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Introduction

Environmental factors may influence brain development

Importance of developmental timing

- Timing of adverse experience¹
- Early life: ↑ susceptibility to environmental factors
- Period of rapid brain development

Buffering effect of positive experiences

- Previously institutionalized children : positive experiences could buffer the effect of negative ones
- Placement in foster care
 - ↑ Total white matter volume²
 - ↑ Attachment³

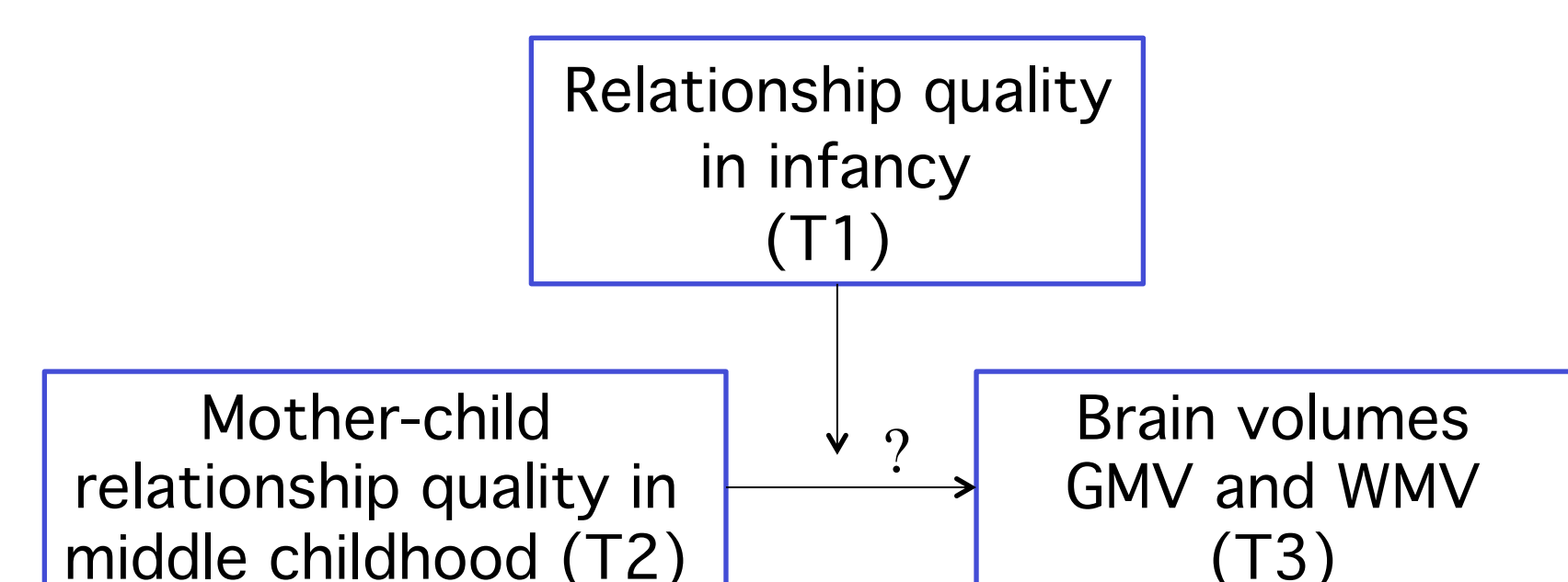
Normative variations in caregiving experiences

- Quality of caregiving experiences, and its effect on brain volumes, may vary from infancy to childhood
- Study in normative sample: Only preschool (not school age) maternal support predicted hippocampal volumetric development⁴

➔ Caregiving experiences at different developmental periods: interaction in the prediction of brain volumes?

