BOKU UNIVERSITY

13th International Conference on Transport Survey Methods
2025
Da Nang Vietnam
Covering Blind Spots of the Transport Datascape in Times of Turbulence
March 30-April 4
2025

Combining TPB and trip characteristics to explain children's active travel

Authors: Juliane Stark, Reinhard Hössinger

Department of Landscape, Water and Infrastructure, Institute of Transport Studies

WWW.YOUNG-MOBILITY.AT

Workshop 1: "Capturing walking and cycling behaviours"

TRA:WELL transport & wellbeing

oead Agentur für Bildung und Internationalisierung

Bundesministerium Bildung, Wissenschaft und Forschung

13th International Conference on Transport Survey Methods, March 30th - 4th April, 2025, Da Nang, Vietnam

Research focus

- Examining strength of the relationship between attitudes, intentions, and behavior in children's travel choices, considering extrinsic factors like trip characteristics
- Theory of Planned Behavior (TPB) focuses on individual dispositions but may not fully capture context-dependent travel decisions
- Combining TPB with trip-based models links social-psychological insights with transport planning

Objectives

- To gain insights on individual & situational factors for children's travel decisions based on an integrative approach
- To examine the influence of TPB constructs on walking and cycling
- To develop trip-based models to assess the impact of trip-specific situational factors on mode choice
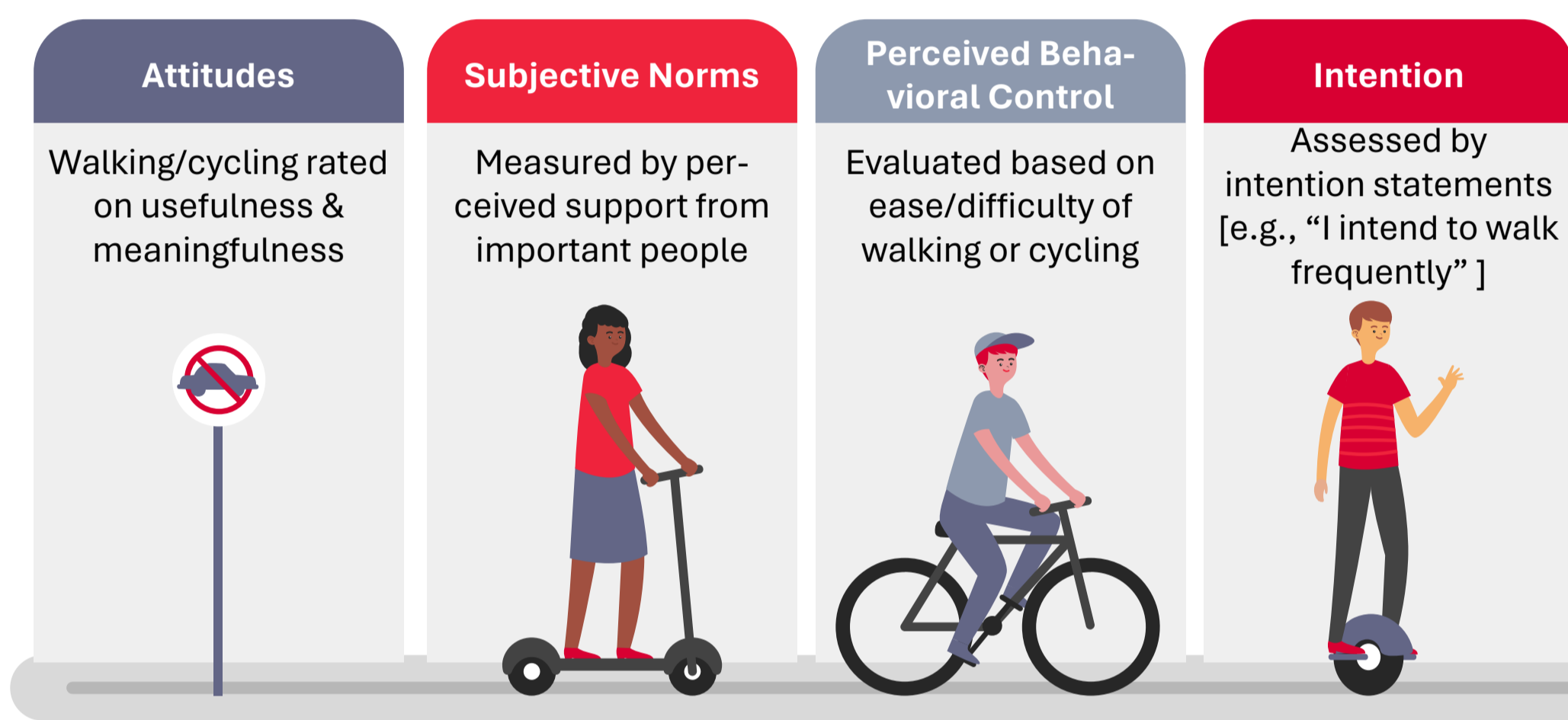
Survey approach & participants

