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# Good intents, but low impacts

**Diverging importance of motivational and socio-economic determinants explaining pro-environmental behavior, energy use, and carbon footprint**
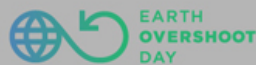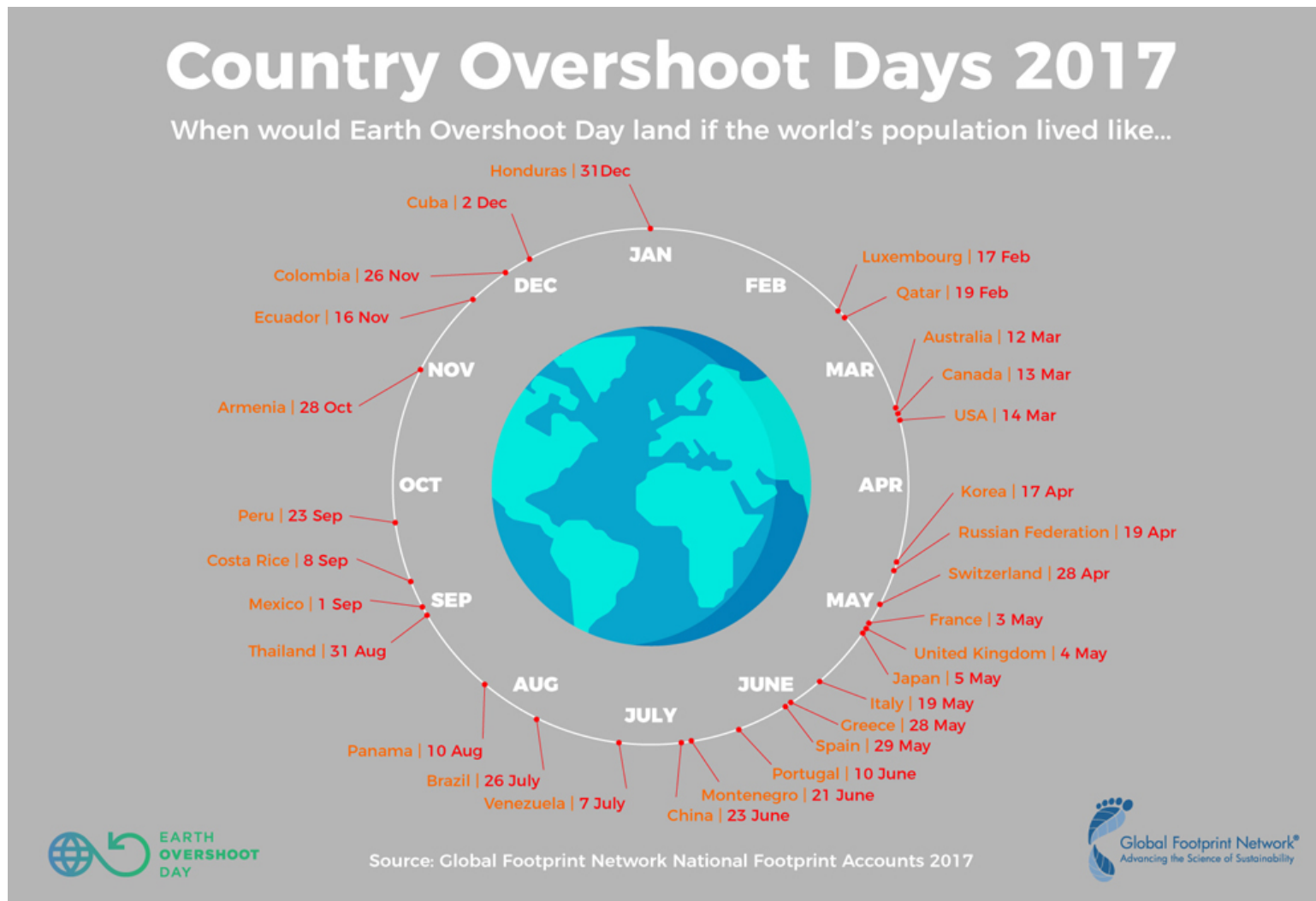
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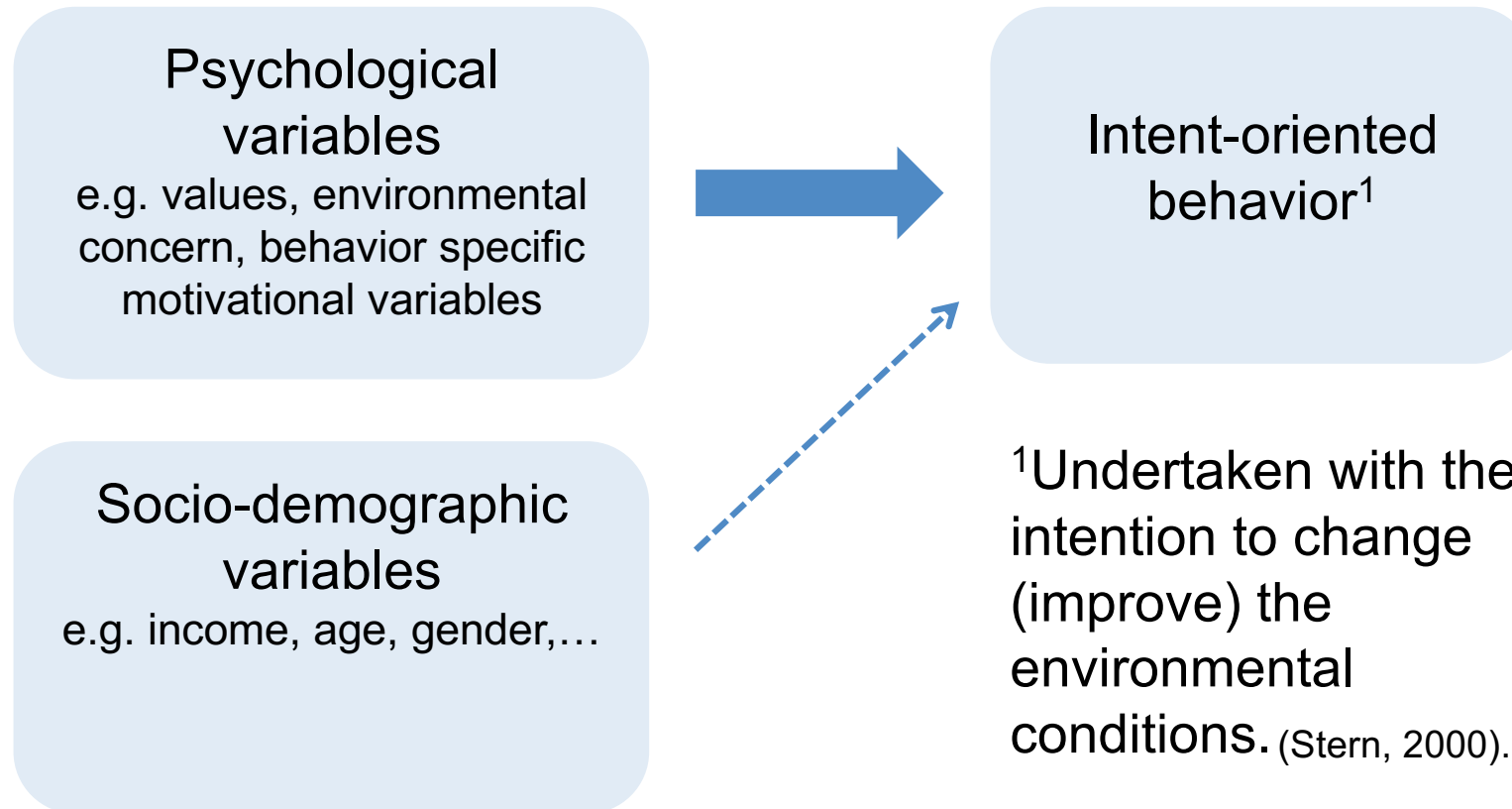[2] Ecolog-Institut, Hannover

