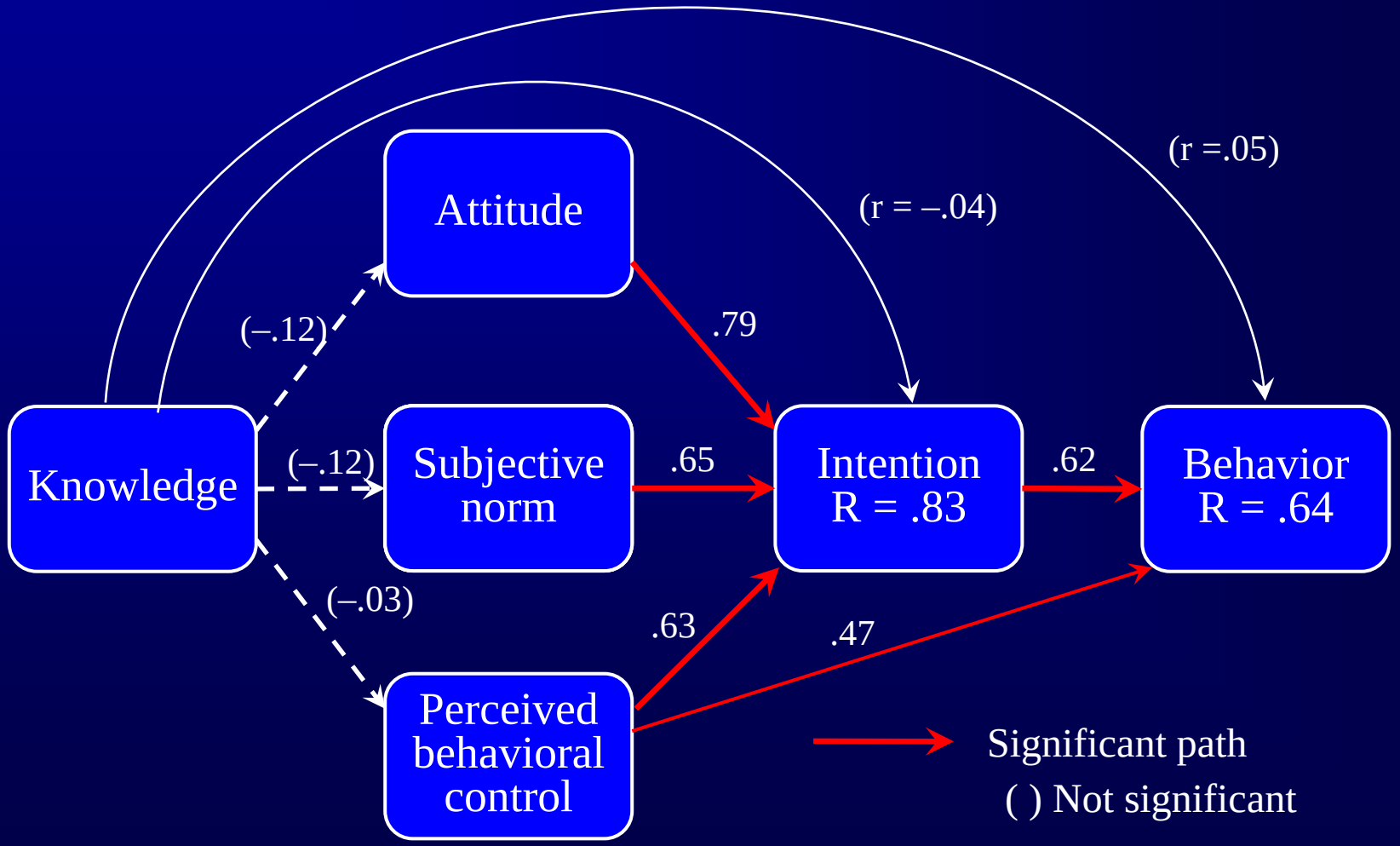
Prediction of Energy Saving Behavior From General Attitudes and Knowledge (N = 79)

