
TwinLife
User Conference 2025
Universität
Bremen

The Organizing Committee

Universität Bremen

TwinLife User Conference 2025

Basic Information

TwinLife

Registration and Certificate

- Regristration desk in room B2880
  - Today: 16:30 – 19:00
  - Tomorrow: 08:30 – 10:00

- Badges and lunch vouchers

- Certificate of attendance

TwinLife

Access and Equipment

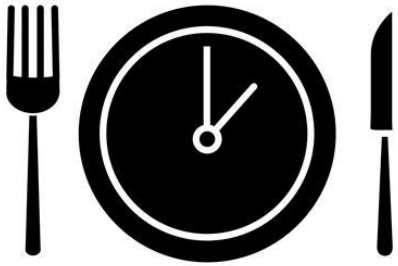
- WiFi
- Projectors and microphone
- Spaces for chats and meetings

TwinLife

Food and Drinks

- Coffee breaks (floor GW2)
  - Thursday morning: 09:45 – 10:15
  - Thursday afternoon: 15:20 – 15:50
  - Friday morning: 10:15 – 10:45

- Lunch (mensa)
  - Thursday: 12:30 – 13:30
  - Friday: 12:30 – 13:30

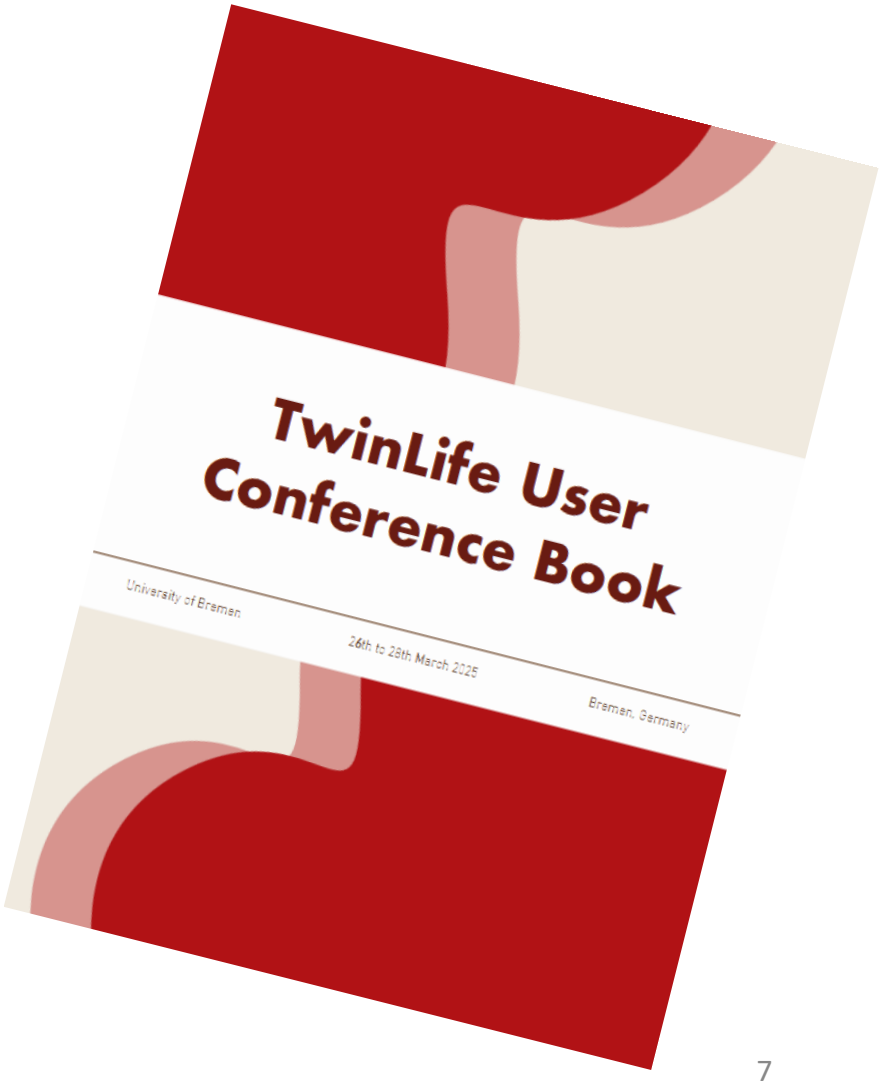


- Get Together at Café Unique (Today !!!)

TwinLife

Basic Rules of Conduct

- If you want to say hello, say: **„Moin!“** (/ˈmɔɪn/)
- If you want to say hello and talk to someone, say: **„Moin, moin!“**
- If you do not know where you are and who you are, please call this number: **+49(0)421 218-68770 / 68772**
- **See conference book for more information!**



TwinLife

A behavioral genetic study on the development of social inequality

Past, Present, and Future

Universität Bremen

TwinLife User Conference 2025

The History of TwinLife

TwinLife

Once upon a time…

…there was an idea !!!

Rainer Riemann

UNIVERSITÄT BIELEFELD

Martin Diewald

UNIVERSITÄT BIELEFELD

Frank Spinath

UNIVERSITÄT DES SAARLANDES

TwinLife

Establishment of a…

German Twin Family Panel

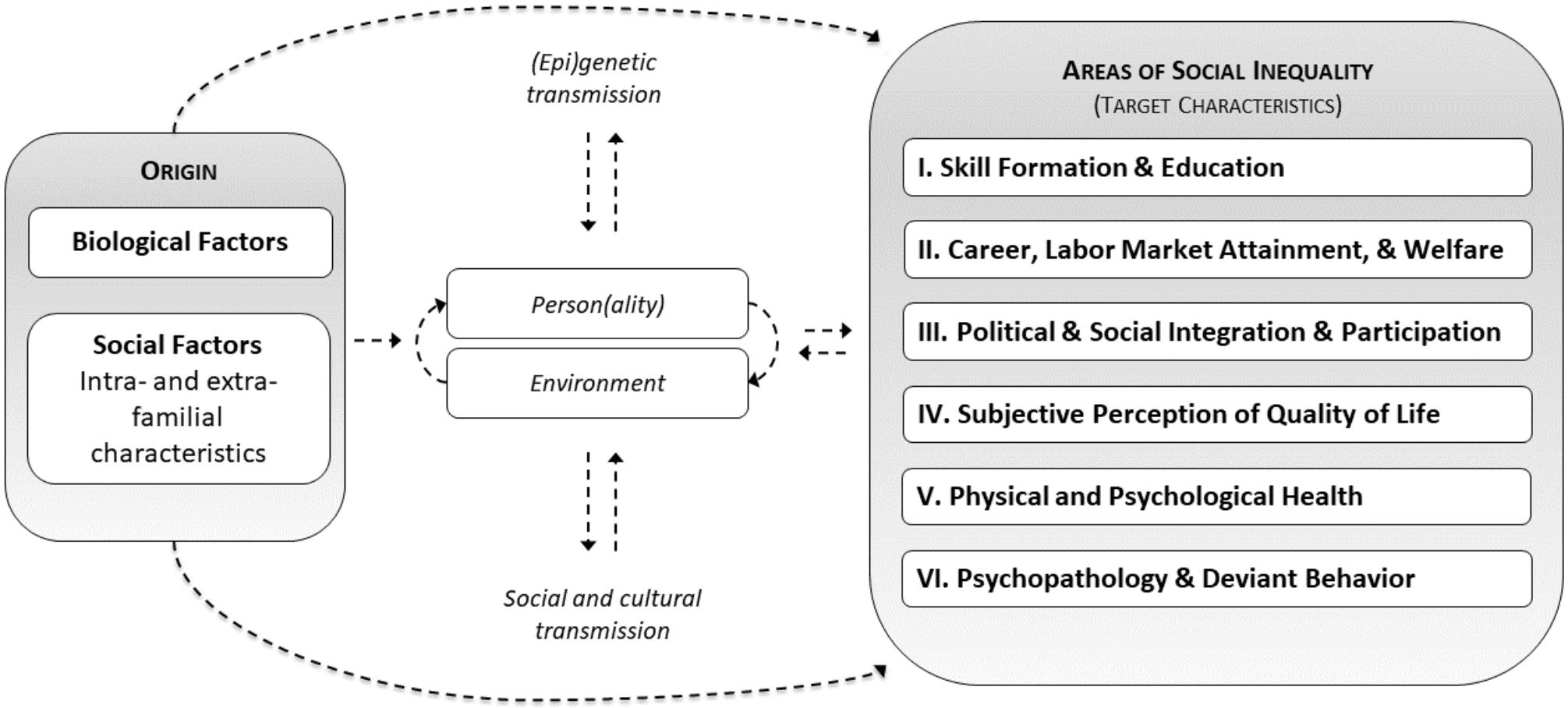
to investigate

→ psychological and sociological sources and mechanisms of the development of differences in life chances

→ the major individual, intra- and extrafamilial, and other contextual influences on a successful development

→ the role of the complex interplay between environmental resources / risk factors and genetic differences for the development of social inequalities

Basic Concept



Realizing a…

Multidisciplinary Perspective & Special Study Design

- Bringing together sociology, psychology, and behavior genetics

- Combination of a multi-cohort, cross-sequential, and an extended twin family design
  - 4 different twin birth cohorts in Germany (5, 11, 17, and 23 years of age)
  - 5 waves and 9 measurement occasions (one year apart)
  - 8-year time span per each individual
  - major developmental age range: 5 to 31 years of age

Multi-Cohort Cross-Sequential Twin-Family Design

Cohort 4
*1990-1993
(~23 years)
F2F 1

Cohort 3
*1997/1998
(~17 years)
F2F 1

Cohort 2
*2003/2004
(~11 years)
F2F 1

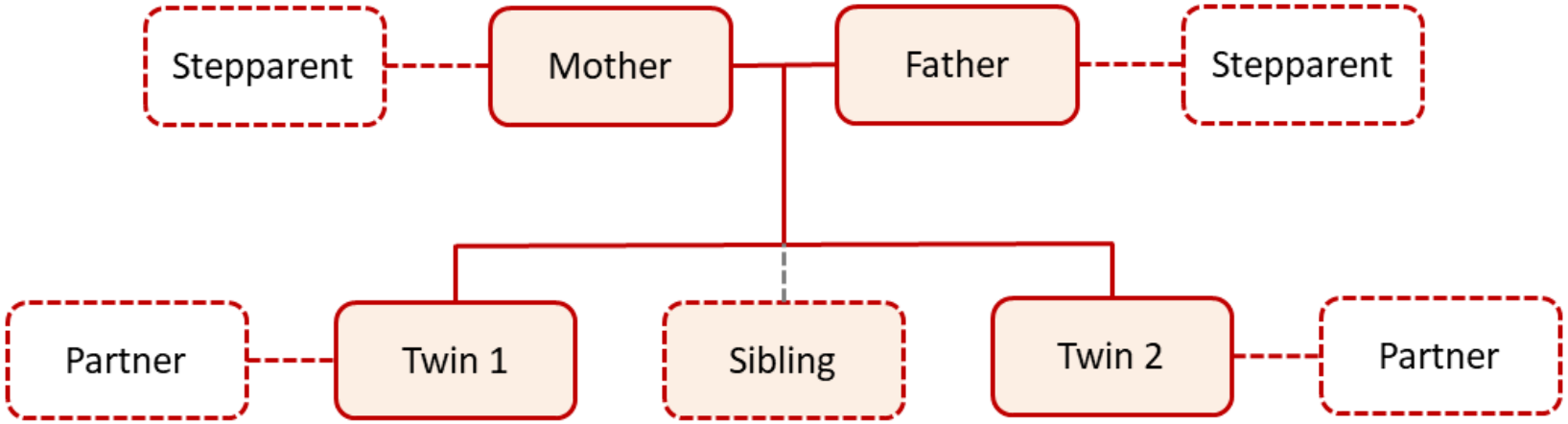
Cohort 1
*2009/2010
(~5 years)
F2F 1

Cohort *born in (age 1st interview)*	2014	2015

→ **population-based sample of >4,000 twin families**

→ **about 500 MZ and 500 DZ twin pairs per cohort**

→ **extended twin family design**



→ **Face-to-Face interviews of > 16.500 individuals**

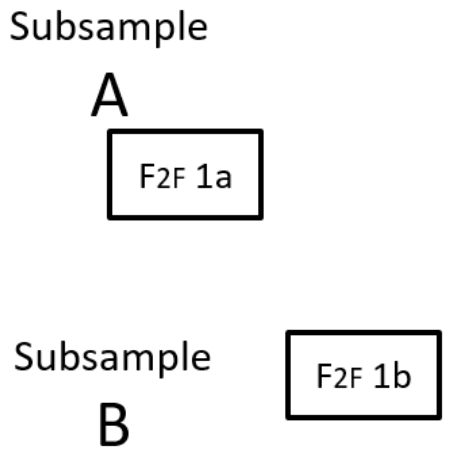
UNIVERSITÄT BIELEFELD TwinLife UNIVERSITÄT DES SAARLANDES

Multi-Cohort Cross-Sequential Twin-Family Design

- ~ 12,000 twin births per year in Germany from 1990 to 2010 → **8 to 10% of all twin births** had to be reached

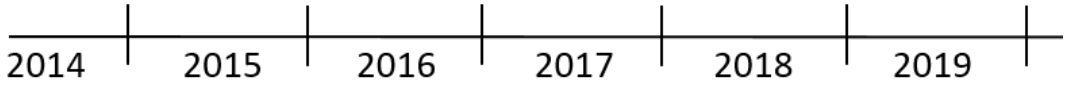
- split into 2 subsamples A and B of the same age from two birth years