**Symposium 'Take a walk on the green side! Predicting pro-environmental attitudes and behaviors'**
**SSP-SGP2017 Lausanne, September 4, 2017**

# Ongoing trend of
# over-consumption of natural resources

# Diverging determinants of intent-oriented and impact-oriented behavior

**Psychological variables**
e.g. values, environmental concern, behavior specific motivational variables

**Socio-demographic variables**
e.g. income, age, gender,…

**Intent-oriented behavior[1]**

[1]Undertaken with the intention to change (improve) the environmental conditions. (Stern, 2000).

# Diverging determinants under an intent-oriented or impact-oriented behavior perspective

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**Psychological variables**
e.g. values, environmental concern, behavior specific motivational variables

**Intent-oriented behavior perspective[1]**

**Socio-demographic variables**
e.g. income, age, gender,…

**Impact-oriented behavior perspective[2]**
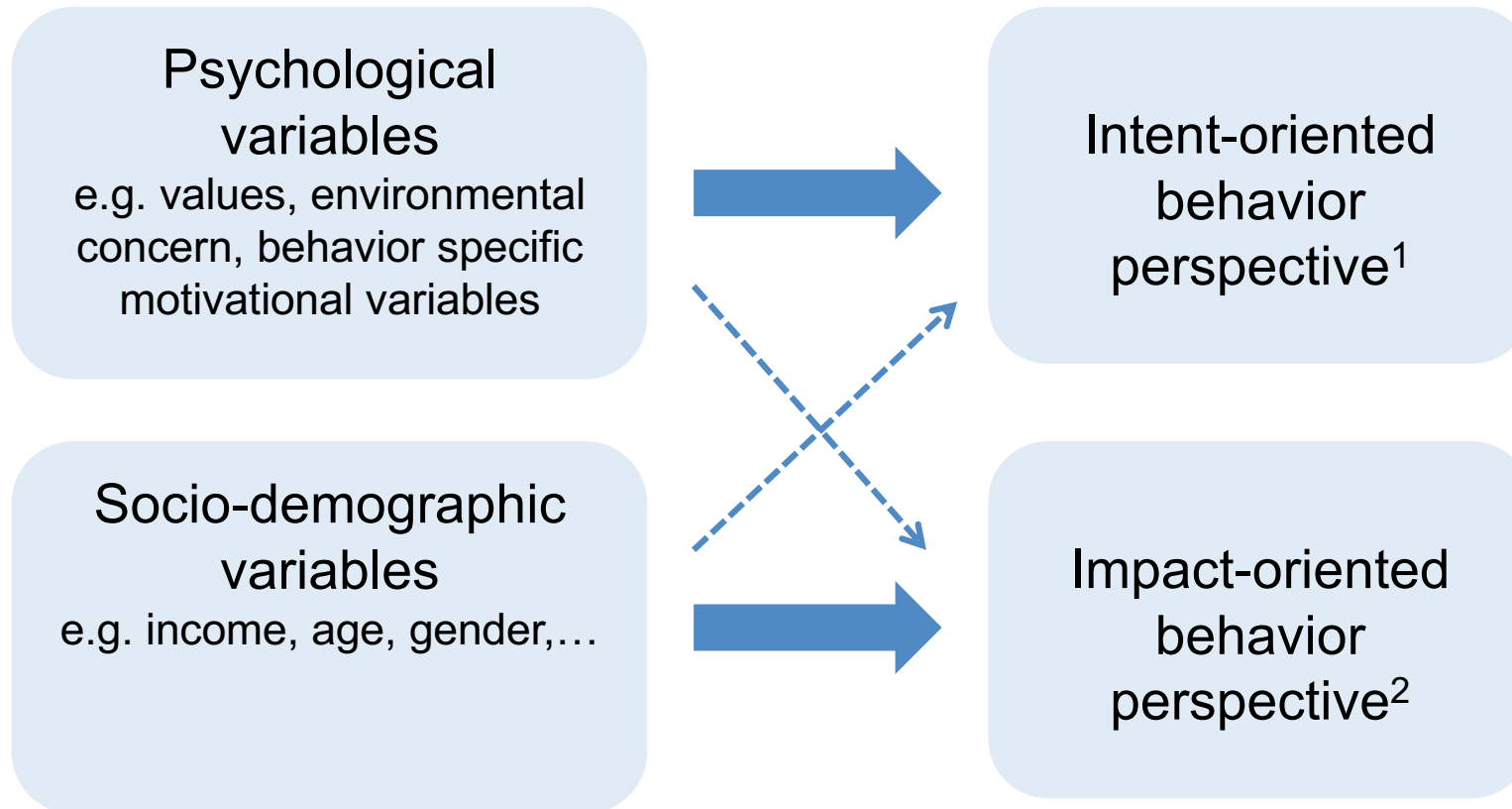
[2]Extent to which the availability of materials or energy from the environment is changed, or the structure and dynamics of ecosystems or the biosphere is altered (Stern, 2000).

(e.g. Abrahamse & Steg, 2009; Csutora, 2012; Gatersleben, et. al., 2002; Kennedy et al., 2013; 2014).

# The Present Study

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## Overall Aim:

Describe and explain individual differences in the consumption of natural resources (in particular energy use and greenhouse gas emissions).

## Aim of this Study:

Explore the diverging insights that emerge from the intent-oriented and impact-oriented research perspectives vis-à-vis environmentally significant behavior.

⇒ Does environmental self-identity explain variance not only in intent-oriented behavior, but also in impact-oriented behavior over and above socio-demographic characteristics?