	Behavior
Environmental attitude scale	.33*

	Knowledge
Environmental attitude scale	.14

	Behavior
Knowledge	.05

TPB and Environmental Knowledge: Conserving Energy

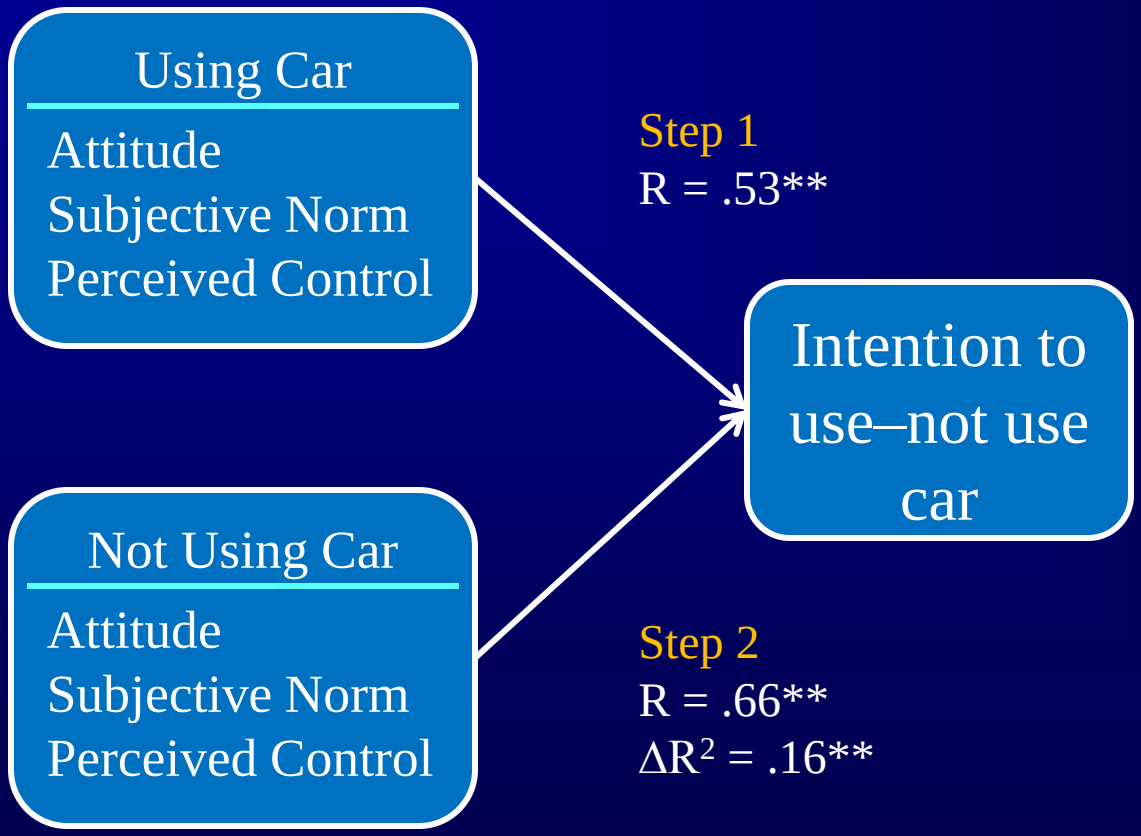


Beliefs About Having – or Not Having – Another Child (Vinokur-Kaplan, 1978)