- **4 - 5% of all twin births / cohort**

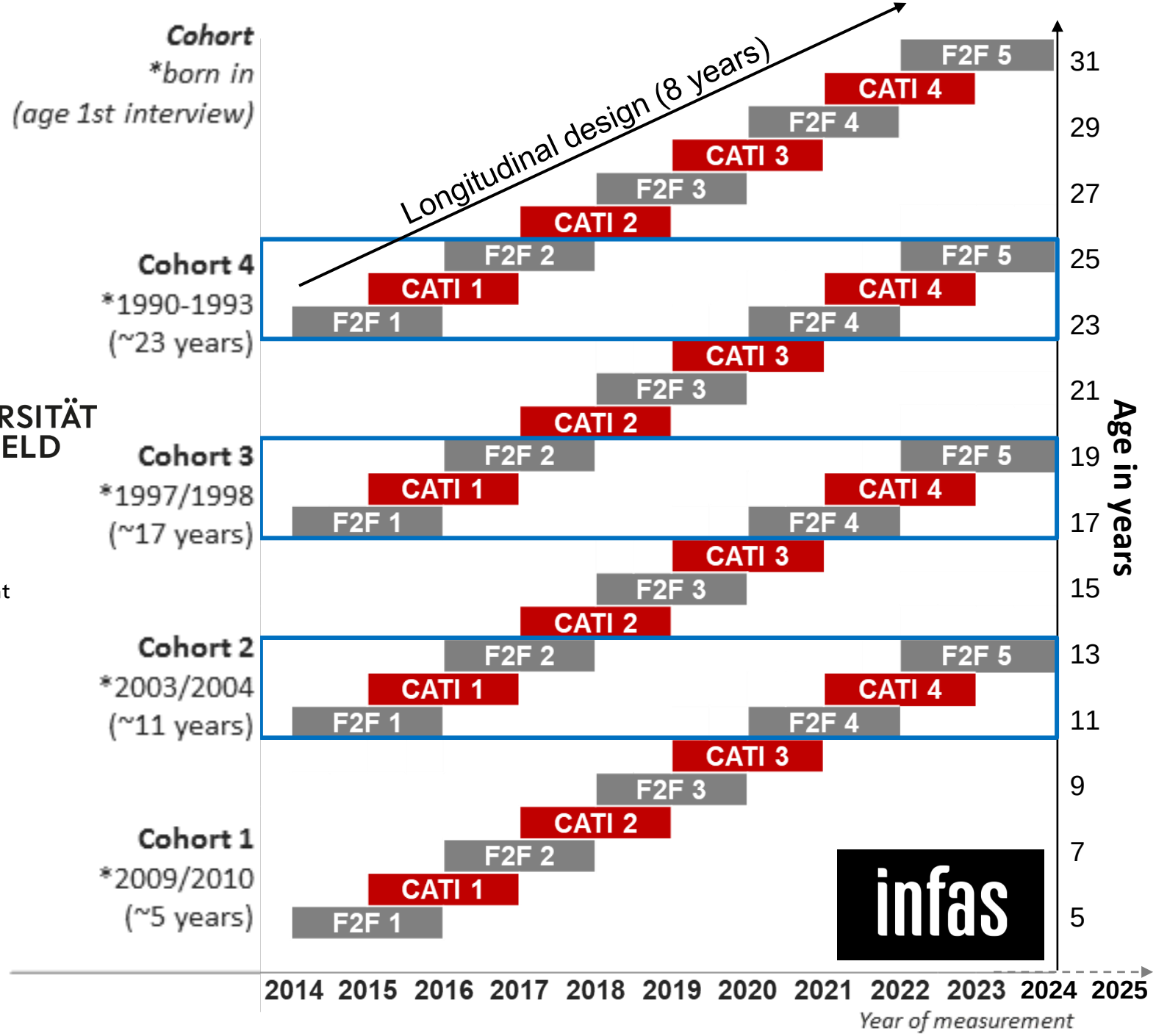


F2F – face-to-face interview

CATI – computer assisted telephone interview



UNIVERSITÄT BIELEFELD TwinLife UNIVERSITÄT DES SAARLANDES



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UNIVERSITÄT DES SAARLANDES

Since 2020:

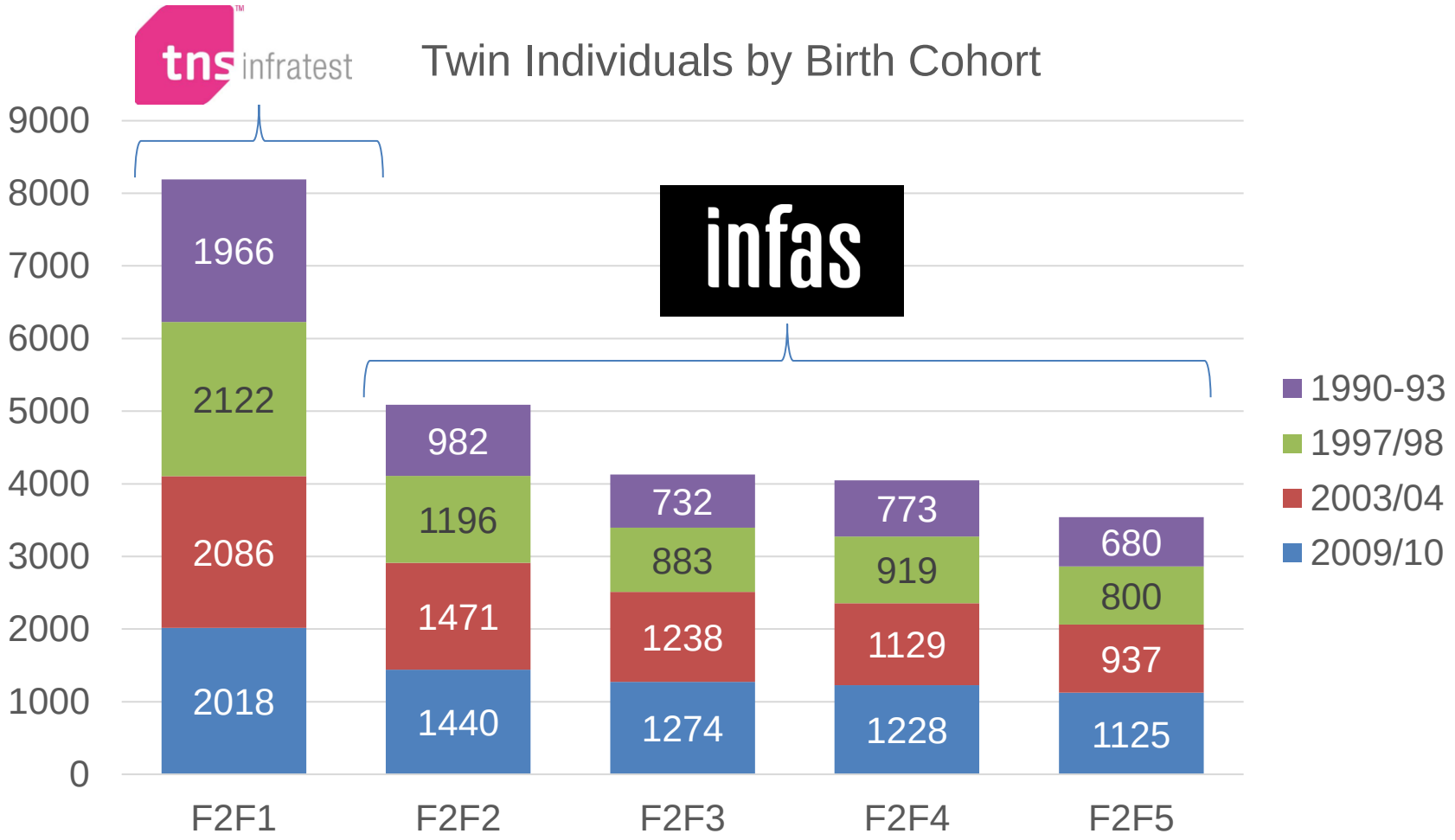
Universität Bremen

Cross-sequential twin family design

CATI – computer assisted telephone interview

F2F – face-to-face interview

Panel Stability



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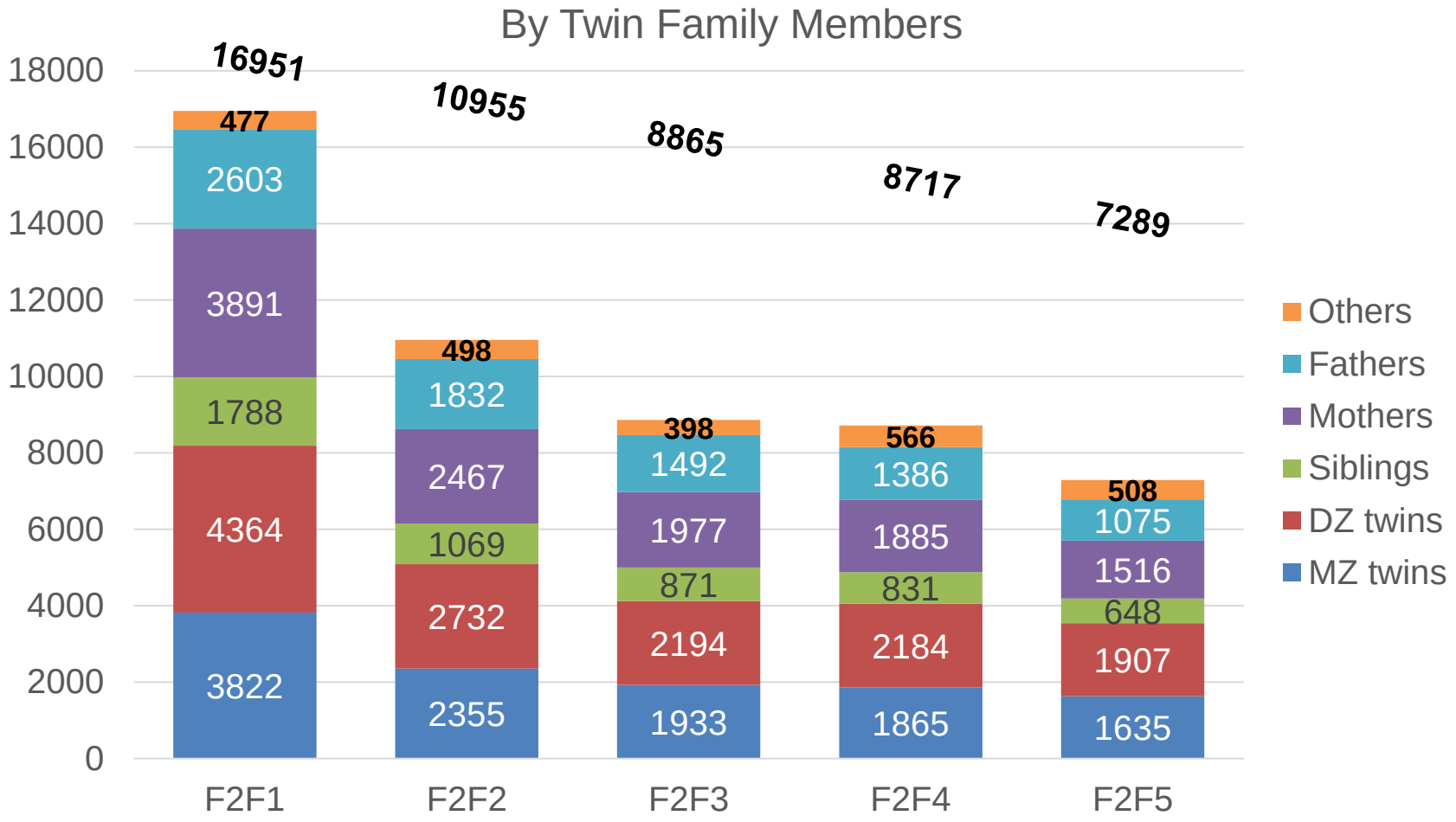


Examples of Measured Constructs

01 Skill formation and education
E.g., photos of school (leaving) certificates, assessment of cognitive abilities (via CFT), motivational aspects, school context and feeling of burden

02 Personality and other traits
E.g., big Five personality, self-esteem, self-efficacy, locus of control, self-regulation, narcissism

03 Employment
E.g., detailed information on employment, assets and income, commuting, shift-work

04 Social and political integration
E.g., political attitudes, participation in political events, social networks and engagement in social associations, discrimination experiences.

05 Psychological and physical health
E.g., height/weight, medical diagnoses, depressiveness, impairment caused by diseases

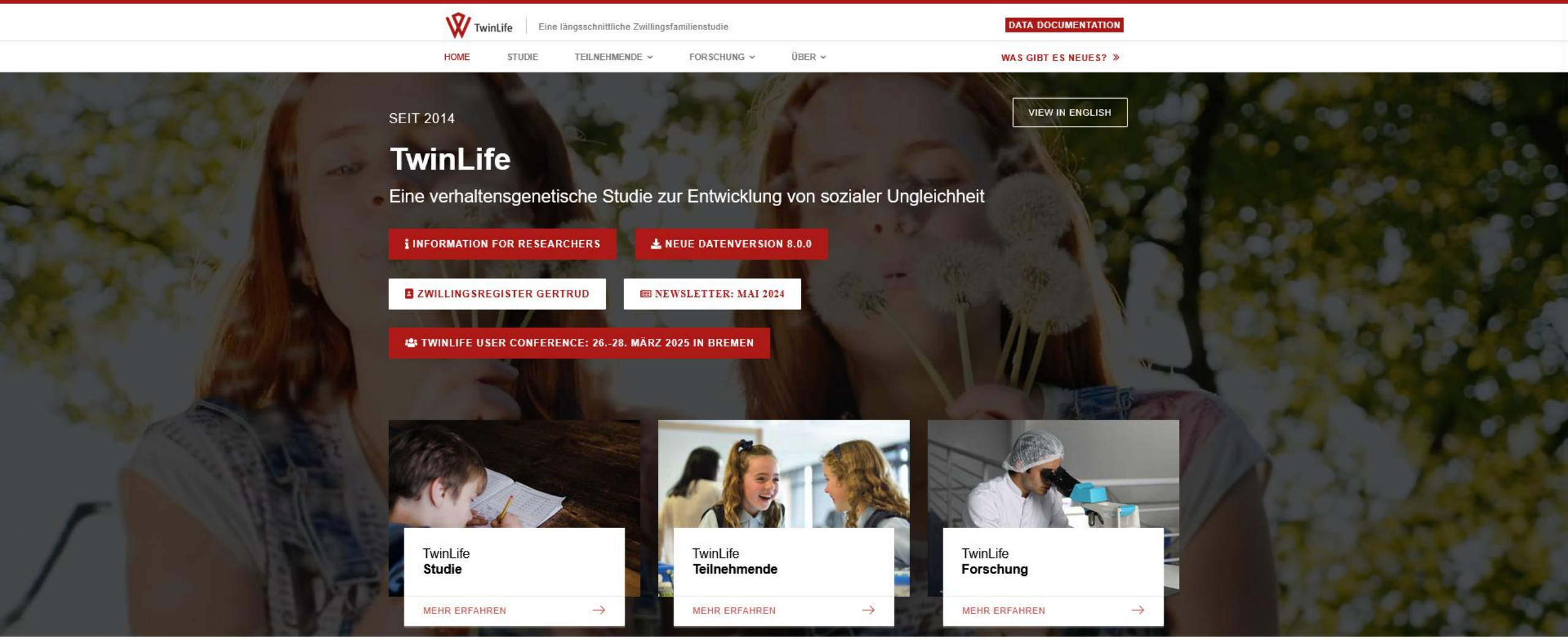
06 Quality of life
E.g., global and domain-specific life satisfaction, experiences of bullying

07 Deviant & problematic behavior
E.g., internalizing, externalizing, delinquent behavior

08 COVID-related information
E.g., health during the pandemic, economic changes, behavioral changes, coping/resilience, threat, burden and stress during the pandemic

09 Molecular genetic and epigenetic data
E.g., polygenic and methylation-based risk scores (these are currently being collected and evaluated in separate satellite projects, and will be shared with the scientific community after the projects have ended)

TwinLife Homepage



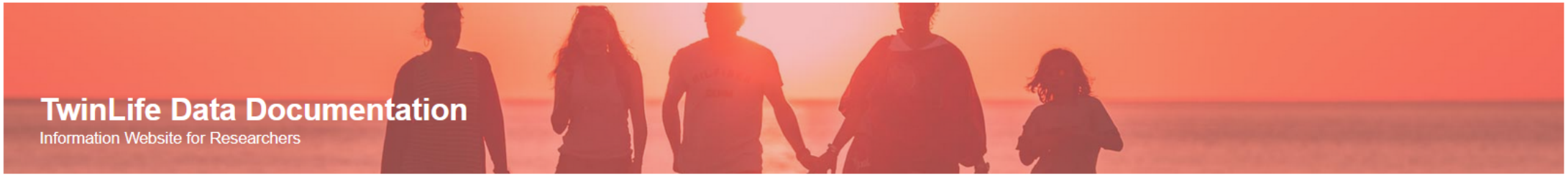
TwinLife Homepage

TwinLife
DATA DOCUMENTATION

- OVERVIEW AND GETTING STARTED +
- 1. ABOUT TWINLIFE +
- 2. DOCUMENTATION OF THE STUDY +
- 3. DATA STRUCTURE +
- 4. CHECK ROUTINES +
- 5. GENERATED VARIABLES AND SCALES +
- 6. PUBLICATIONS: CITATION, ETHICS AND FUNDING STATEMENTS +
- 7. USEFUL LINKS
- 8. WORKSHOPS

Search ...