— Environmental self-identity (Gatersleben, et al., 2012; Van der Werff et. al. 2013; Whitmarsh & O'Neill, 2010)

# Method: Survey Procedure

> March / April 2014

> By a Market Research Institute (GfK)

> Face-to-face interviews with CAPI (Computer Assisted Personal Interview) ~ 45min

> German speaking residents > 18 years

> Recruitment within an existing participant pool stratified for age, gender, household size, based on national proportions.

# Method: Sample Characteristics
## *N* = 1'012

*Slightly under represented:*
*High incomes*
*Slightly over represented:*
*Medium incomes*

→

*Slightly under represented:*
*Higher education*
*Slightly over represented:*
*Low and medium education*

| Characteristics | M | SD | % |
|---|---|---|---|
| Age in years | 49.8 | 17.6 | |
| Net monthly per capita income in € (income) | 1,186.7 | 624.3 | |
| Number of household members | 2.5 | 1.2 | |
| Gender | | | |
| Male | | | 49.1 |
| Female | | | 50.9 |
| Highest education level completed (education) | | | |
| Secondary school | | | 39.5 |
| Intermediate school | | | 32.7 |
| Higher education entrance qualification | | | 20.7 |
| Higher education | | | 5.6 |
| Missing | | | 1.5 |
| Home ownership | | | |
| Rental | | | 72.2 |
| Owns home | | | 27.8 |
| Residential area | | | |
| Urban | | | 59.2 |
| Rural | | | 40.8 |

(Moser & Kleinhückelkotten, 2017, Table 1)

# Method: Measures

| | Impact | Intent |
|---|---|---|
| Overall | • Overall energy use (kWh/a)<br>• Carbon footprint (kgCO$_2$e/a) | • Self-reported pro-environmental behavior<br>(two items, $\alpha$ = .76) |
| Housing | • Living space (m$^2$)<br>• Number of energy-consuming appliances | • Number of energy-efficient appliances |
| Food | • Meat consumption | • Importance of organic food |
| Mobility | • Distance in passenger car (km/a)<br>• Distance vacation trip (km) | - |

| Socio-demographics | Psychological |
|---|---|
| Age, Gender, Education, Income, Household size, Home ownership, | • Environmental self-identity<br>(two items, $\alpha$ = .74) |

# Predicting impact-oriented vs. intent-oriented behavior I

| | Pro-environmental behavior | | | Overall energy use (kWh/a) | | | Carbon footprint (kgCO$_2$e/a) | | |
|---|---|---|---|---|---|---|---|---|---|
| | $B$ | $SE$ | $\beta$ | $B$ | $SE$ | $\beta$ | $B$ | $SE$ | $\beta$ |
| Constant | 1.10 | 0.16 | | 4.17 | 0.05 | | 3.68 | 0.05 | |
| Age | 0.00 | 0.00 | .00 | 0.00 | 0.00 | −.12** | 0.00 | 0.00 | −.13*** |
| Gender (male = 0) | −0.05 | 0.04 | −.03 | −0.06 | 0.01 | −.13*** | −0.06 | 0.01 | −.16*** |
| Education | −0.04 | 0.03 | −.04 | 0.00 | 0.01 | −.02 | 0.00 | 0.01 | .00 |
| Income | 0.00 | 0.00 | −.01 | 0.00 | 0.00 | .25*** | 0.00 | 0.00 | .27*** |
| Number of household members | −0.01 | 0.03 | −.01 | −0.02 | 0.01 | −.10* | −0.02 | 0.01 | −.09* |
| Owns home (rental = 0) | −0.07 | 0.05 | −.03 | 0.10 | 0.02 | .22*** | 0.08 | 0.01 | .19*** |
| Urban vs. rural region | 0.07 | 0.04 | .04 | 0.00 | 0.01 | .01 | 0.00 | 0.01 | −.01 |
| Environmental self-identity | 0.66 | 0.02 | .70*** | −0.02 | 0.01 | −.09** | −0.02 | 0.01 | −.08** |
| $R^2/R^2$adj | | .52/.51 | | | .19/.19 | | | .20/.19 | |
| $F$ | | 123.03*** | | | 27.46*** | | | 28.97*** | |
| $N$ | | 934 | | | 935 | | | 935 | |

(Moser & Kleinhückelkotten, 2017, Table 3)

