

The overlap between well-being and resilience

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Introduction

- **Well-being (WB)** = people's affective and cognitive evaluations of their lives. The affective component refers to the presence of positive feelings, whereas the cognitive component refers to the evaluative satisfaction with life.
- **Psychological resilience (RES)** = an individual's ability to maintain or recover mental health after the experience of stress or adverse life events.
- Well-being and resilience are strongly phenotypically correlated, but less is known about the nature of the overlap.

The aim of this study is to investigate the genetic and environmental overlap between well-being and resilience and to investigate whether the phenotypic correlation is based on a causal relation or an underlying set of genes.

Methods

Sample:

- Wave 1: 4447 twins + 1411 siblings (mean age: 32.87 (SD: 11.4), 66.2% female)
- Wave 2: 9590 twins + 1963 siblings (mean age: 31.73 (SD: 14.4), 67.7% female)

Measures:

- **WB:** Life Satisfaction scale (Diener et al., 1985)
- **Resilience:**
 - Dutch Life Event scale (Van der Velden et al., 1992)
 - ASR Anxious-Depressed (AD) scale (Achenbach & Rescorla, 2003)
 - Resilience: residual of the regression of number of life events on the AD score
 - Individuals who experience less AD symptoms than expected based on the number of life events are resilient, whereas people with more AD symptoms than expected are less resilient.

Analyses:

- *Bivariate common pathway twin model:* longitudinal measurement model
 - Decompose the variance of WB and RES in latent (stable over time) and wave-specific variance
 - Model the overlap between the latent factors of WB and RES
- *Causal analyses:* MZ twin difference model + longitudinal bivariate models + correlation within-subject differences over time

Results

- Strong phenotypic correlations WB + RES: $r = .463 / .505$ (wave 1/2).
- **Sex effect:** men are more resilient than females.
 - Wave 1: men ($M = 3.10$ (SE: .20)) vs females ($M = -2.12$ (SE: .18)).
 - Wave 2: men ($M = 2.13$ (SE: .18)) vs females ($M = -0.93$ (SE: .15)).

Common Pathway Twin model (Figure 1 and Table 1):

- No quantitative sex difference in the estimates of the latent factors RES and WB.
- Sex differences in the estimates of wave specific factors.
- The latent factor resilience shares **50%** of the genetic variance and **73%** of the environmental variance with well-being.