Terms and Privacy
Downloads
Start



The TwinLife Data Documentation is intended to give both an overview of the longitudinal twin family study TwinLife and a short instruction on how to use the TwinLife data. It corresponds to the contents of the ➔Short Guide.
The following pages contain information about the project and links to various helpful documents that should facilitate the first steps into working with the TwinLife data. For a very quick description of everything you need to get started with the TwinLife Dataset see the *Getting Started* section below.
All additional documents of data documentation are provided in the downloads section.

INFORMATION FOR RESEARCHERS

For the scientific community, we installed this English data documentation website, where all important information about Twinlife can be found. Please use the content navigation on the left to find your way through the documentation, or use the search bar on the bottom left to find information on specific topics.

Under ➔ Publications, you can find an overview of all scientific publications known to us, which have been published around the TwinLife project or with the data of the project.

For a short overview of the Twinlife project you will find some basic information below. Clicking the headings will open the content.

- **› What is TwinLife?**
- **› Where can I find further information and a documentation of the data?**
- **› How can I get the data?**

Getting Started | Downloads section | Publications | Study contents

Back to the TwinLife-Homepage

UNIVERSITÄT BIELEFELD | UNIVERSITÄT DES SAARLANDES | Universität Bremen

TwinLife Core Project‘s Team Members

Since 2013 until today…

TwinLife

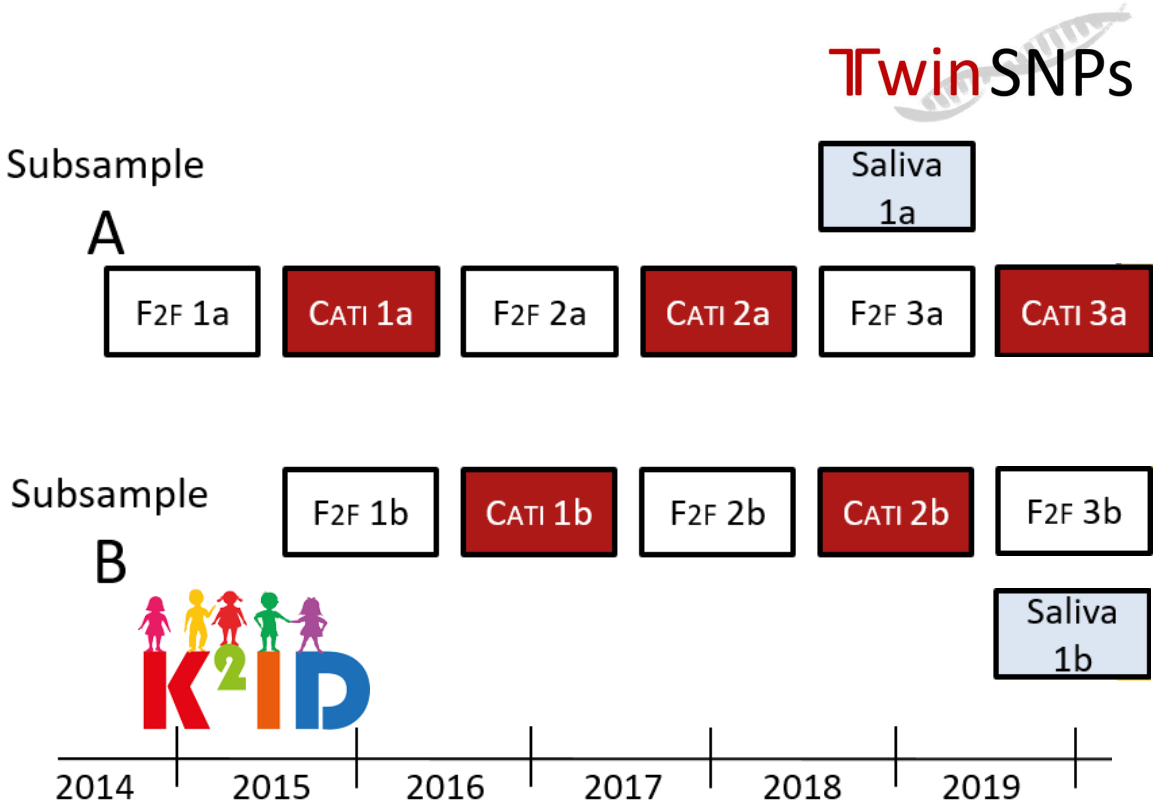
Universität Bremen

TwinLife User Conference 2025

The TwinLife Satellite Projects

TwinLife

Core TwinLife and Satellite Projects



TwinSNPs

CHARLOTTE PAHNKE
LEONARD FRACH
ANDREAS FORSTNER
CARLO MAJ
MARKUS NÖTHEN

TwinSNPs

Molecular Genetic extension of TwinLife

Genotyping

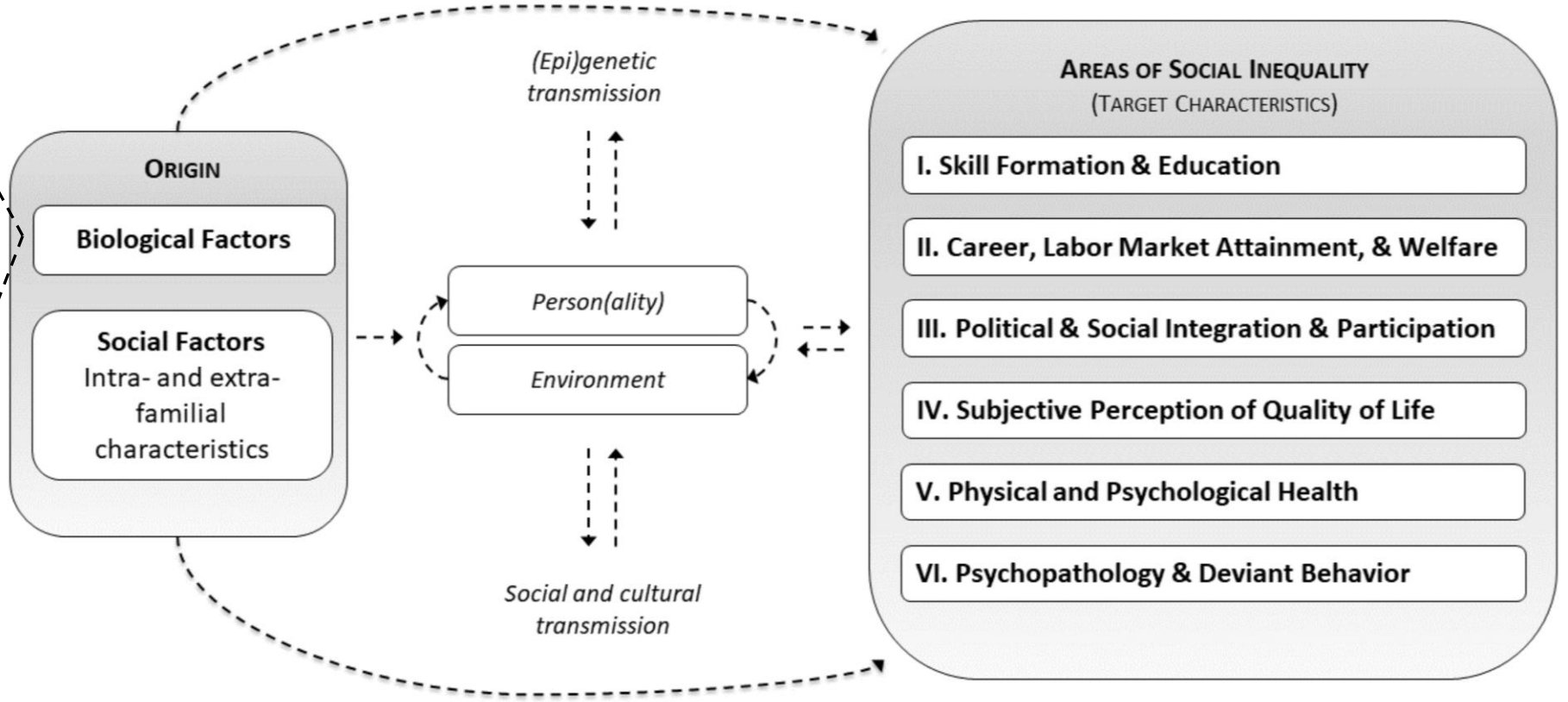
TwinLife Epigenetic Change Satellite

DNA Methylation profiling

TCS

TwinLife

A behavioral genetic study on the development of social inequality



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Molecular Genetic extension of TwinLife

Genotyping

TwinLife Epigenetic Change Satellite

DNA Methylation profiling

> 12,000 saliva samples of > 6,500 individuals

Number of samples	1	2	3
Number of individuals	2362	2170	2016

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Molecular Genetic extension of TwinLife

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> 10,000 extracted DNA samples (extraction of third samples ongoing)

Shirin Zare

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TwinSNPs

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Shirin Zare

> 5,500 individuals genotyped and passed QC

for a subset: longitudinal DNA Methylation profiling

Carlo Maj

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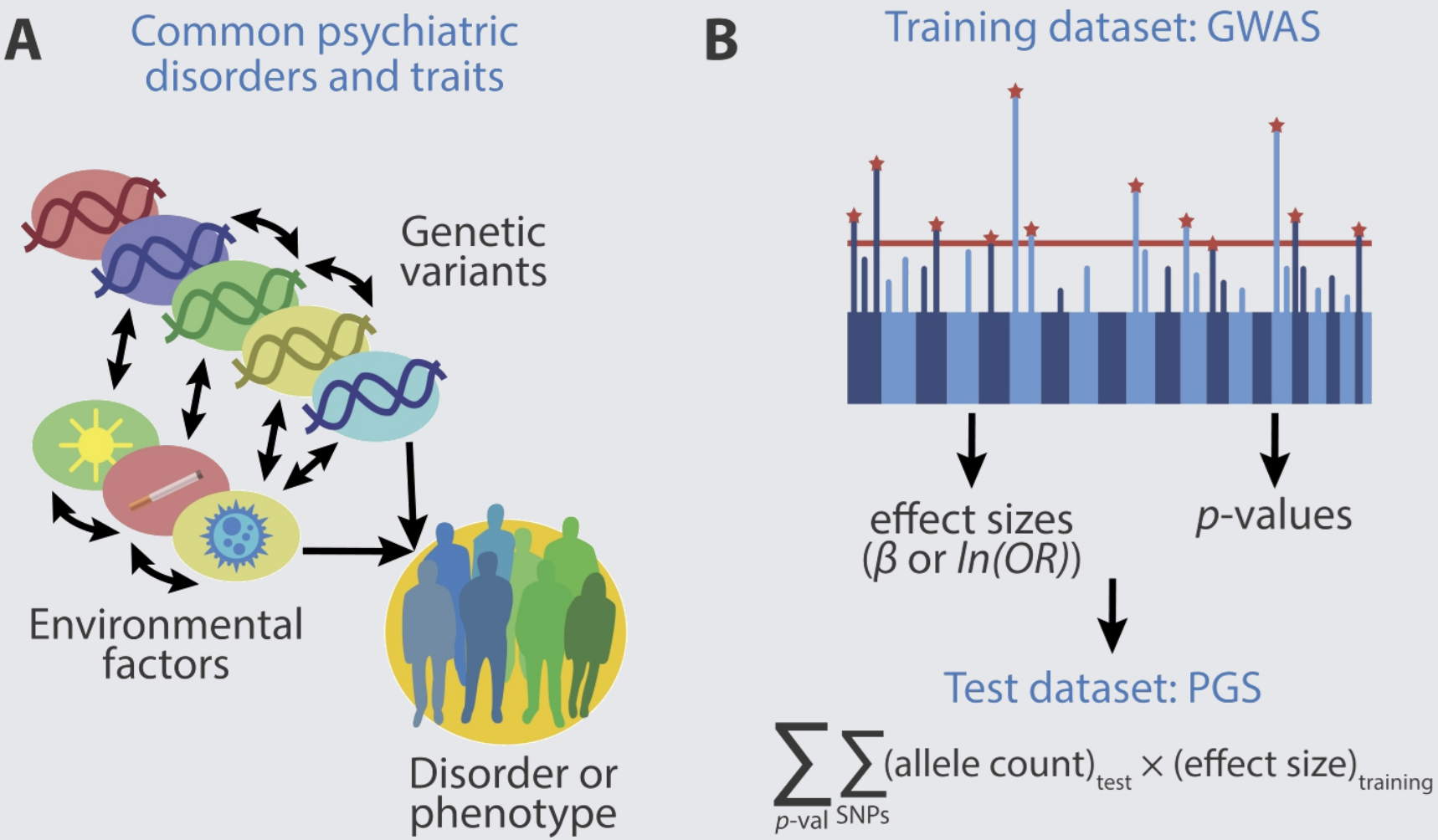
Polygenic Scores (PGS)



Nöthen & Andlauer, 2020

Polygenic Scores (PGS)

Method:

PRS-CS auto model (Ge et al., 2019)

Polygenic Scores (PGS)