SI & PEB: low values = high SI /PEB
OE & CF: low values = low impact

# Predicting impact-oriented vs. intent-oriented behavior II

| | Living space (m²) | | | Household appliances (kWh/a) | | | Energy-efficient appliances | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| Constant | 1.63 | 0.03 | | 3.00 | 0.05 | | 1.50 | 0.20 | |
| Age | 0.00 | 0.00 | .10*** | −.00 | 0.00 | −.09* | −.01 | 0.00 | −.18*** |
| Gender (male = 0) | 0.01 | 0.01 | .03 | .00 | 0.01 | .00 | .14 | 0.05 | .08** |
| Education | 0.01 | 0.00 | .03 | −.02 | 0.01 | −.09** | −.02 | 0.03 | −.02 |
| Income | 0.00 | 0.00 | .21*** | .00 | 0.00 | .09* | .00 | 0.00 | .21*** |
| Number of household members | −0.09 | 0.00 | −.58*** | −.08 | 0.01 | −.42*** | −.16 | 0.03 | −.22*** |
| Owns home (rental = 0) | 0.15 | 0.01 | .37*** | .01 | 0.02 | .02 | .30 | 0.06 | .16*** |
| Urban vs. rural region | 0.01 | 0.01 | .02 | −.00 | 0.01 | −.01 | −.06 | 0.05 | −.03 |
| Environmental self-identity | −0.01 | 0.00 | −.04* | −.03 | 0.01 | −.13*** | −.13 | 0.03 | −.15*** |
| $R^2/R^2$adj | | .65/.64 | | | .22/.21 | | | .19/.18 | |
| F | | 209.10*** | | | 32.79*** | | | 25.06*** | |
| N | | 927 | | | 935 | | | 892 | |

(Moser & Kleinhückelkotten, 2017, Table 4)

SI: low values = high SI
LS & HA: low values = low impact
EEA: low values = low impact

# Predicting impact-oriented vs. intent-oriented behavior III

| | Meat consumption | | | Organic foods | | | Car trips (km/a) | | | Vacation trips (km) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β | B | SE | β |
| Constant | 3.26 | 0.22 | | 2.73 | 0.17 | | 0.83 | 0.42 | | 3.56 | 0.44 | |
| Age | 0.00 | 0.00 | .02 | 0.00 | 0.00 | −.04 | −0.01 | 0.00 | −.10** | 0.00 | 0.00 | −.05 |
| Gender (male = 0) | 0.59 | 0.06 | .32*** | −0.21 | 0.04 | −.14*** | −0.58 | 0.11 | −.15*** | 0.04 | 0.11 | .02 |
| Education | −0.02 | 0.04 | −.02 | −0.11 | 0.03 | −.13*** | −0.13 | 0.07 | −.06 | 0.02 | 0.07 | .02 |
| Income | 0.00 | 0.00 | −.04 | 0.00 | 0.00 | −.05 | 0.00 | 0.00 | .43*** | 0.00 | 0.00 | .41*** |
| Number of household members | −0.07 | 0.03 | −.09* | −0.04 | 0.03 | −.05 | 0.84 | 0.07 | .48*** | 0.20 | 0.07 | .17** |
| Owns home (rental = 0) | −0.01 | 0.07 | −.01 | −0.24 | 0.05 | −.14*** | 0.42 | 0.14 | .10** | 0.19 | 0.13 | .07 |
| Urban vs. rural region | 0.08 | 0.06 | .04 | −0.08 | 0.04 | −.05 | 0.32 | 0.11 | .08** | −0.24 | 0.11 | −.09* |
| Environmental self-identity | −0.09 | 0.03 | −.09** | 0.32 | 0.02 | .39*** | −0.22 | 0.06 | −.11*** | 0.04 | 0.06 | .03 |
| $R^2/R^2$adj | | .13/.12 | | | .27/.26 | | | .34/.33 | | | .15/.14 | |
| F | | 16.97*** | | | 42.90*** | | | 55.56*** | | | 10.23*** | |
| N | | 934 | | 475 | 934 | | | 891 | | | 475 | |

(Moser & Kleinhückelkotten, 2017, Table 5)

SI & OF: low values = high SI & OF
MC: low values = high impact
CT & VT: low values = low impact

# Discussion

In sum we found …

— Environmental self-identity predicts intent-oriented behaviors (PEB, EE appliances, organic food)

— But plays an ambiguous role in explaining the environmental impact of a person

— Income plays the major role in predicting environmental impact, but is not the only relevant socio-demographic predictor

$\Rightarrow$ Good intents but low impacts:
Pro-environmentally motivated people try to reduce their energy consumption and greenhouse gas emissions but they remain with low impact behaviors.

# Discussion

$\Rightarrow$ Pro-environmentally motivated people try to reduce their energy consumption and greenhouse gas emissions but they remain with low impact behaviors.

**Potential explanations:**

> Lacking knowledge about the impacts of environmentally-friendly behavior => wrong decisions? (Csutora, 2012)

> Psychological variables => easy behaviors, structural factors => difficult behaviors (Whitmarsh, 2009)

> Going together of materialistic beliefs and environmental concern (Gatersleben et al. 2010)

$\Rightarrow$ efficiency, but no sufficiency measures?