- Sample: 71 children (10-14) from 3 secondary schools, 1,265 trips recorded
- Data collection: April–May 2023
- Attitude surveys: in class with supervision
- Trip Data: Collected via a 7-day online travel diary with researcher support

SCAN ME

Questionnaires

Attitude questionnaire

- Introduction:
  - Not an exam, no wrong answers, skipping questions allowed
  - Asked children to think about typical trips
  - Two fill-in examples
- Response format: 5-point Likert scales
- Constructs (TPB Predictors):

Attitudes	Subjective Norms	Perceived Behavioral Control	Intention
Walking/cycling rated on usefulness & meaningfulness	Measured by perceived support from important people	Evaluated based on ease/difficulty of walking or cycling	Assessed by intention statements [e.g., "I intend to walk frequently"]

Travel diary

- Survey levels: person, day, trip, trip stage
- Socio-demographics:
  - Household car ownership, bike/scooter availability, pt-subscription, walking distance to transit stops
  - Living situation, …, Health status, …
- Trip details:
  - Origin & destination [addresses]
  - Trip purpose [e.g., school, sports, shopping]
  - Weather conditions [multiple selections possible]
  - Mode choice decision-maker [child, adult, joint decision]
  - Option to report undirected trips [e.g., hanging out]
- Trip stage data:
  - Travel mode, duration, companions [alone, friends/siblings, parents/adults, accompanying someone]
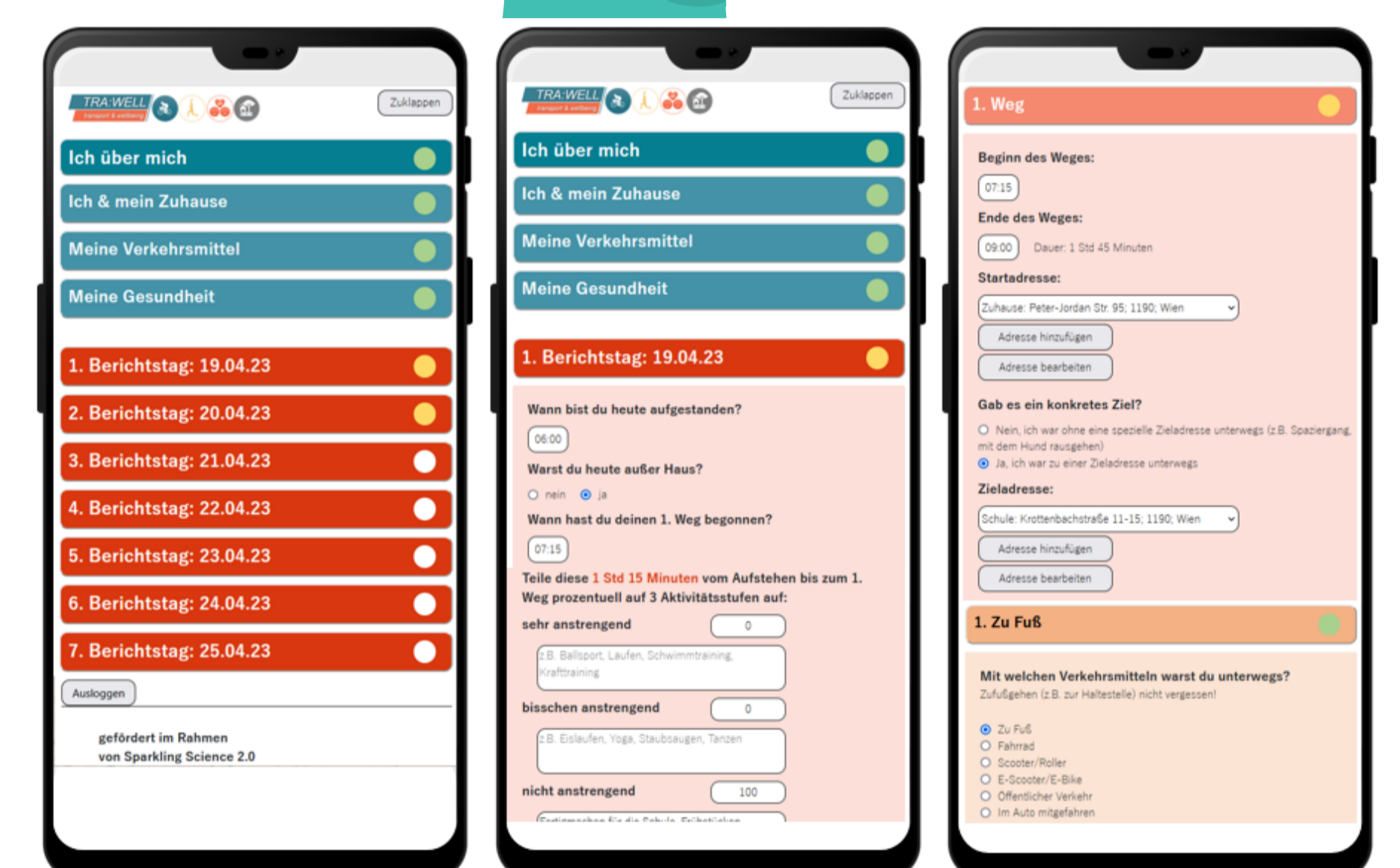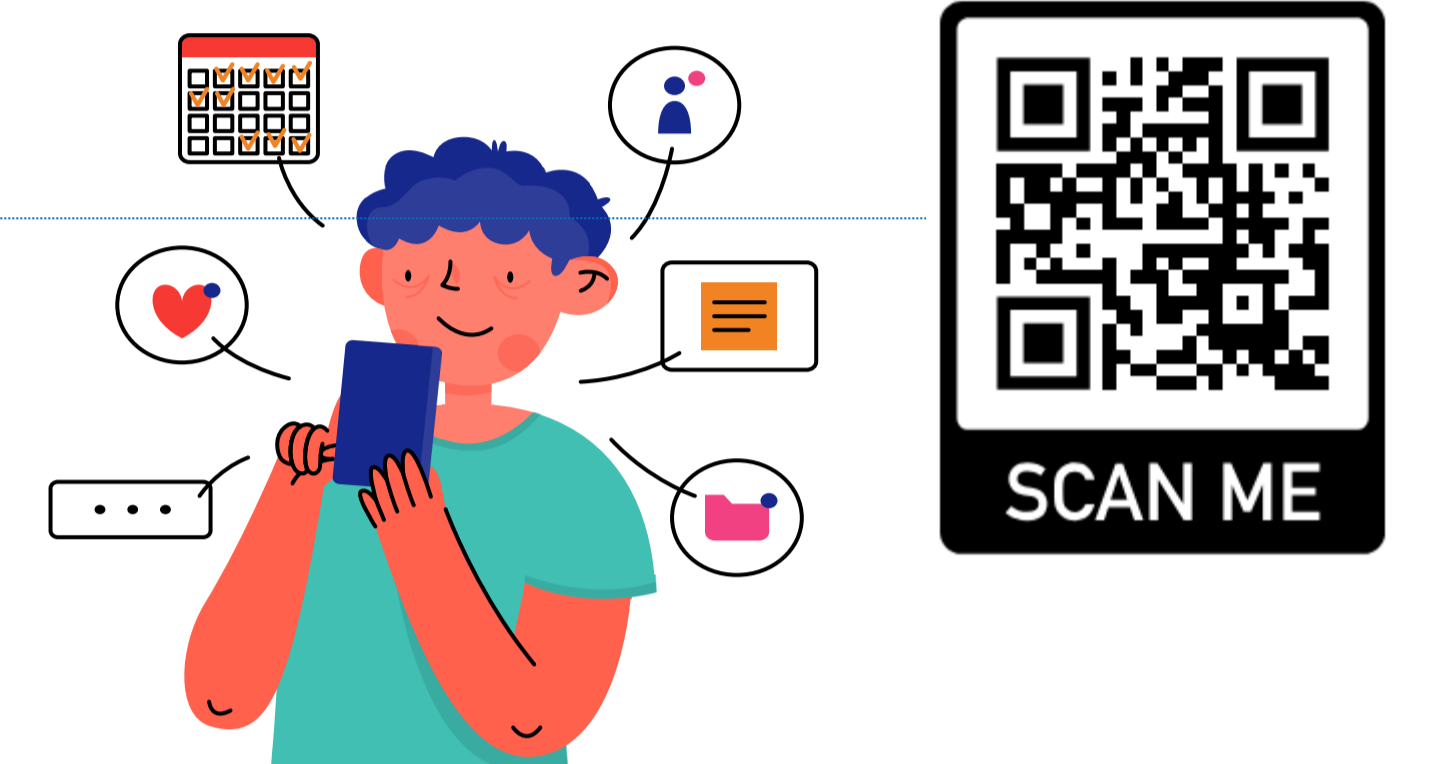
Figure 1: Examples of screenshots of the questionnaire (in German)