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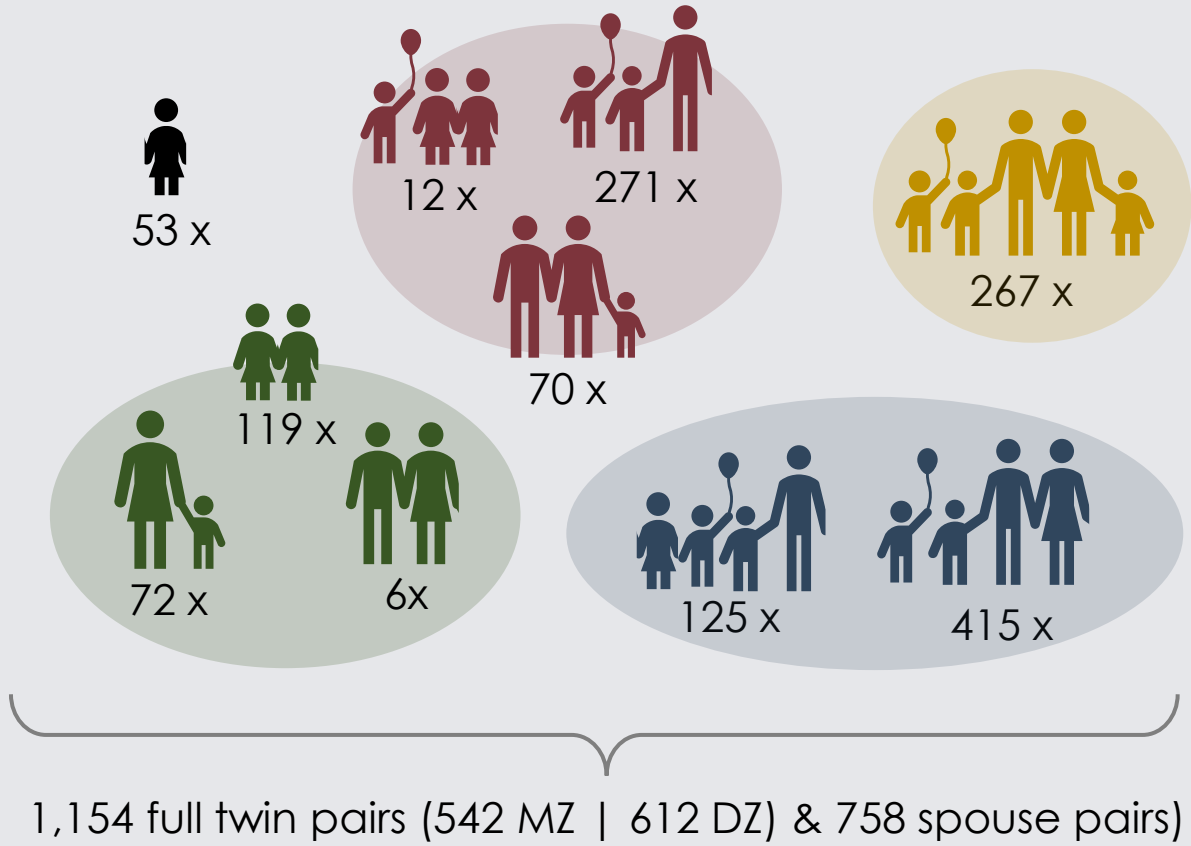
Current Freeze:

> 100 PGS for ***N* = 5,421 individuals** of European genetically inferred ancestry from **1,410 families**



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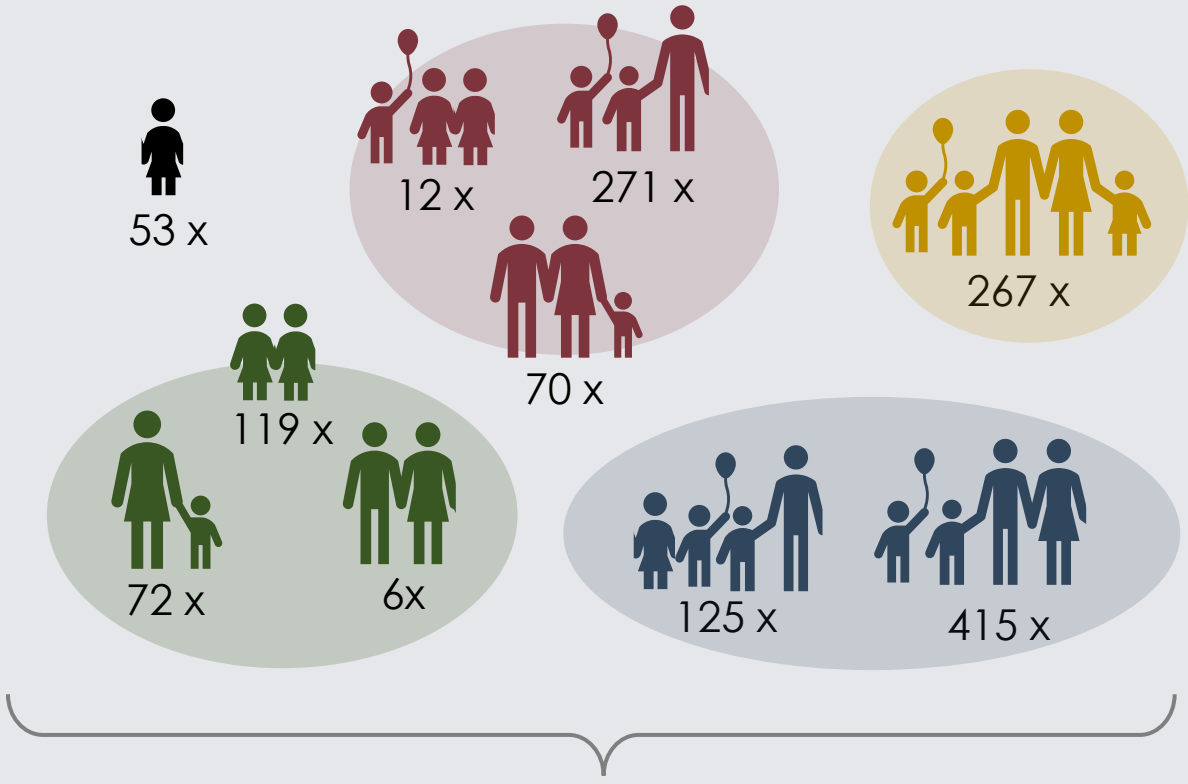


Allows analysis of..

… construct validity and generalizability of PGS, within- vs between-family effects, gene-environment correlation and interaction, assortative mating, indirect versus direct genetic effects, concordance with twin family modeling results…

CATEGORY	POLYGENIC SCORES
Educational & cognitive traits	Educational attainment (including cognitive and non-cognitive aspects), cognitive performance, intelligence, reading & language abilities (word reading, IQ, spelling, nonword reading, nonword repetition, phoneme awareness)
Psychiatric disorders	ADHD, schizophrenia, bipolar disorder (including type 1 & 2), major depressive disorder (MDD), depressive symptoms, anxiety, PTSD, panic disorder, Tourette syndrome, autism spectrum disorder (ASD), anorexia nervosa, alcohol dependence, alcohol use disorder, cannabis use disorder, opioid dependence, cross-disorder, obsessive-compulsive disorder
Well-being & personality traits	Subjective well-being, life satisfaction, positive affect, well-being spectrum, eudaimonic & hedonic well-being, extraversion, neuroticism, conscientiousness, agreeableness, openness, risk-taking, loneliness, financial satisfaction, family satisfaction, friendship satisfaction, work satisfaction
Physical traits	Height, body mass index (BMI), chronotype, morning person, epigenetic clocks (Hannum, Horvath, GrimAge, PhenoAge)
Inflammatory & biological markers	C-reactive protein, interleukin-10, interleukin-6, tumor necrosis factor-alpha, PAI-1 & granulocyte proportions
Other	Childhood maltreatment, self-rated health

Team Bonn

Andreas Forstner

Markus Nöthen

Leonard Frach

Charlotte Pahnke

Consortia

Polygenic Index Repository

Twinning Genetics Consortium

International Gaming Consortium

Trio GWAS

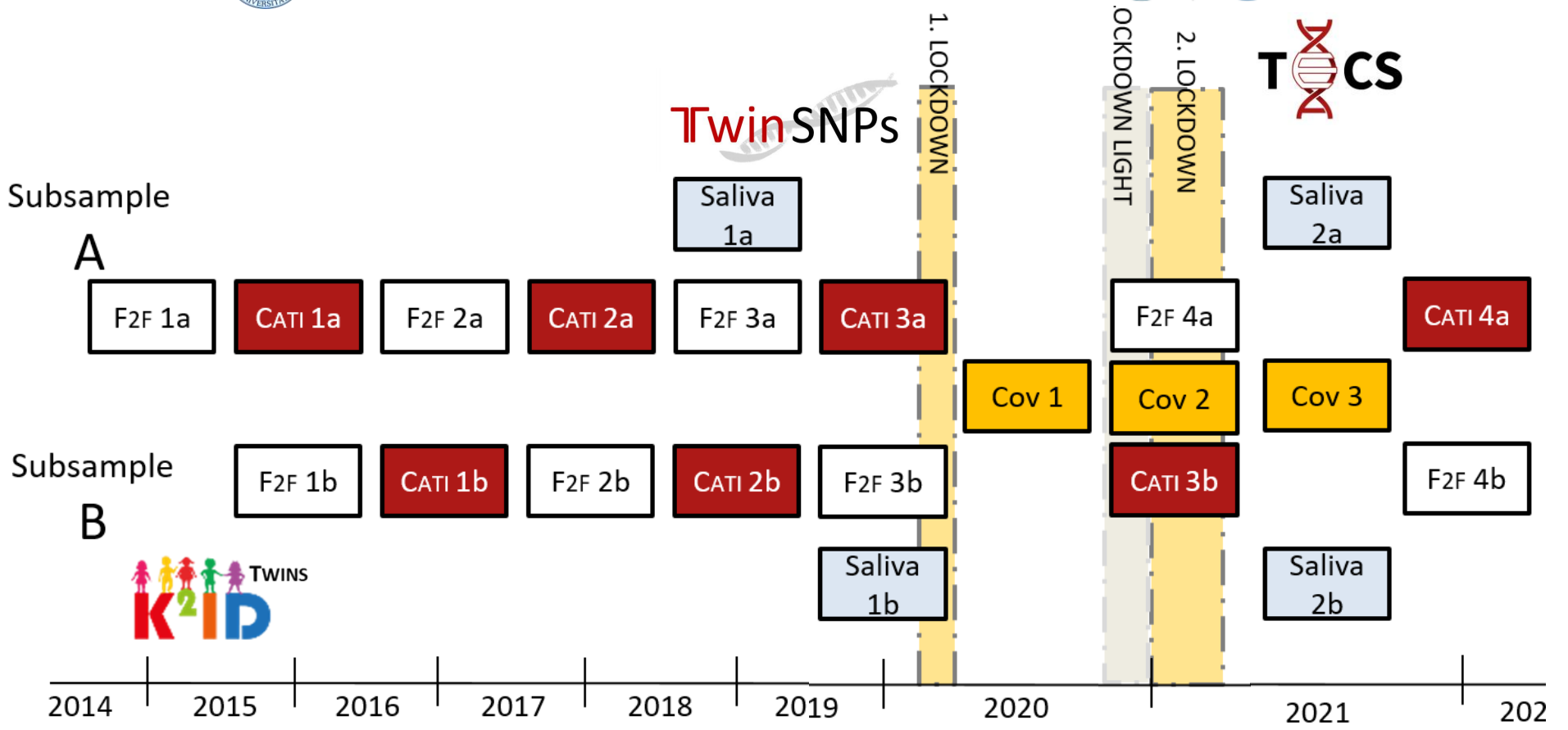
Data Availability

Requires a data transfer agreement or collaborating with an analyst on our side

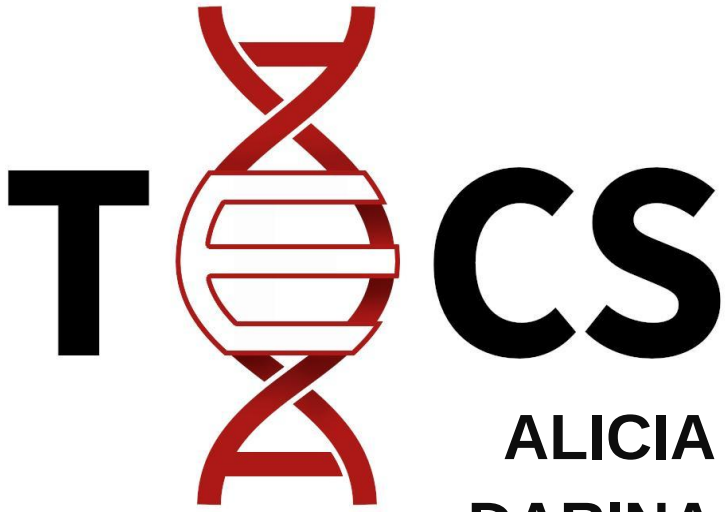
Contact us with a short project proposal (1-2 pages) or if you have any questions:

pahnke@uni-bonn.de | frach@uni-bonn.de

Core TwinLife and Satellite Projects



TwinLife



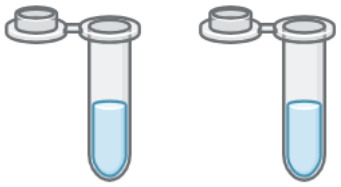
ALICIA SCHOWE
DARINA CZAMARA
ELISABETH BINDER
CHARLOTTE PAHNKE
ANDREAS FORSTNER
MARKUS NÖTHEN