$\Rightarrow$ Individuals' pro-environmental motivation is overridden by the overall effect of various consumption options that open up with higher socioeconomic status.

# Implications

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> Does environmental-psychological research focus on the relevant behaviors?

> Does environmental-psychological research focus on the relevant target groups?

> Which theories and concepts help us to go beyond single behavior and rather investigate / changing lifestyle patterns?

> How may western living standards / subjective well-being be decoupled from environmental impact?

# Thank you for your attention!

For questions and comments:
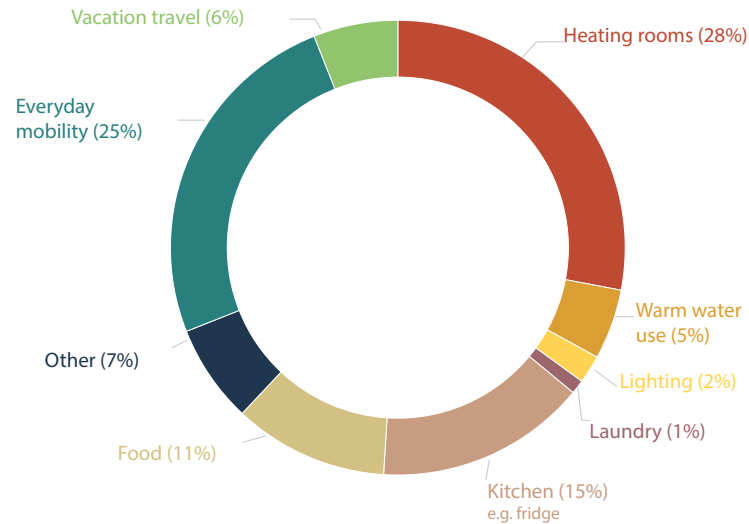
stephanie.moser@cde.unibe.ch

## Publications:

> Kleinhückelkotten, S., Neitzke, H.-P., & Moser, S. (2016). *Repräsentative Erhebung von Pro-Kopf- Verbräuchen natürlicher Ressourcen in Deutschland (nach Bevölkerungsgruppen). Texte | 39/2016*. Dessau-Rosslau: Umweltbundesamt.

> Moser, S., & Kleinhückelkotten, S. (2017). Good Intents, but Low Impacts: Diverging Importance of Motivational and Socioeconomic Determinants Explaining Pro-Environmental Behavior, Energy Use, and Carbon Footprint. *Environment and Behavior*, DOI:10.1177/0013916517710685

> Moser, S., Lannen, A., Kleinhückelkotten, S., Neitzke, H. P., & Bilharz, M. (2016). *Good intentions, big footprints: Facing household energy use in rich countries* (CDE Policy Brief No.9). Bern: CDE.
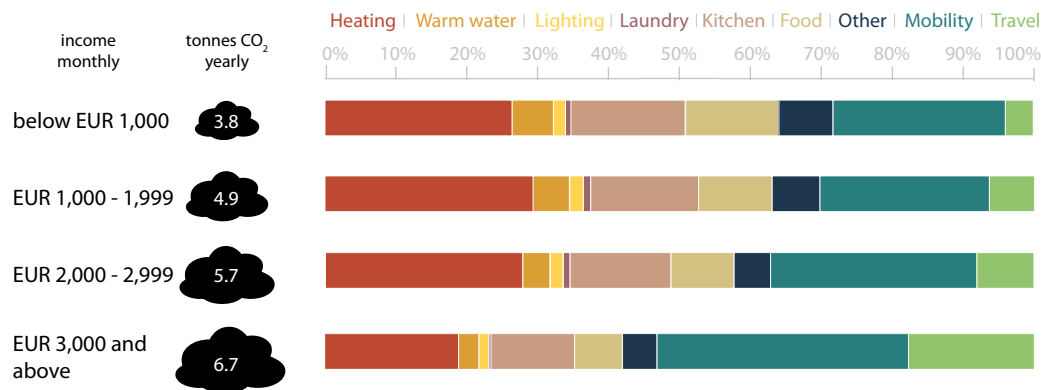
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> Moser, S., & Kleinhückelkotten, S. (2017). Good Intents, but Low Impacts: Diverging Importance of Motivational and Socioeconomic Determinants Explaining Pro-Environmental Behavior, Energy Use, and Carbon Footprint. *Environment and Behavior*, DOI:10.1177/0013916517710685

> Moser, S., Lannen, A., Kleinhückelkotten, S., Neitzke, H. P., & Bilharz, M. (2016). *Good intentions, big footprints: Facing household energy use in rich countries* (CDE Policy Brief No.9). Bern: CDE.