Results

Model for walking

- Trip characteristics increased r-squared of walking: 0.03 to 0.11
- Walking ↑ with **decision freedom** and when trips have **no specific target**, walking ↓ with ↑ **trip distance** & ↓ **walking distance to pt**

WALKING
Free choice
No target
Trip distance
Next pt stop

CYCLING
Free choice
Pt- subscription
Good weather

Model for bicycle use

- Trip characteristics increase r-squared of behavior from 0.11 to 0.20
- Bicycle use ↓ if a **public transit subscription** is available and ↑ with children's **freedom of choice** and **good weather conditions**
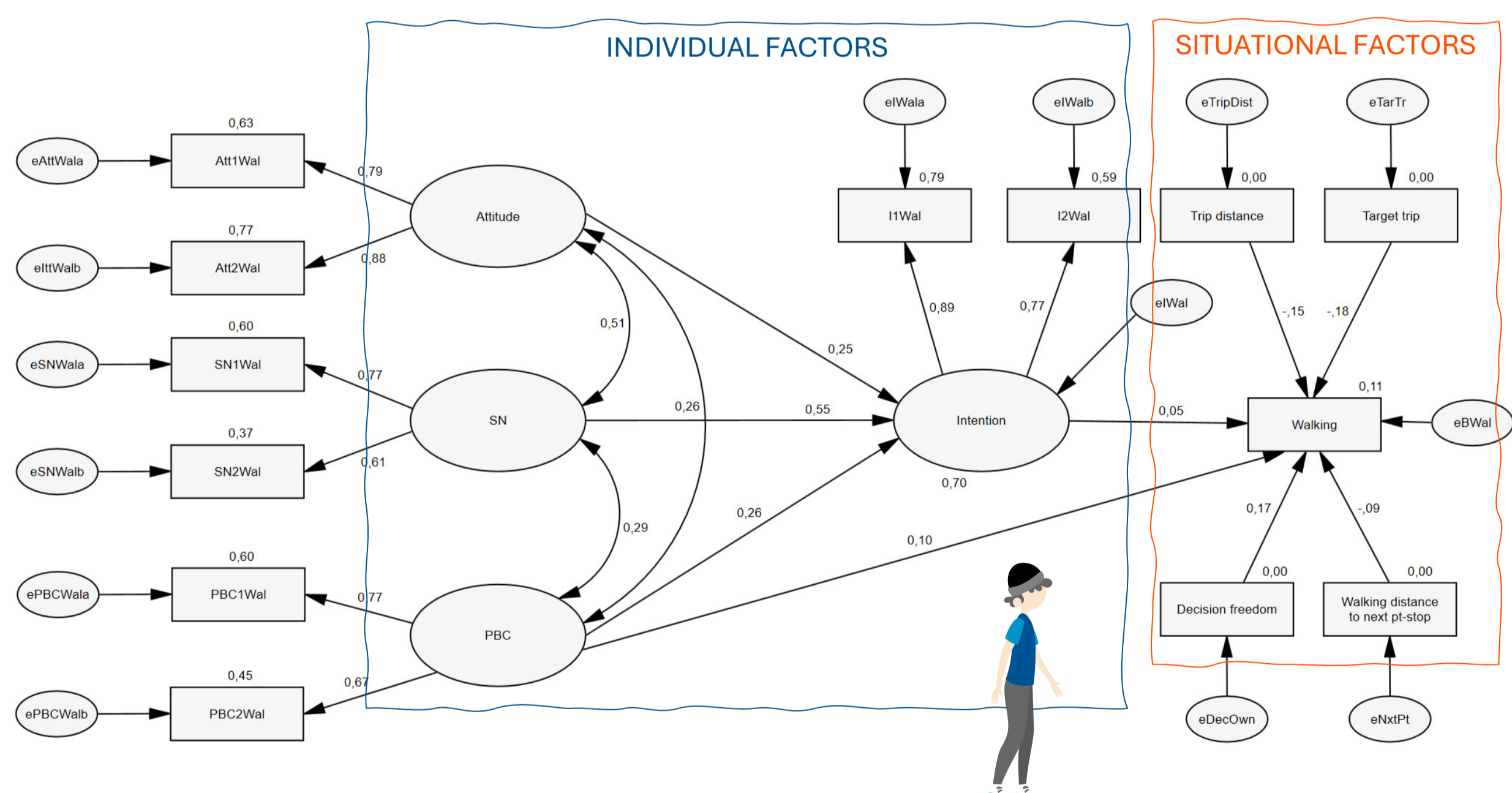
Structural equation models performed using max.likelyhood estimation (IBM SPSS AMOS 27.0.0)

BEHAVIOR
= main response variable
= time share of cycling / walking
(0 to 1)