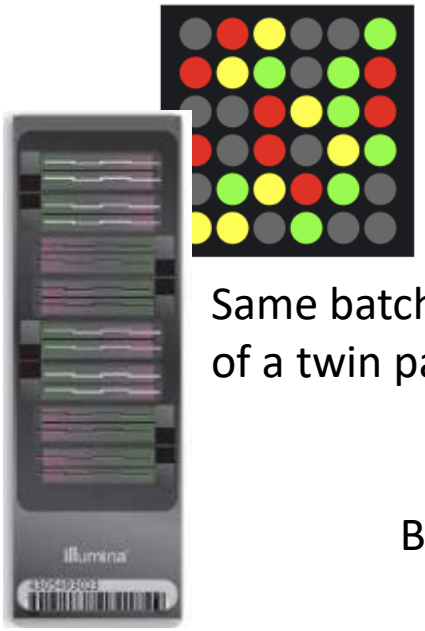
TwinLife

TwinLife Epigenetic Change Satellite

TwinSNPs

Genotyped MZ and DZ twins



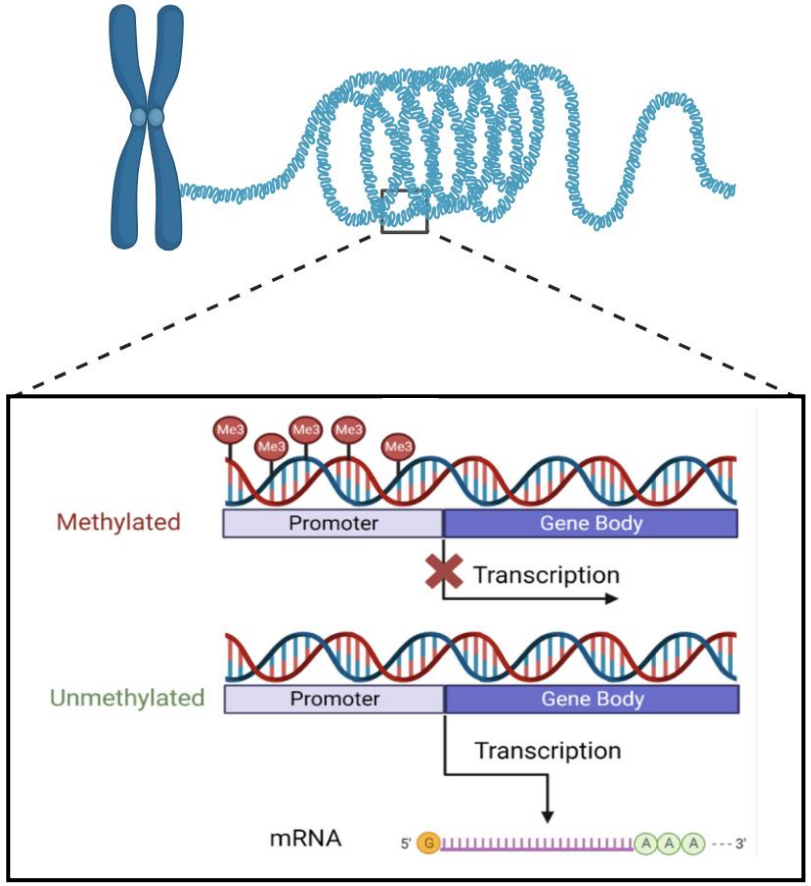


Same batch for all samples of a twin pair

Illumina EPIC v1

Beta = for each site, proportion of methylated vs unmethylated cells

~750,000 CpG sites



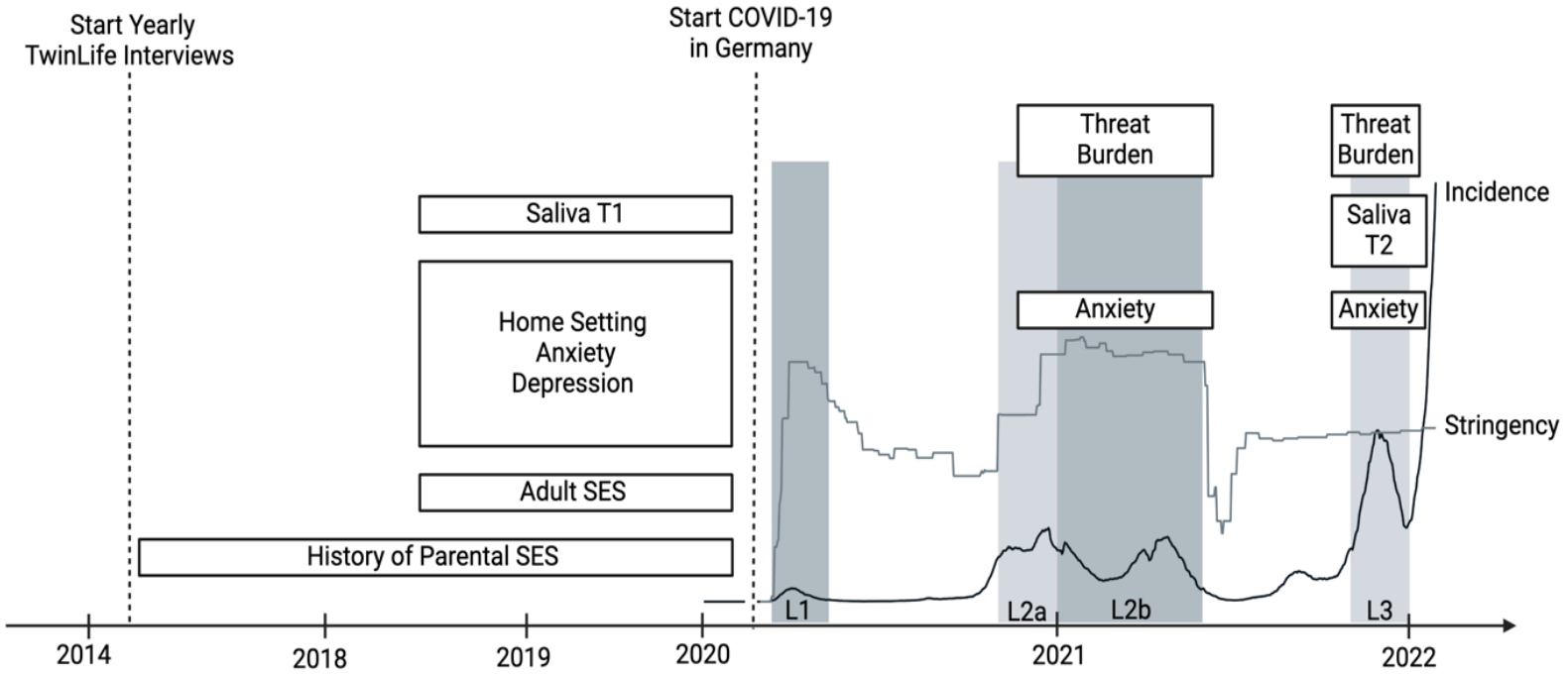
TwinLife Epigenetic Change Satellite

Sample

- 489 complete twin pairs
- 263 MZ, 226 DZ pairs
- 45-68% Female

1,055 individual twins

- 366 children
- 395 adolescents
- 161 young adults
- 133 adults



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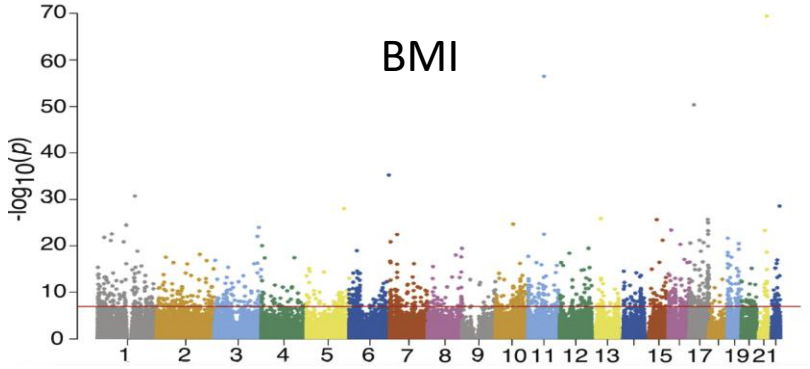


Do et al., AJHG, 2023

SCAN ME

Intro to Epigenetic Scores by Darina Czamara

Composite Epigenetic Scores

- Aging (Epigenetic clocks)
- Cognition
- BMI
- Inflammation
- Puberty

Paper Presentation Session 4

Room B3009

PPS 4A Epigenetics I – Chair: Alicia SCHOWE

14:40 Alicia SCHOWE et al.: *Genetic and Environmental Contributions to Salivary DNA Methylation Across Development: A Longitudinal Analysis of Monozygotic and Dizygotic Twins*

15:00 Dmitry KUZNETSOV et al. *Genetic and Environmental Contributions to Epigenetic Aging Across Adolescence and Young Adulthood.*

Thursday

Paper Presentation Session 5

Room B3009

WPPS 5A Epigenetics II (Room B3009) – Chair: Jana INSTINSKE

15:50 Jana INSTINSKE et al.: *Epigenetic Aging and Personality Differences: Latent Change Analyses of Twin Data*

16:10 Dmitry KUZNETSOV et al.: *Tracking Bullying Experience in Accelerated Epigenetic Aging During Adolescence*

16:30 Yixuan LIU et al.: *Evidence of Faster Pace of Aging Measured in Saliva DNA Methylation Among Educational Mobile German Young Adults*

TwinLife Epigenetic Change Satellite

MAX PLANCK INSTITUTE
OF PSYCHIATRY

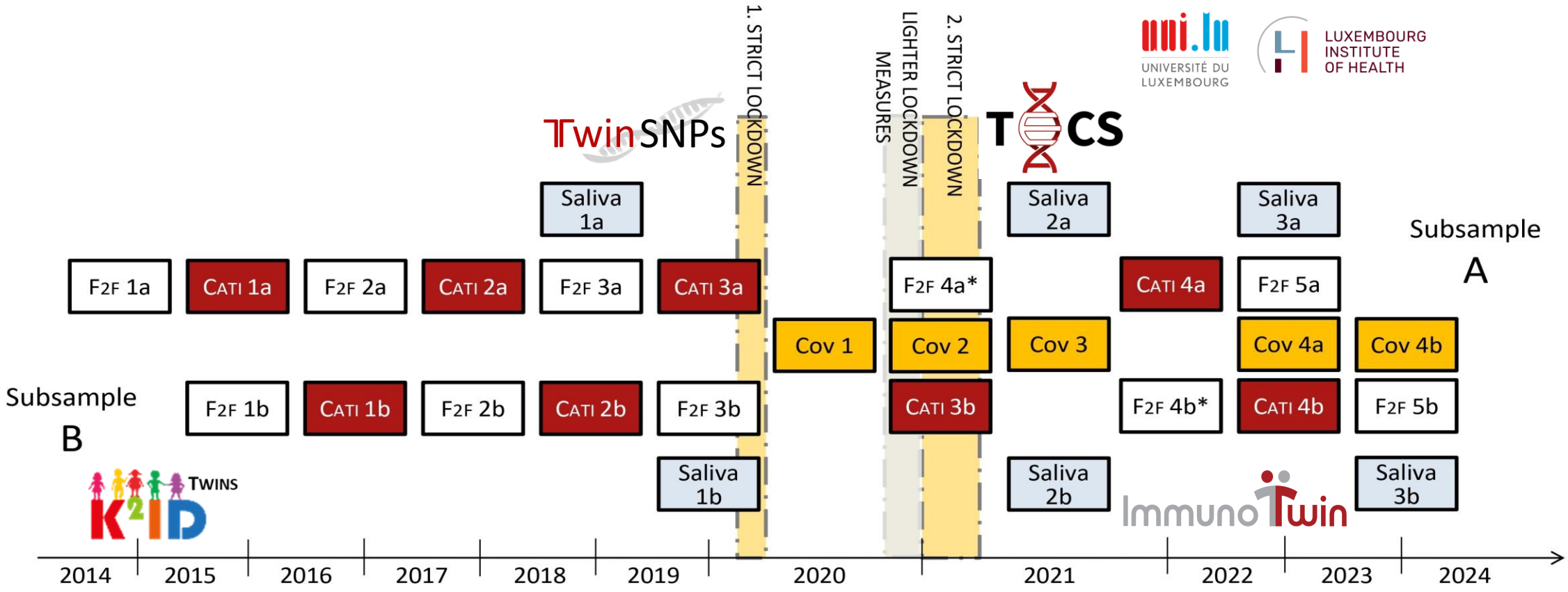
DNAm QC
Data management
Epi-Score computations

ukb universitäts klinikumbonn | Institut für Humangenetik

Data
generation

TwinLife Data Management

Core TwinLife and Satellite Projects



LENA WEIGEL

CLAUS VÖGELE

CONCHITA D‘AMBROSIO

JONATHAN TURNER

TwinLife

UNIVERSITÄT BIELEFELD
Faculty of Sociology

ImmunoTwin

The ImmunoTwin project

Lena Weigel

2025 TwinLife User Conference

26-28 March

Bremen, Germany

TwinLife

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Faculty of Sociology

ImmunoTwin

The ImmunoTwin Project

UNIVERSITÄT BIELEFELD

- Cooperation between

  Prof. Dr. Martin Diewald (Bielefeld University, Germany)

  Prof. Dr. Claus Vögele (Luxembourg University, Luxembourg)

  Prof. Dr. Conchita D‘Ambrosio (Luxembourg University, Luxembourg)

  Dr. Jonathan Turner (Luxembourg Institute of Health, Luxembourg)

- Project started in January 2022

uni.lu | UNIVERSITÉ DU LUXEMBOURG

LUXEMBOURG INSTITUTE OF HEALTH

Project goals:

- Analysis of risks and protective functions for immunological health in youth and young adulthood
- Research on immunological aging and its developmental conditions, including sociological and psychological concepts
- Investigating epigenetic clocks and processes in the microbiome linked to social processes

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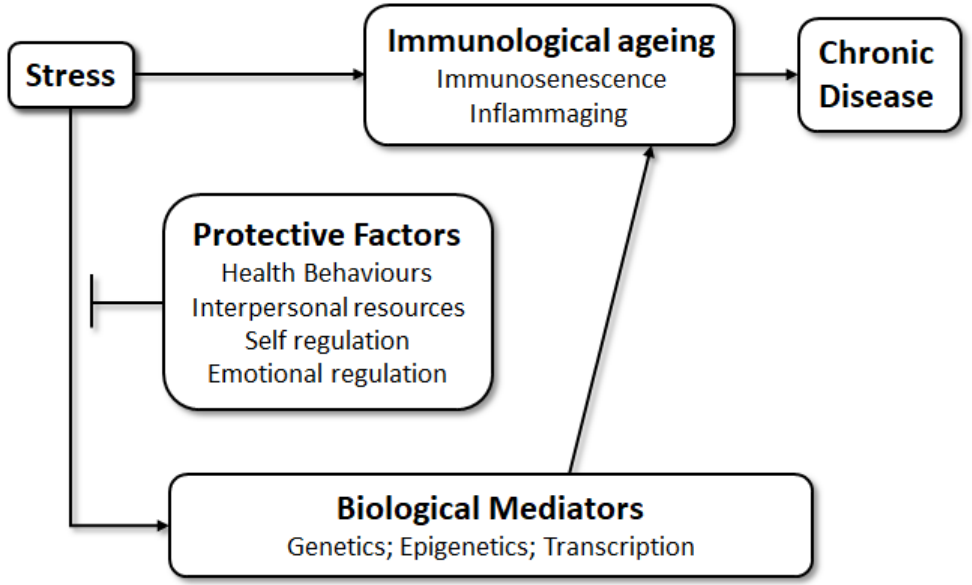
ImmunoTwin

Background of the study

Examining the link between biological and social processes and their impact on health

- Accelerated immunological ageing may be key to understanding health disparities and social inequalities
- Poor life conditions are perhaps the most powerful driver of immune ageing (both immunosenescence and inflammaging)
- Currently: limited data on how daily stressors/adversity "later in life" (after early childhood) are linked to immunosenescence and inflammaging



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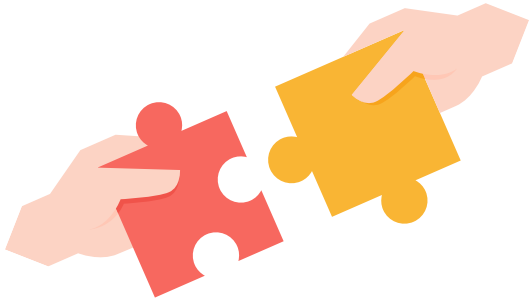
ImmunoTwin



What is done usually?