- *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

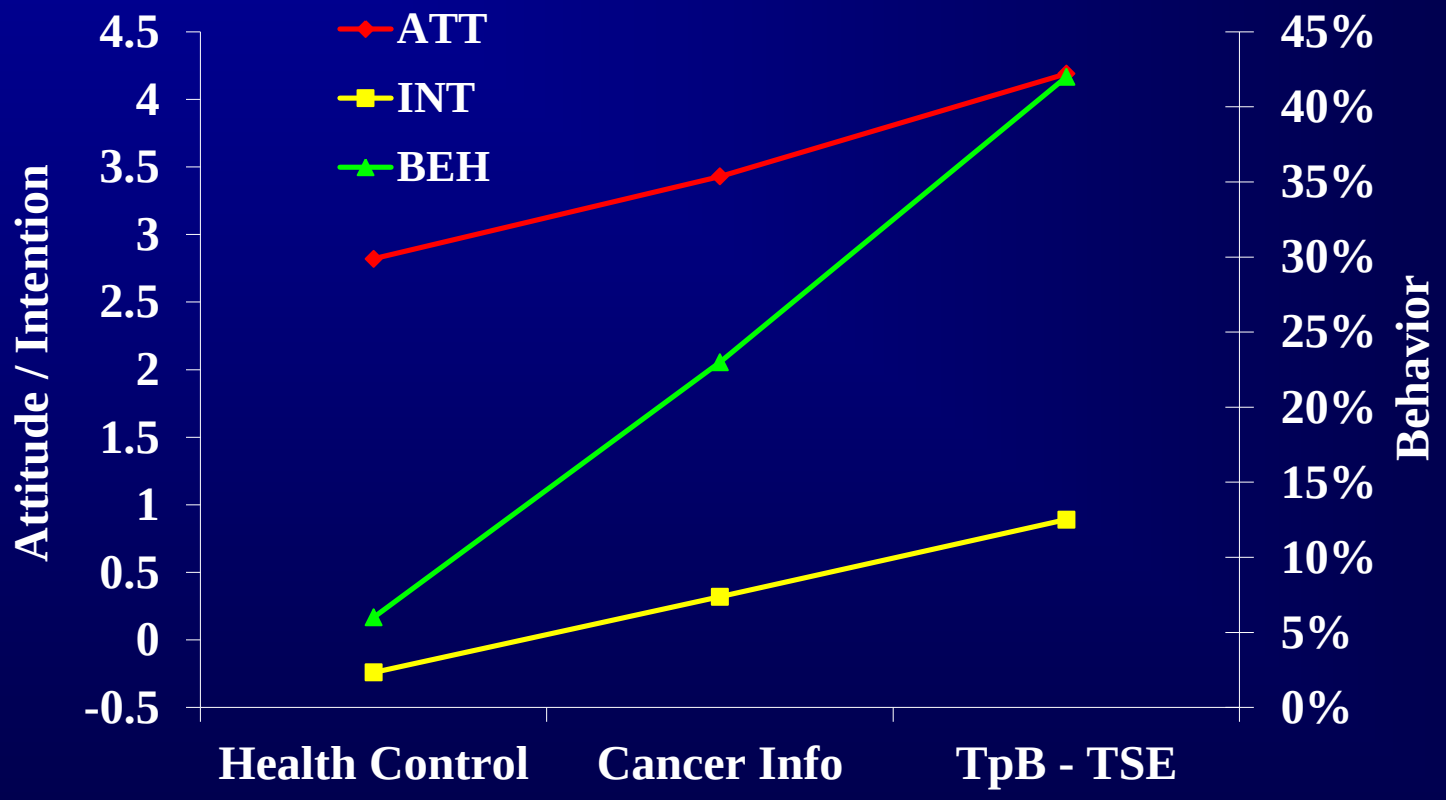
(Gardner & Abraham, 2010)



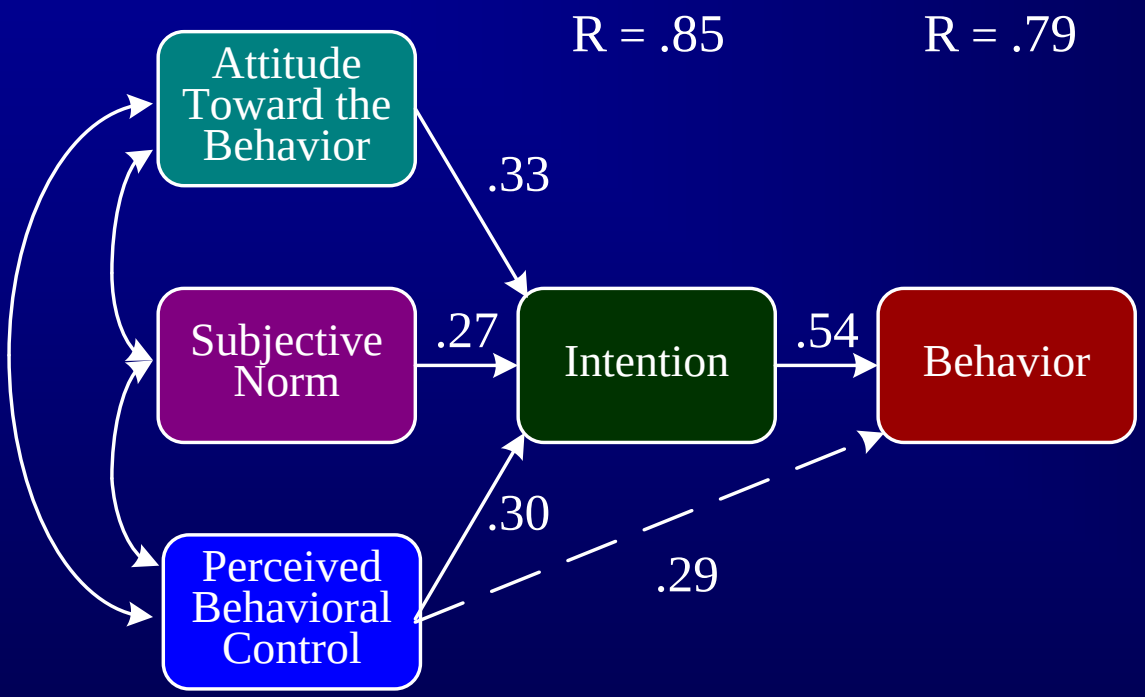
Testicular Self-Examination
(Murphy & Brubaker, 1990)