> Whitmarsh, L, & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology, 30*(3), 305-314.

> Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology, 29*(1), 13-23.

> van der Werff, E, Steg, Li, & Keizer, K. (2013). It is a moral issue: The relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. *Global Environmental Change, 23*(5), 1258-1265.

# Overall Consumption

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Vacation travel (6%)
Heating rooms (28%)
Everyday mobility (25%)
Warm water use (5%)
Lighting (2%)
Laundry (1%)
Other (7%)
Food (11%)
Kitchen (15%) e.g. fridge

Contribution of different consumption areas to annual per capita $CO_2$ emissions
(Moser, et al., 2016, Fig.1)



| income monthly | tonnes $CO_2$ yearly |
|---|---|
| below EUR 1,000 | 3.8 |
| EUR 1,000 - 1,999 | 4.9 |
| EUR 2,000 - 2,999 | 5.7 |
| EUR 3,000 and above | 6.7 |

Heating | Warm water | Lighting | Laundry | Kitchen | Food | Other | Mobility | Travel
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Per capita $CO_2$ emissions and consumption area shares according to income groups
(Moser, et al., 2016, Fig.2)

# Assessment and calculation of overall energy use (example)



Per-capita overall energy use

Housing + Transportation + Consumption

Daily Transportation + Vacation trips

Leisure trips + Communter trips + Shopping trips / Household size

$$\text{Distance home - work}^a \times 2 \; \times \; \text{Number of trips per week}^b / 5 \; \times \; ( \; 106^c \times \text{Vehicle power consumption in summer} \; + 105^c \times \text{Vehicle power consumption in winter} \; )$$

$f$ (Vehicle type[d]; If passenger car: Engine type[e]; Type of fuel[f])
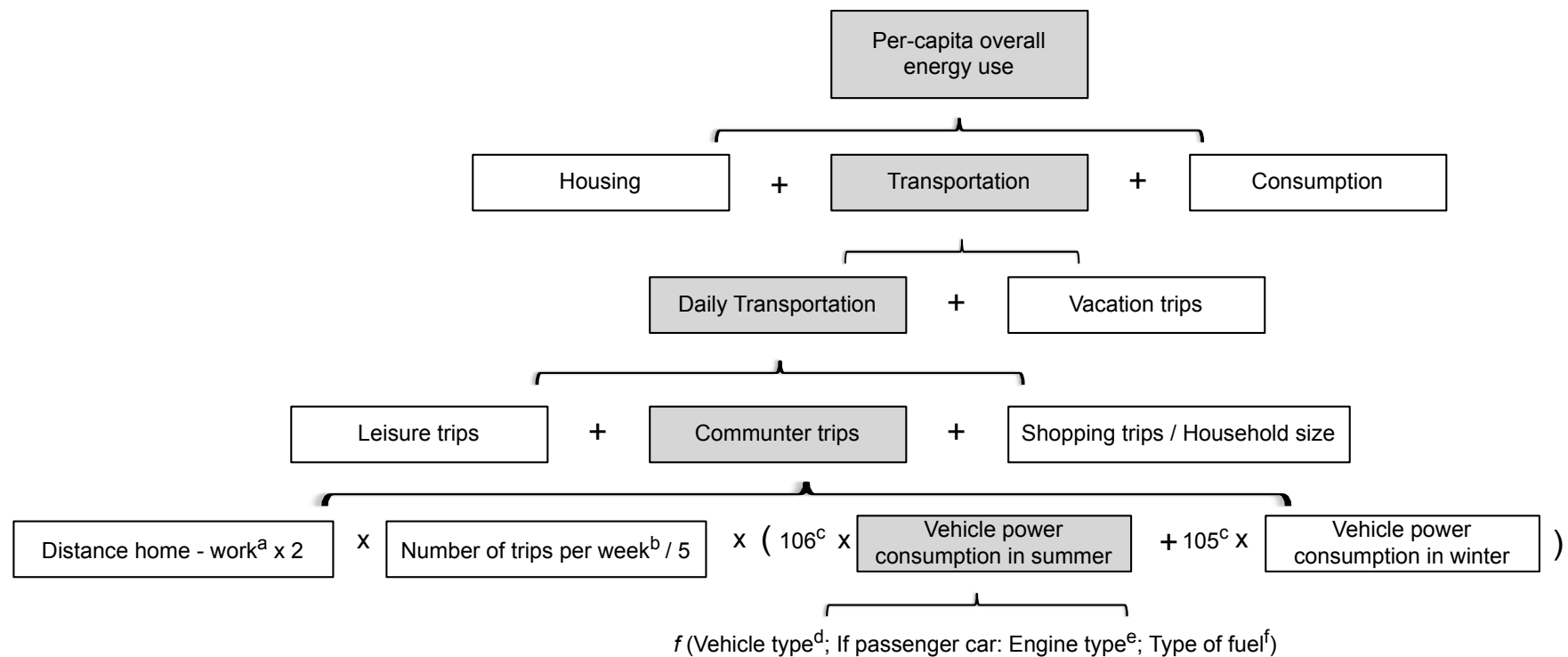
(Moser & Kleinhückelkotten, 2017, Online Appendix)