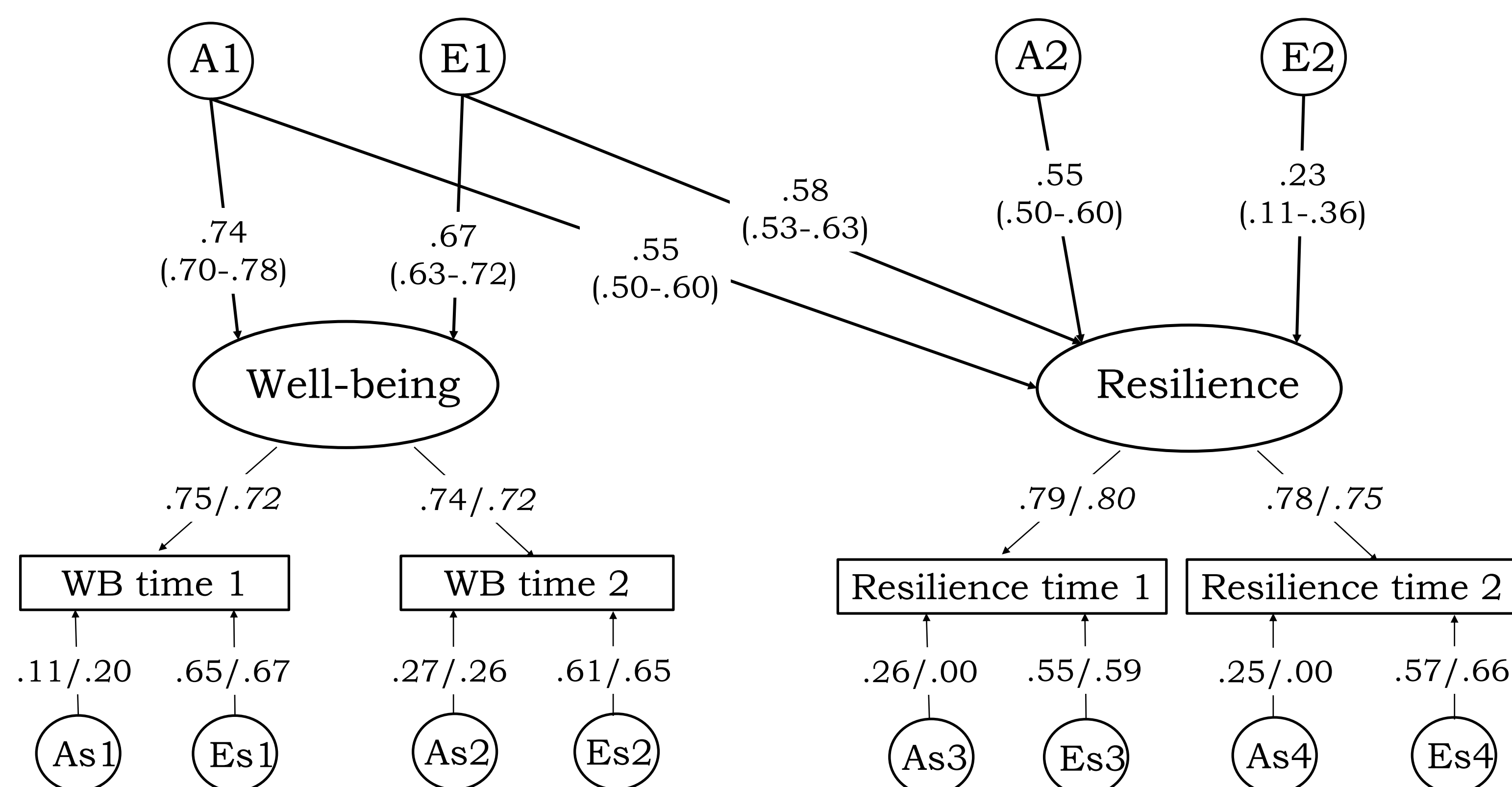


Fig 1. Path estimates of the final common pathway model for females/males.

Table 1. Bivariate heritability estimates and correlations of the latent factors.

| | A | E |
|-------------|---------------------------|---------------------------|
| Well-being | .548 (.53-.57) | .452 (.43-.51) |
| Resilience | .609 (.60-.62) | .391 (.39-.41) |
| Bivariate | .512 (.48-.53) | .488 (.44-.50) |
| Correlation | rG: .708 (.70-.71) | rE: .928 (.86-.98) |

Results

Causal models

1. MZ twin difference:

The twin with higher WB, also scores higher on RES (left panel of Figure 2) and vice versa (right panel).

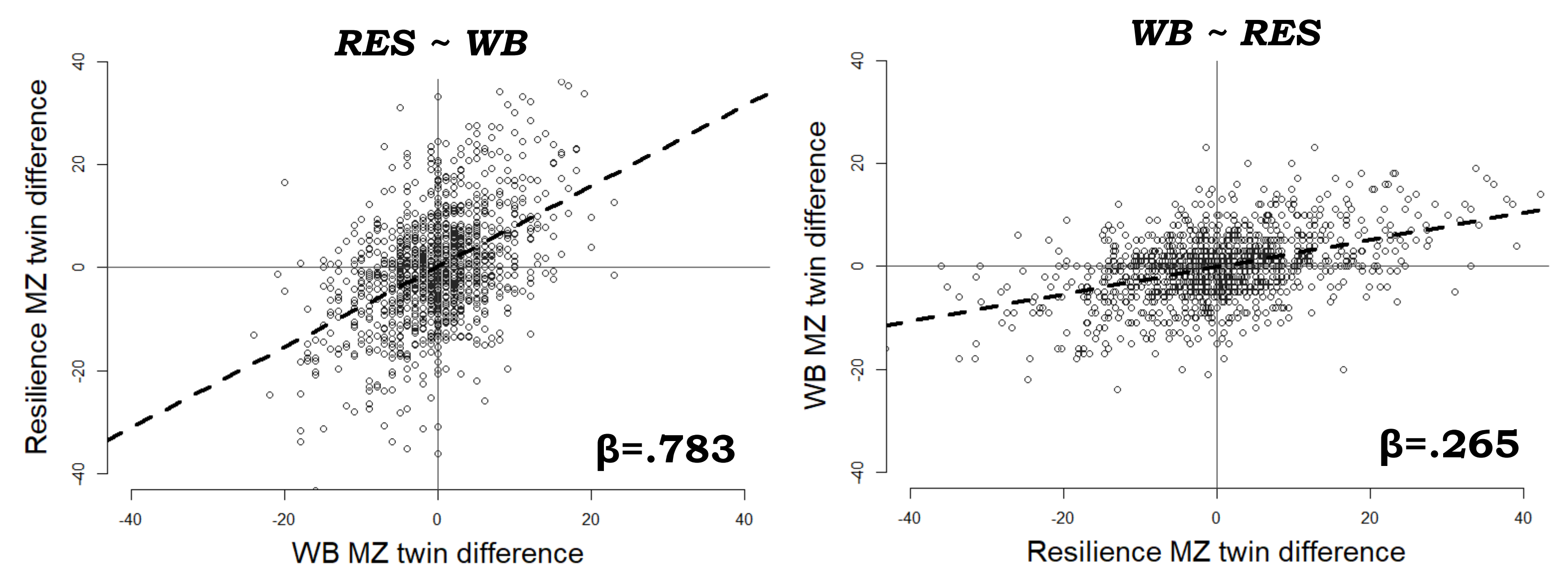


Fig 2. The MZ twin differences in WB and RES are correlated.