- *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)



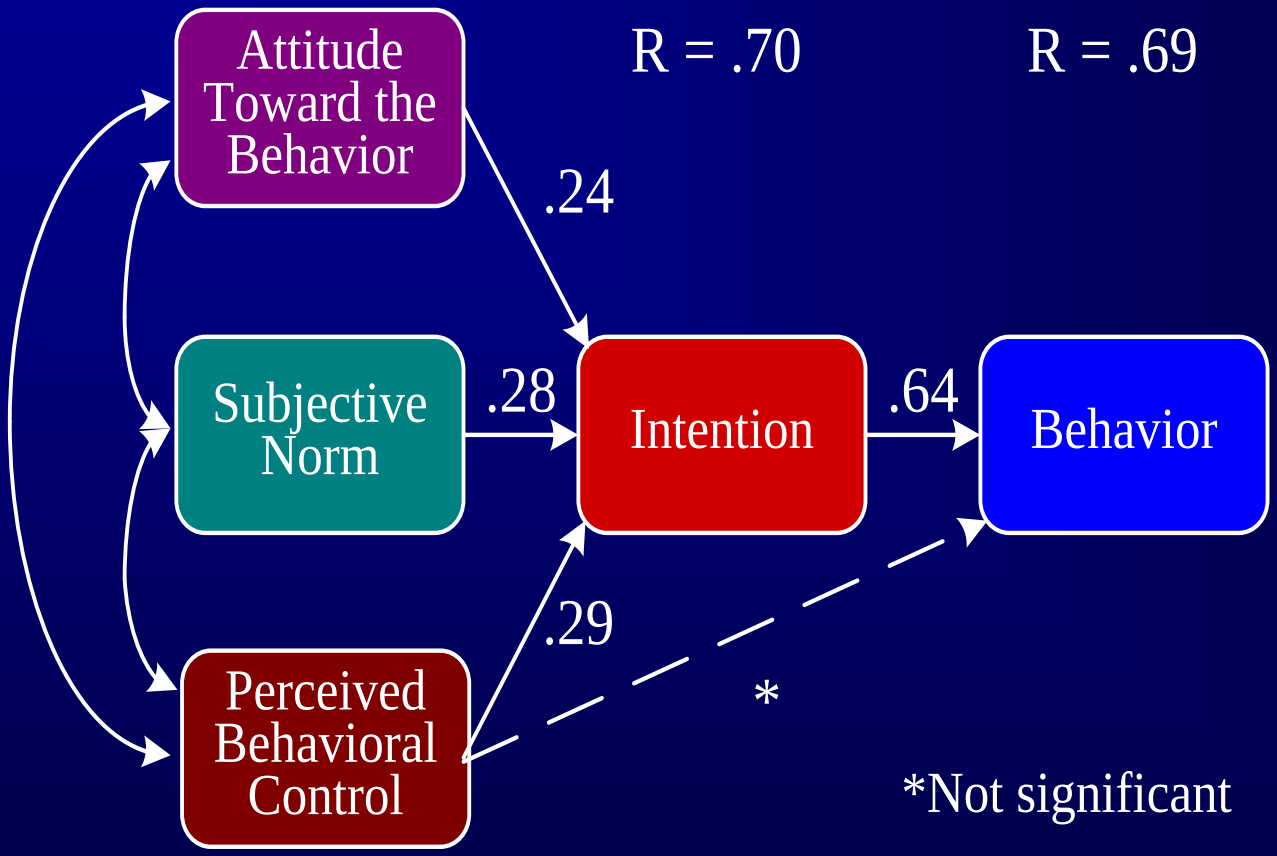
Using Public Transportation: Intervention Outcomes (Bamberg, 2006)

	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.