- Studies on epigenetic susceptibility to the early life environment
- Epigenetic studies on individual components (e.g., pollution, smoking, alcohol)

What is done in ImmunoTwin?

- Using discordant MZ twins to see epigenetic differences induced by adverse (psycho)social environments → not just discrete components, but their joint effects and different saliences
- Looking at experiences “later in life”, because research to date focuses primarily on very early life (around birth and early childhood)
- Examining stressful experiences that can affect anyone, beyond the usual trauma research

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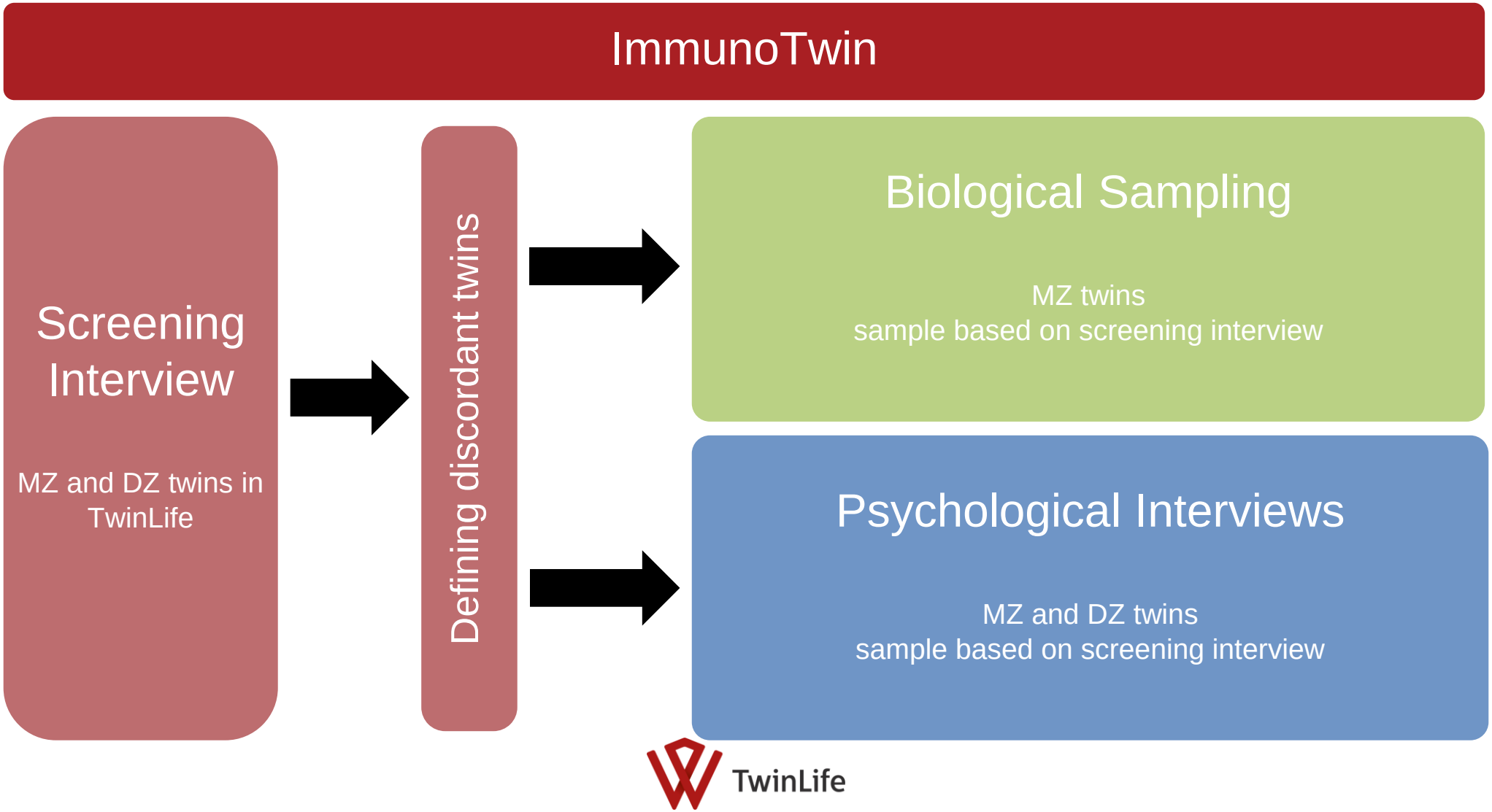
ImmunoTwin

Structure of the project



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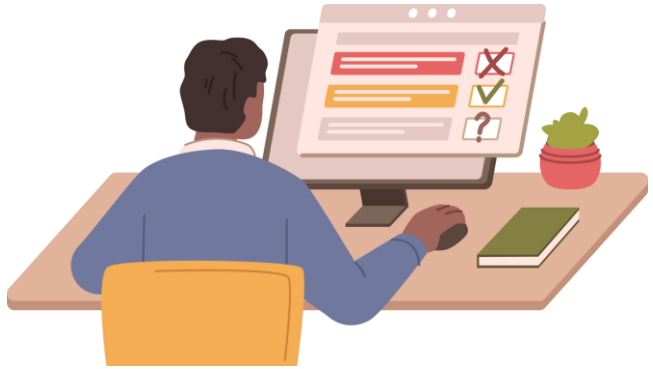
ImmunoTwin

Screening interview

- Assessment of acute and chronic stress based on MZ and DZ twins in the TwinLife sample
- N = 2,079 twins in three age cohorts



Defining adversity-discordant twins

- Base data: Screening interview + additional TwinLife data (chaos in home environment, loneliness) from survey waves before
- Chosen sample: N = 739 twin pairs (349 MZ and 390 DZ twin pairs)
- Three approaches combined: 1) score ranking, 2) Euclidean distance and 3) standard deviation-based ranking
- Results: N = 317 (144 MZ and 173 DZ) adversity-divergent twin pairs

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Faculty of Sociology

ImmunoTwin

Biological sampling

- Collection of blood and saliva samples by the participant's doctor
- Participants selected by discordance from the screening interview sample
- Final sample after processing: 63 MZ twins

Psychological interviews

- Version of the Mini-DIPS (Diagnostic short interview for mental disorders)
- Participants selected by discordance from the screening interview sample
- Final sample (interviews) = 154 (82 DZ and 72 MZ twins)

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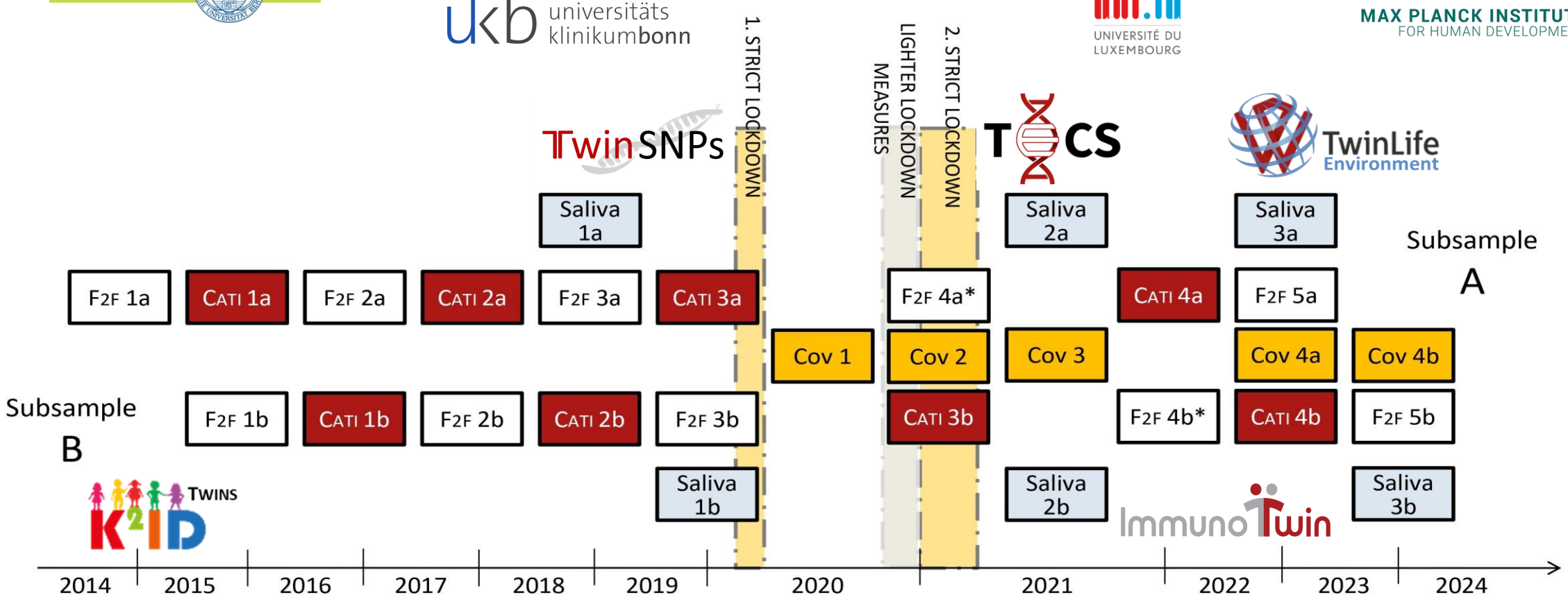
Interested in the latest research results from the project?

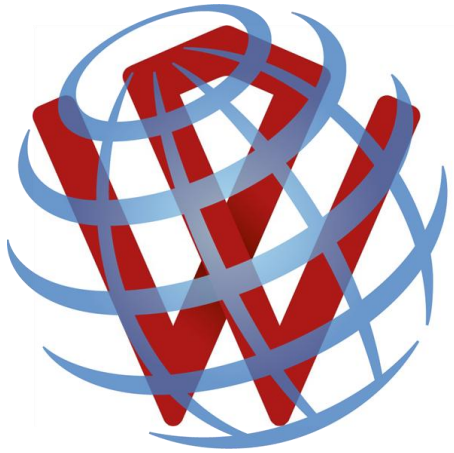
Thursday, 27th March

Time	Location	Topic
13:30 – 14:30		**Workshop & Paper Presentation Session 3**
	Room B3009	**Workshop ImmunoTwin** **13:30** Jonathan TURNER: *What is ImmunoTwin?* **13:45** Jeanne Le CLÉAC'H et al.: *Impact of Psycho-Social Environment (PSE) on Immune Profiles: Immunophenotyping Adversity-Divergent Monozygotic Twins* **14:00** Archibold MPOSHI et al.: *Biological Embedding of the Psycho-Social Environment: Insights From Monozygotic Twin DNA Methylation Analysis* **14:15** Discussion

TwinLife

Core TwinLife and Satellite Projects





TwinLife
Environment

MOANA BEYER

ELISABETH BINDER

SIMONE KÜHN

TwinLife Environment

Moana Beyer & Simone Kühn
Centre for Environmental Neuroscience
Max Planck Institute for Human Development

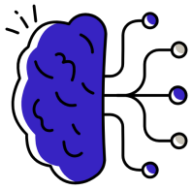
TwinLife User Conference
March 26, 2025

39%

Higher prevalence of mental health disorders in cities

26%

Increased risk of cognitive impairments with higher residential traffic

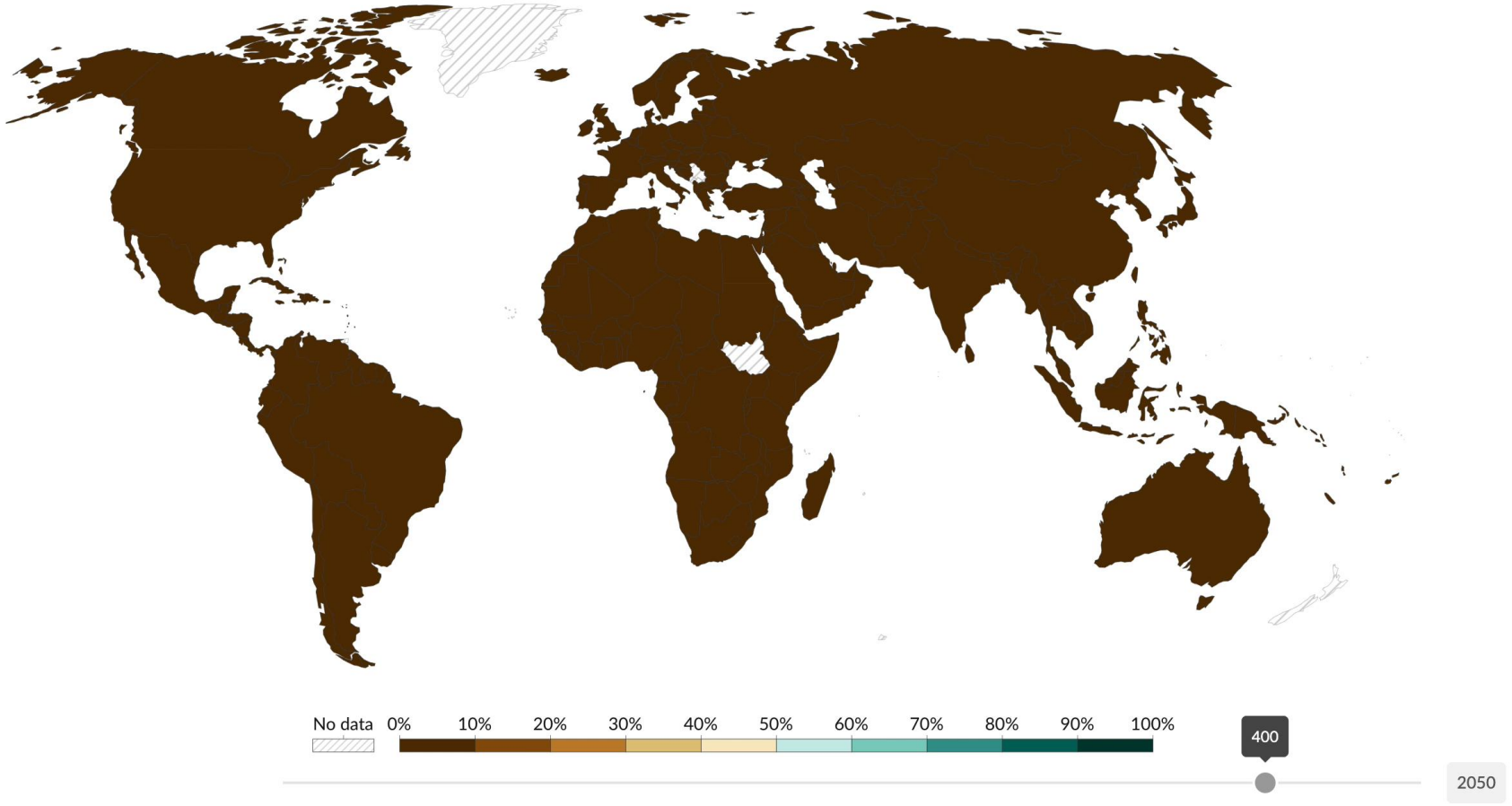


~5%

Variance in grey matter volume that can statistically be explained by one‘s urban environment