# Assessment of PEB and SI

**Pro-environmental behavior**

> "I organize my daily life so as to use as few natural resources as possible"

> "I even try to use as few natural resources as possible when it requires substantial extra costs and effort"

**Environmental self-identity**

> "I think of myself as a consumer who cares about saving natural resources"

> "A resource-saving lifestyle is an important part of who I am"

5-point scale, ranging from 1 = "I totally agree" to 5 = "I totally disagree"
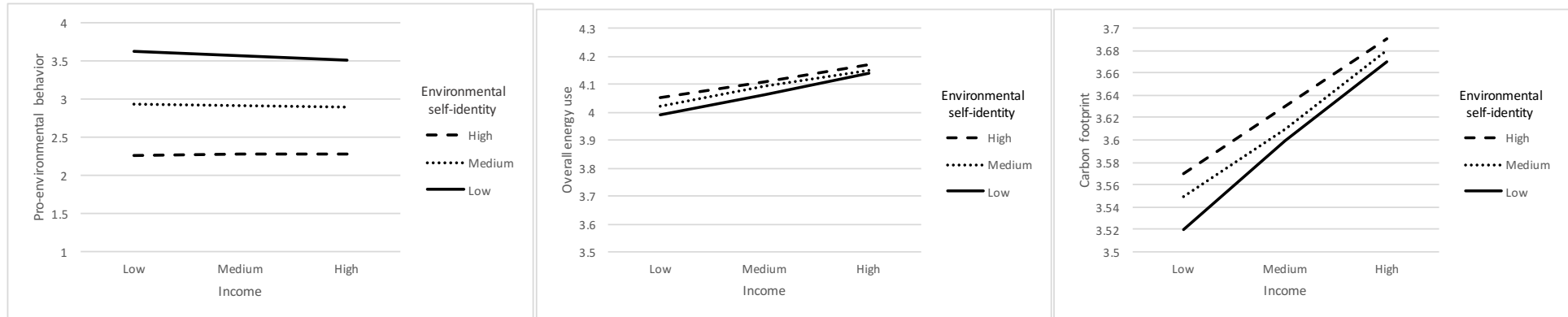
# Interaction between Income and SI



Table C1: *Linear models predicting pro-environmental behavior, overall energy use, and carbon footprint (moderation analysis)*

|  | Pro-environmental behavior | | | | Overall energy use (kWh/a) | | | | Carbon footprint (kgCO$_2$e/a) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | B | S.E. | t | p | B | S.E. | t | p | B | S.E. | t | p |
| Constant | 2.92 | .02 | 140.21 | .000 | 4.09 | .01 | 629.63 | .000 | 3.61 | .01 | 608.57 | .000 |
| Env. Self-identity (centered) | .68 | .02 | 29.65 | .000 | -.02 | .01 | -3.49 | .001 | -.02 | .01 | -3.08 | .002 |
| Income (centered) | .00 | .00 | -1.03 | .306 | .00 | .00 | 9.06 | .000 | .00 | .00 | 9.76 | .000 |
| Income x Env. Self-identity | -.00 | .00 | -1.49 | .138 | .00 | .00 | .90 | .364 | .00 | .00 | 1.27 | .205 |
| $R^2$ | .51 | | | | .13 | | | | .14 | | | |
| N | 945 | | | | 946 | | | | 946 | | | |

*Notes.* Due to their skewed distribution, overall energy use and carbon footprint were log-transformed.



(Moser & Kleinhückelkotten, 2017; Online Appendix)

| | Living space (m$^2$) | | | | Household appliances (kWh/a) | | | | Energy-efficient appliances | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | B | S.E. | t | p | B | S.E. | t | p | B | S.E. | t | p |
| Constant | 1.57 | .00 | 328.08 | .000 | 2.67 | .01 | 400.77 | .000 | .71 | .03 | 27.08 | .000 |
| Env. Self-identity (centered) | -.01 | .01 | -1.12 | .261 | -.02 | .01 | -2.90 | .004 | -.14 | .03 | -5.70 | .000 |