Multiple answers on weather conditions assigned to a single "factor of good weather" (increases with sunny & warm & decreases with rainy & cold)
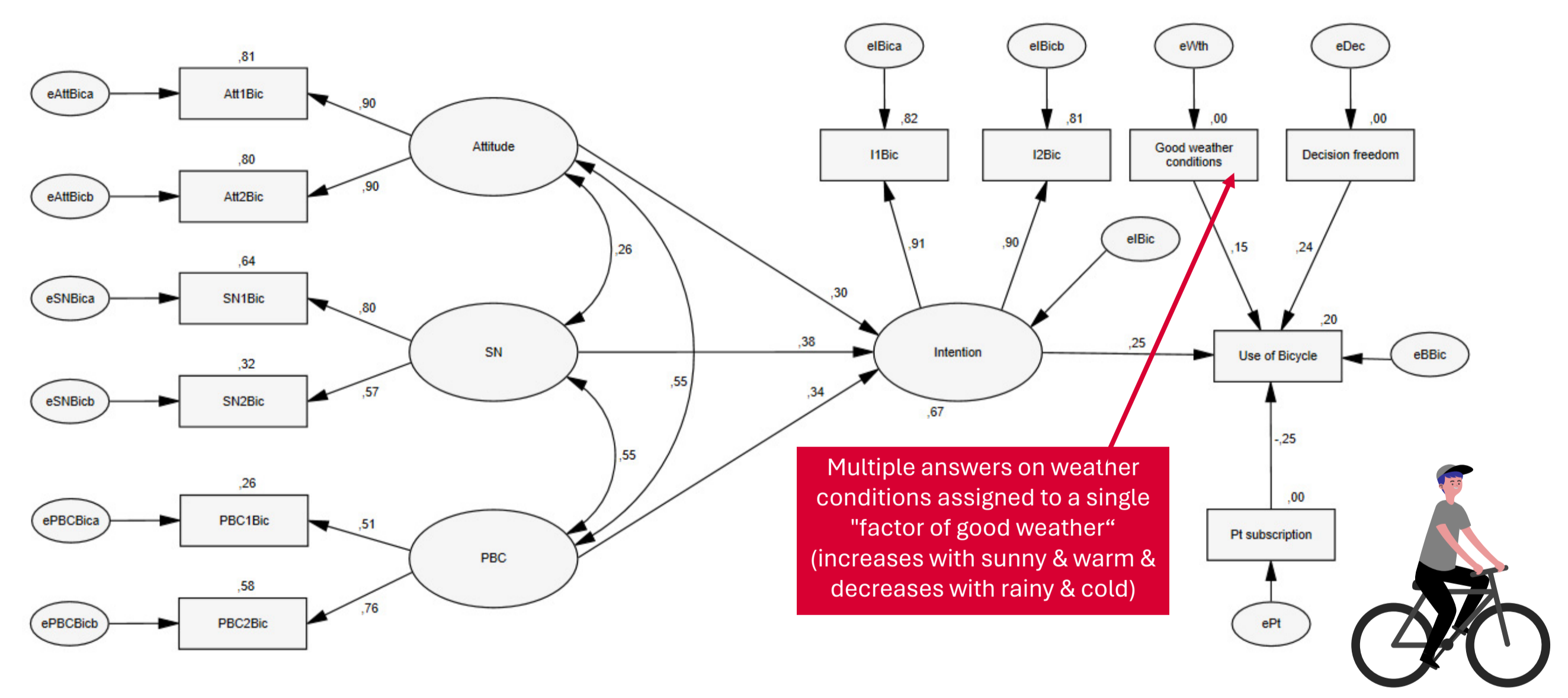
Figure 2: Structural equation model for bicycle use with standardized path coefficients and explained variances in intentions and behavior. N = 1,265 trips. ATT = attitude; SN = subjective norm; PBC = perceived behavioral control; INT = intention; B = behavior. GFI=0.923, AGFI=0.879, RMSEA=0.099, CFI=0.833

Figure 3: Structural equation model for bicycle use with standardized path coefficients and explained variances in intentions and behavior. N = 1,265 trips. ATT = attitude; SN = subjective norm; PBC = perceived behavioral control; INT = intention; B = behavior. GFI=0.927, AGFI=0.881, RMSEA=0.096, CFI=0.897

Discussion

- Situational factors matter: Strong predictive power of trip characteristics (e.g., distance, decision freedom, weather)
- Cycling better explained than walking, as children view cycling as a deliberate choice, while walking is often seen as routine movement rather than a transport mode
- Children's travel behavior is less well explained by TPB compared to adults, possible reasons:
  - Weaker link between disposition and behavior in children due to lower autonomy and more impulsive decisions
  - Different measurement approach - assessing actual trips instead of generalized self-assessments, which may introduce greater variance but reduce bias

For more information: see full paper, for survey method: see also Stark et al.: "Intersecting mobility and physical activity: A comprehensive multi-day survey approach for assessing movement behavior in early adolescence" (ISCTSC 2025)

Conclusions

- Contribution: Integrating TPB with trip characteristics helps understand both psychological and situational factors influencing children's active travel
- Implications:
  - Strategies should highlight walking's benefits and make it more engaging
  - Different approaches may be needed for walking vs. cycling promotion
- Autonomy matters: Children's freedom to choose their travel mode significantly impacts their mobility behavior
- Further studies are needed to explore additional factors shaping children's travel patterns

Illustrations: Pixabay, Slidesgo