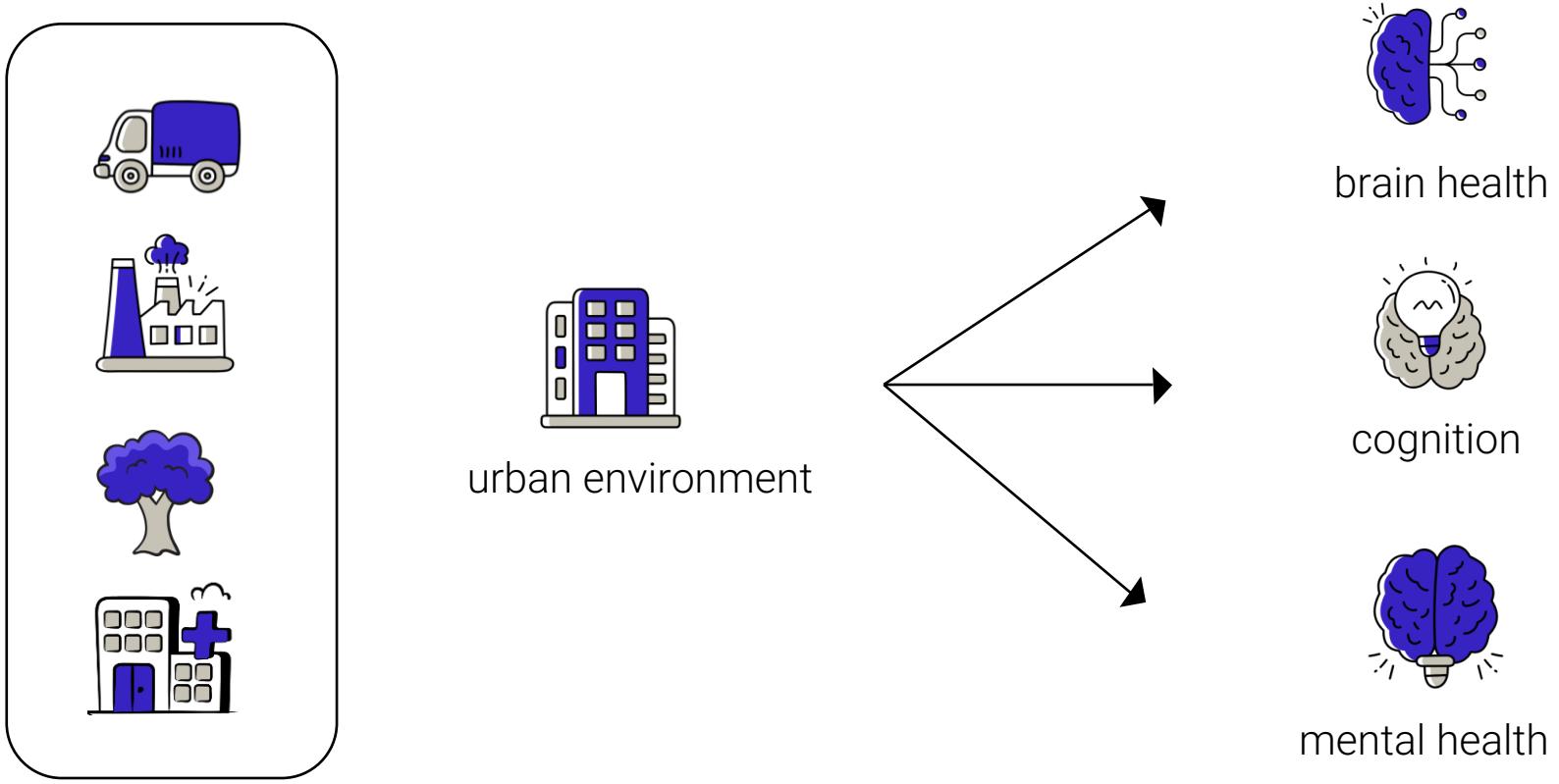
Besser et al., 2021; Bos et al., 2023; Bostrom et al., 2002; Calderón-Garcidueñas et al., 2008, 2011; Casanova et al., 2016; Cerin et al., 2017, 2018; Chen et al., 2015, 2017; Crous-Bou et al., 2020; Dadvand et al., 2018; Fett, Lemmers-Jansen & Krabbendam, 2019; Furlong et al., 2022; Gale et al., 20202; Guxens et al., 2018, 2022; Hedges et al., 2019; Kim et al., 2023; Kühn et al., 2017, 2021, 2022, 2023; Li et al., 2023; Lubczyńska et al., 2021; Morgan & Mall, 2019; Mortamais et al., 2017, 2019; Nussbaum et al., 2020; Peen et al., 2010; Peterson et al., 2015, 2022; Power et al., 2018; Pujol et al., 2016; Wellenius et al., 2012; Wilker et al., 2015; Xu et al., 2023; Yao et al., 2022

The Share of the World's Population Living in Urban Areas

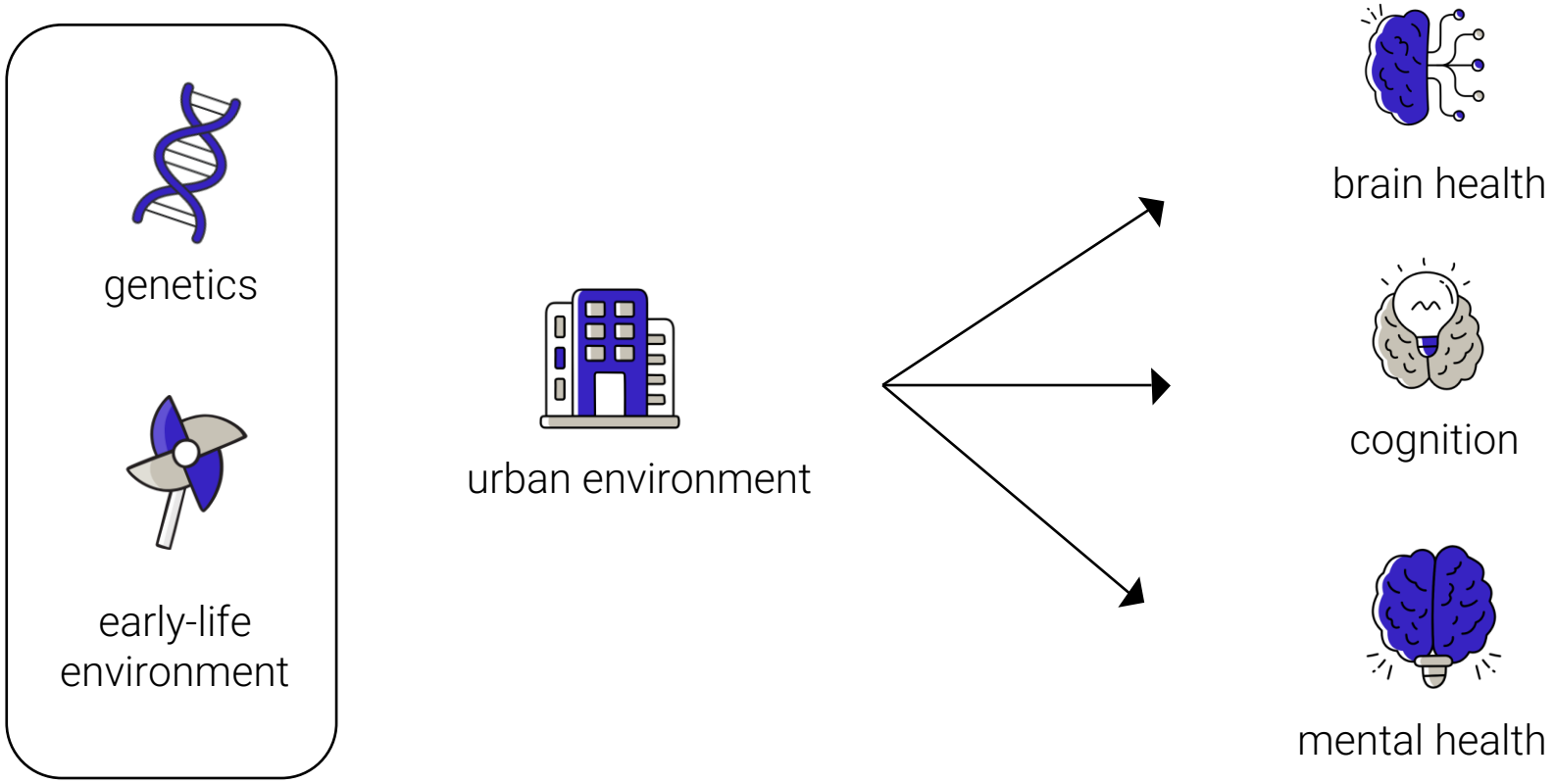


United Nations, Department of Economic and Social Affairs, Population Division (2018); HYDE (2023)

Our Environment Is Associated with Brain Health, Cognition, and Mental Health

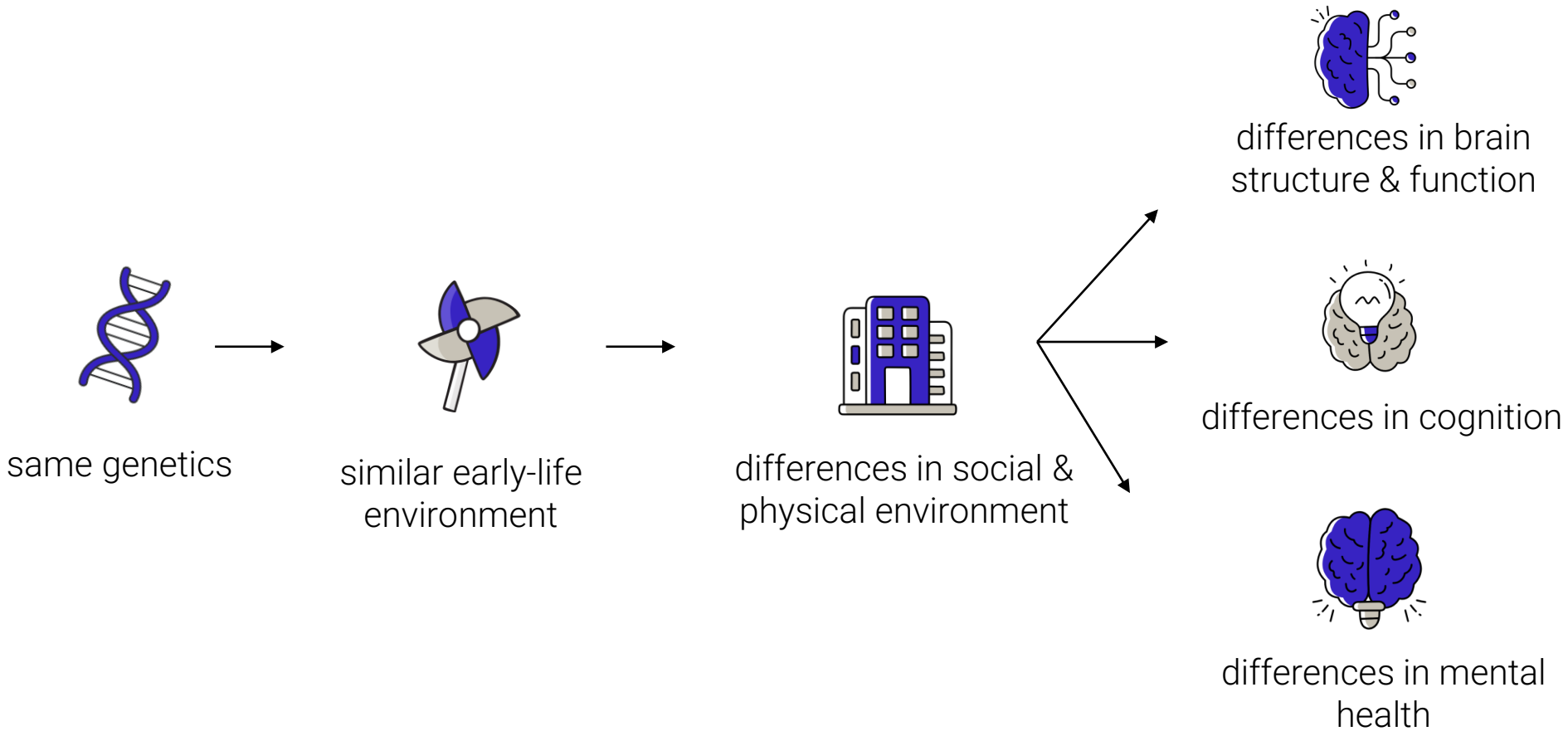


Genetics and Early-Life Environment Confound these Associations

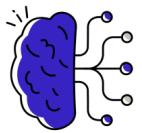


Georgi et al., 2019 ; Tunstall et al., 2014, 2015; Norman & Boyle, 2005

Twin Design Solves the Confounding Issue



Testing 150 Monozygotic Twin Pairs On Site



MRI scan

- brain structure
- brain function

Biological samples

- epigenetics
- genetics
- microbiome
- presence of chemical substances
- etc.

Questionnaires

- home environment
- work environment
- mental health
- social environment
- etc

Cognitive tests

- working memory
- attention
- language
- spatial updating
- etc.

Clinical interview

- psychiatric disorders

Testing 300 Twin Pairs in Their Natural Environment

Smartphone

- GPS tracking
- noise pollution
- GEMA*: social environment, mental health, affect, working memory etc.

Smartwatch

- peripheral skin temperature
- pulse rate & variability
- electrodermal activity
- sleep
- etc.

Air-measuring device

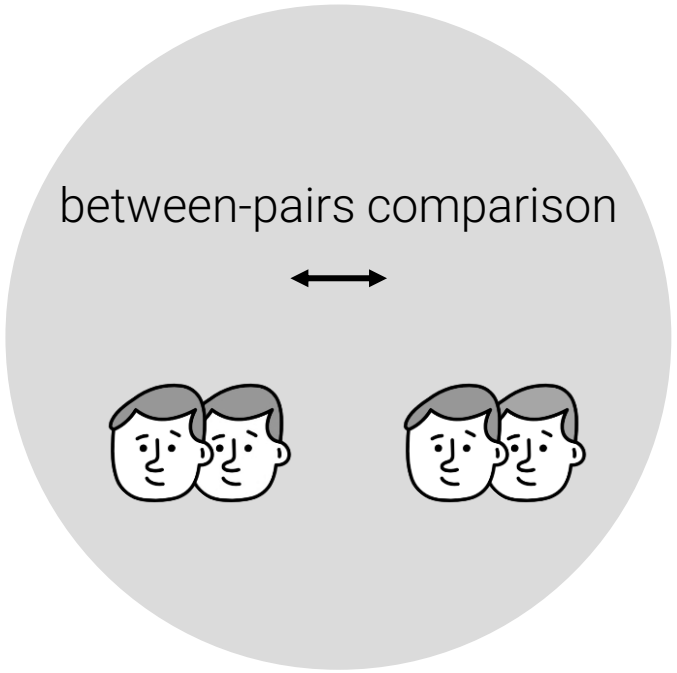
- particulate matter
- volatile organic compounds
- temperature
- pressure
- etc.