2. Longitudinal bivariate correlations: (female/male)

- Baseline WB and later RES: significant rG (.64/.29) and rE (.20/.32)
- Baseline RES and later WB: significant rG (.62/.64) and rE (.19/.22)

3. Correlation of longitudinal within-subject differences:

A change in WB over time predicts a change in RES over time (left panel of Figure 3) and vice versa (right panel).

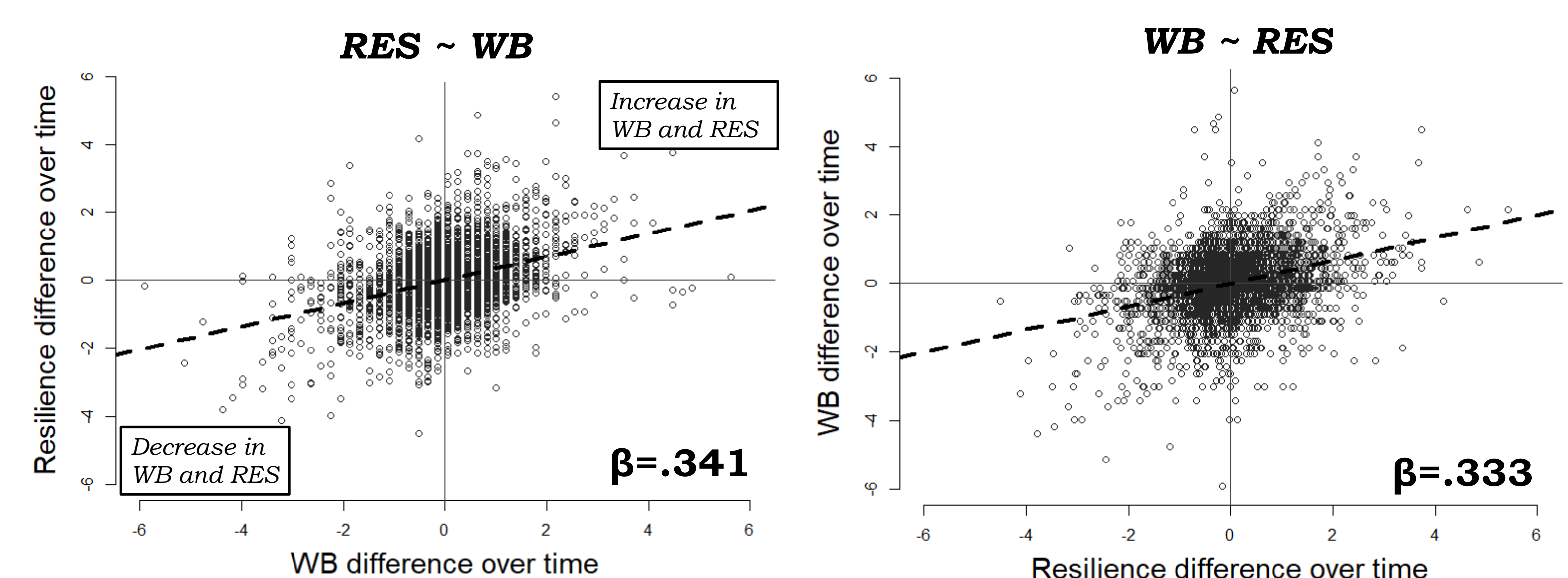


Fig 3. The within-subject differences in WB and RES over time are correlated.

Conclusions

- **Men are more resilient** than women, but there are **no quantitative sex differences** in the heritability of latent well-being (55%) and resilience (61%).
- There are **strong phenotypic, genetic and environmental correlations** between well-being and resilience.
- The causality analyses suggest a **bidirectional causal relationship** between well-being and resilience.

Next steps:

1. Predictions with polygenic scores of resilience and well-being;
2. Compute the genetic correlation RES and WB using GWAS summary statistics and LD-score regression;
3. Apply the MR-DoC twin model: a causal twin model with polygenic scores.

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