* GEMA: geographical ecological momentary assessment

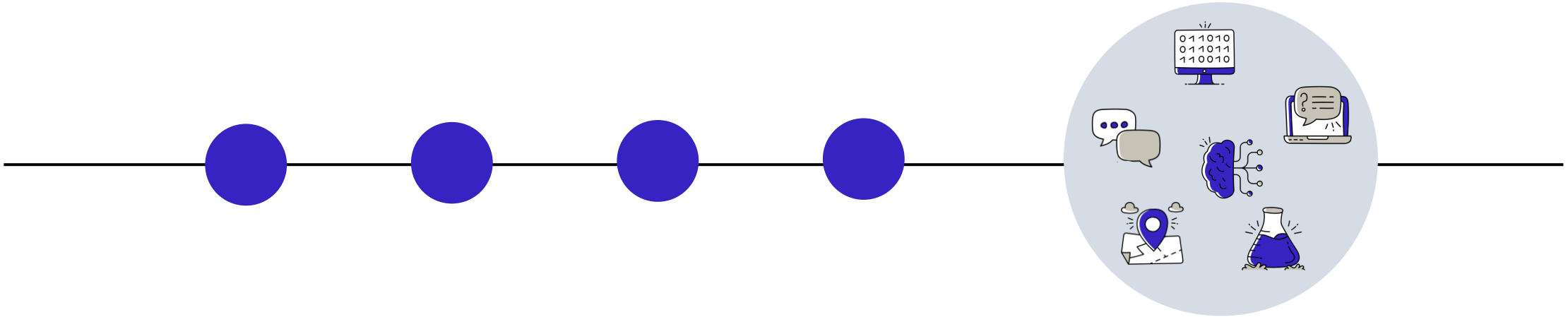
Testing 300 Twin Pairs in Their Natural Environment

150 monozygotic twin pairs

150 dizygotic twin pairs



Longitudinal Data from TwinLife



Longitudinal data from TwinLife

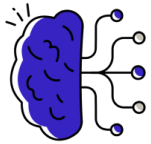
TwinLife Environment

Some Research Questions

How does air pollution alter brain structure, brain function, and cognitive performance?

Does living near green spaces protect against stress-related mental health disorders?

How does noise pollution influence us?



Which environmental differences cause the largest difference in brain structure and function?

Which environmental factors pose the highest risk for the development of anxiety and depression?

Thank you

Centre for Environmental Neuroscience,
Max Planck Institute for Human Development
Led by Prof. Dr. Simone Kühn

MAX PLANCK INSTITUTE
FOR HUMAN DEVELOPMENT

UNIVERSITÄT BIELEFELD

University of Bremen

MDC MAX DELBRÜCK CENTER FOR MOLECULAR MEDICINE IN THE HELMHOLTZ ASSOCIATION

Max-Planck-Institut für Psychiatrie

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH – UFZ

SAARLAND UNIVERSITY

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All icons from Freepik.

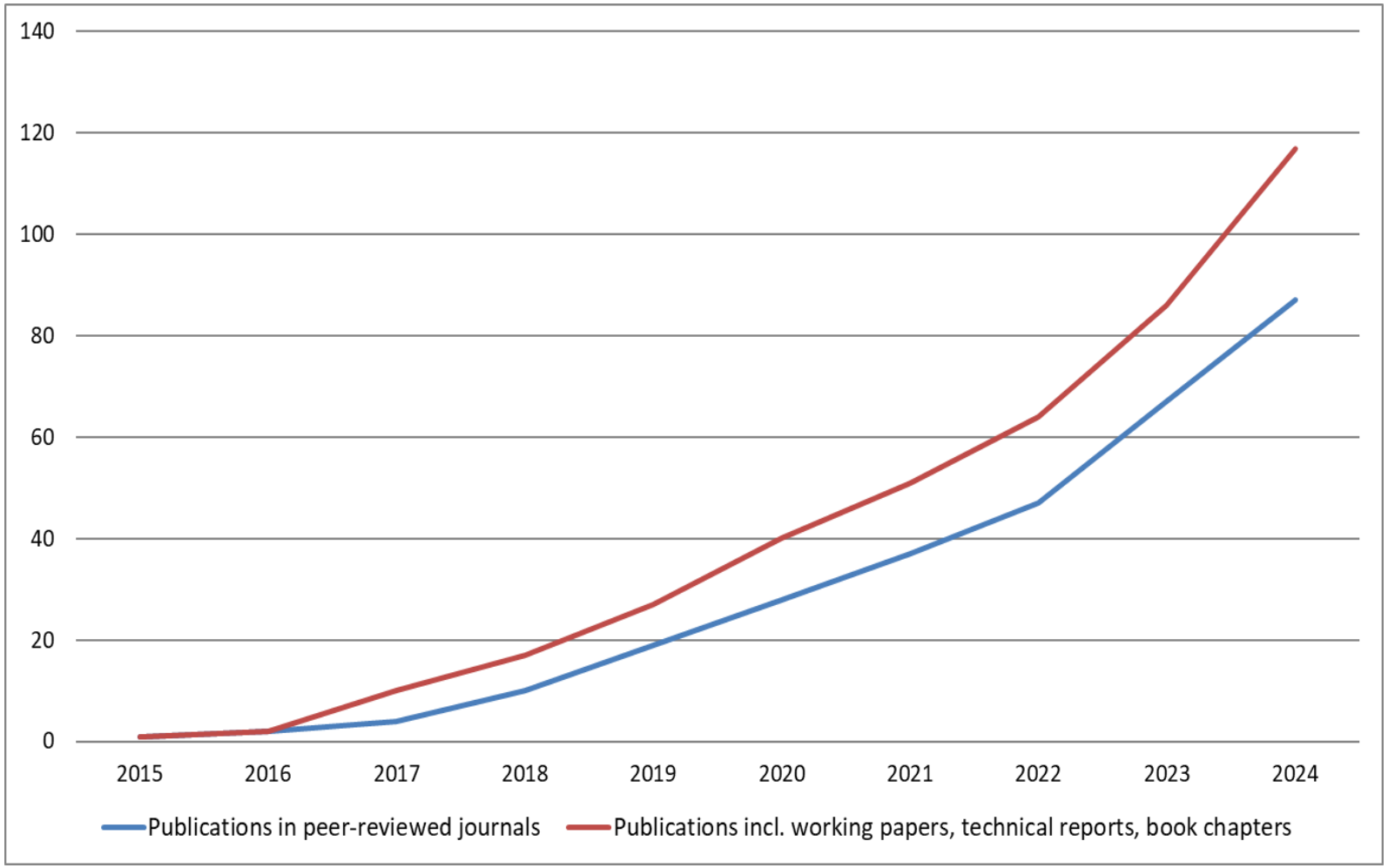
Universität Bremen

TwinLife User Conference 2025

The Current Status and Future Perspectives

TwinLife

Cumulative Increase of Publications



TwinLife

Current Collaborations in Germany

TwinLife Core Project

TwinLife Satellite Projects

Cooperation with contracts

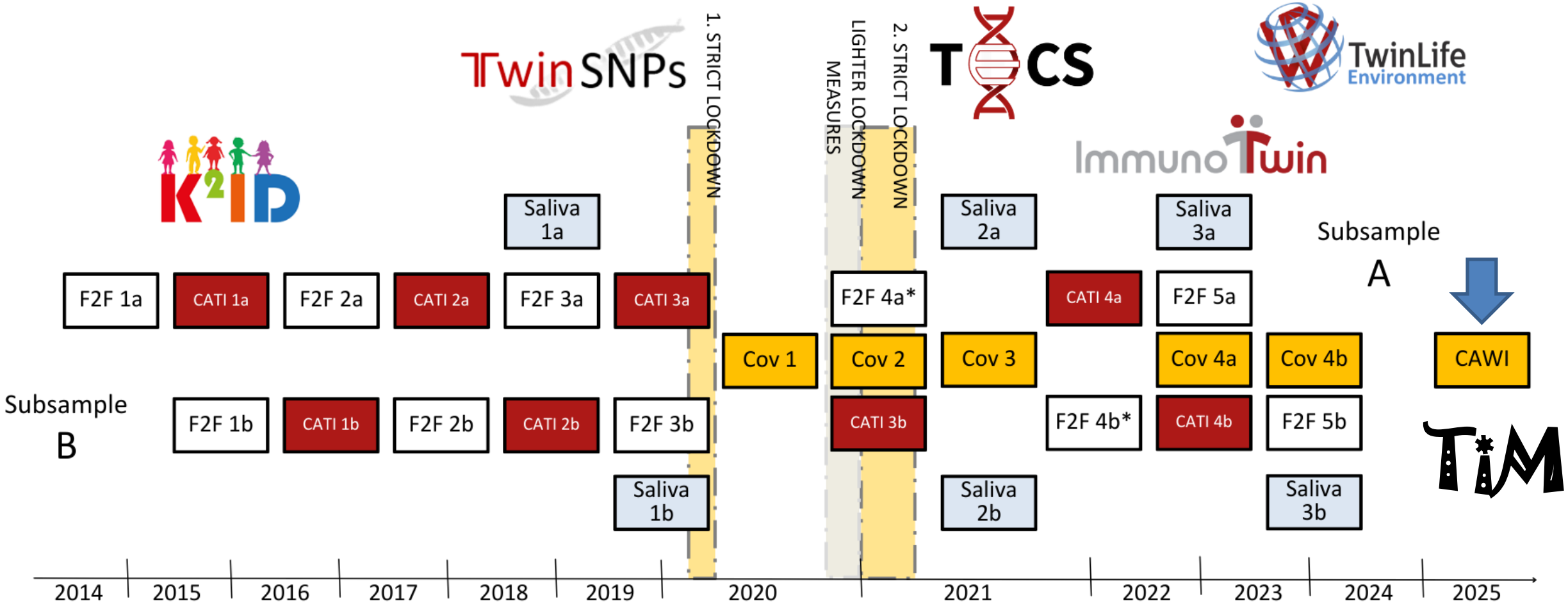
Cooperation regarding publications

* Former TwinLife Team Members

International TwinLife Collaborations

European TwinLife Collaborations

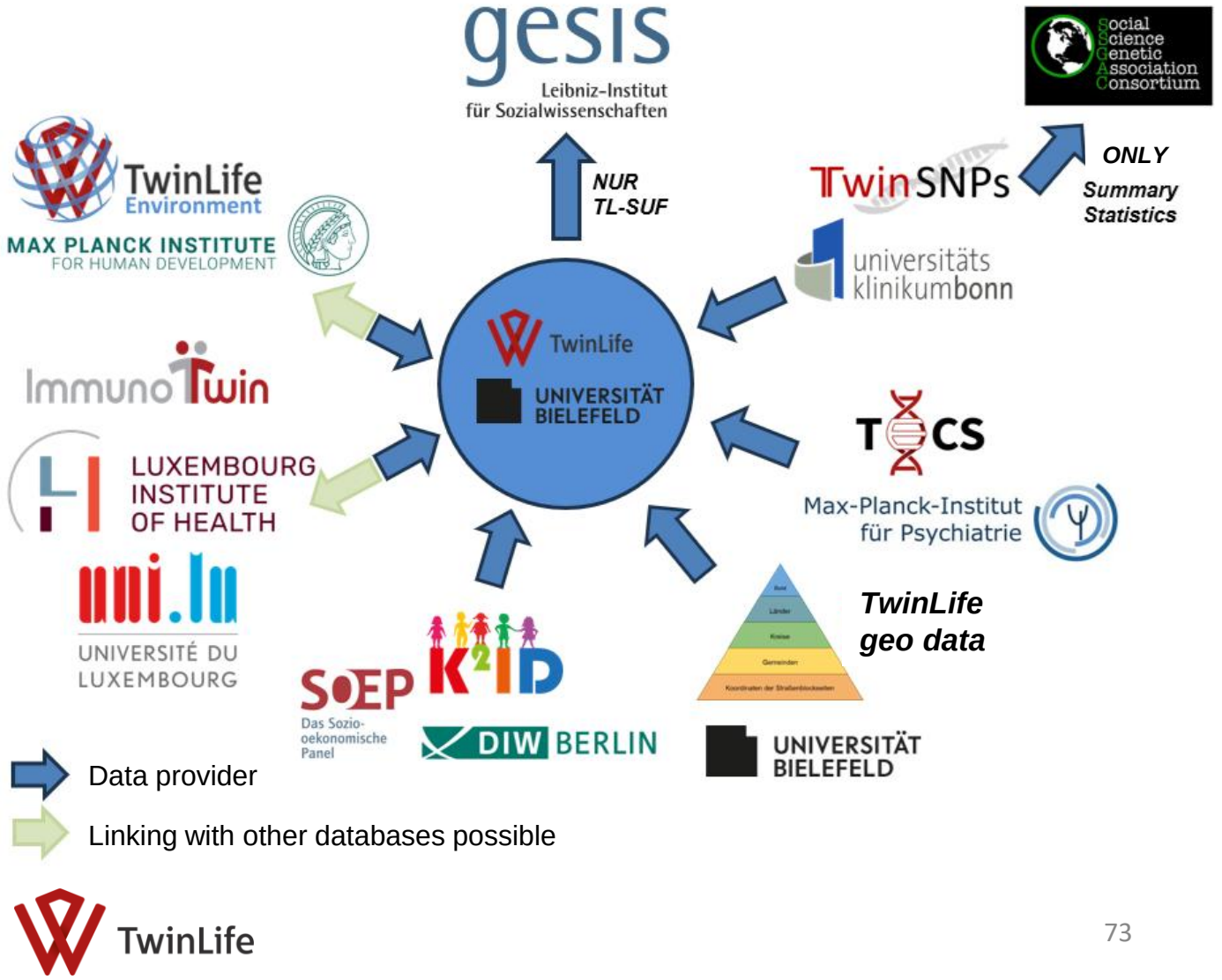
Current Plans



TwinLife Research Data Centre

AIMS

- Completion and quality control of the datasets from the ongoing or planned surveys
- Securing this data for further cooperation projects and a possible continuation of data collection within the framework of further funding lines
- Providing data for users outside the core TwinLife researchers and cooperation partners



TwinLife

GERTRUD ZWILLINGSREGISTER – German Twin Registry under Development

- 1st German Twin Registry
- Initiative of the MPI for Human Development Berlin
- Collaboratives:
  - Universitätsklinik Tübingen
  - Bielefeld University
  - University of Bremen
  - Medical School Berlin
  - MPI for Empirical Aesthetics
  - Saarland University
- https://www.gertrud.info/

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Get Together at Café Unique

TwinLife