The current study

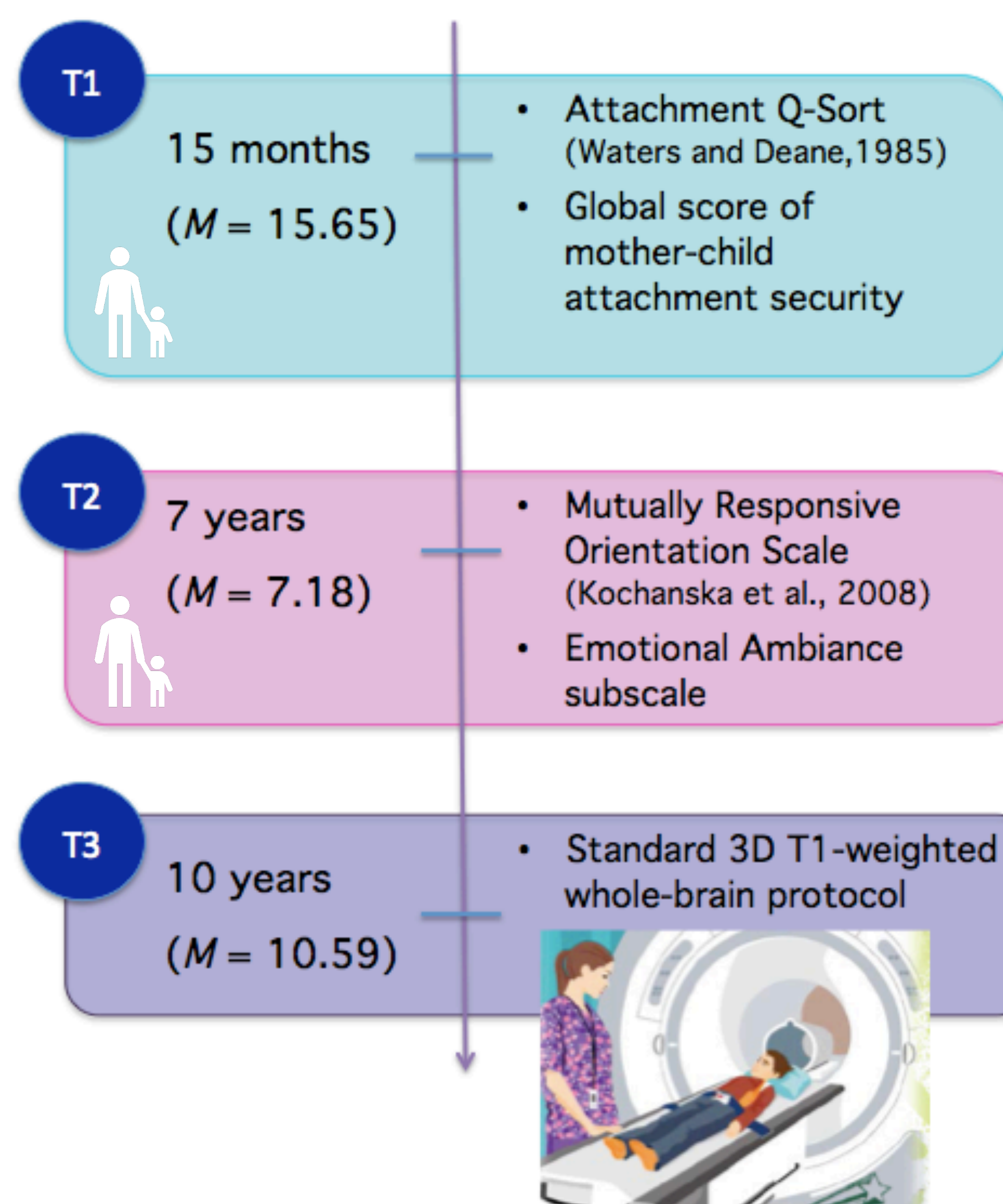
- Examine whether the effects of recent caregiving experiences depend in part on earlier caregiving



GMV= Grey matter volume; WMV= White matter volume

Method

- Substudy of a larger longitudinal cohort study
 - Grandir Ensemble
 - Recruitment 2005-2011 from birth lists
 - Low-risk, middle-class sample
 - 10-year follow-up
 - Current study includes data from children who completed T3 (n = 33; 13 boys)



Statistical analyses

- Preprocessing and brain volume extraction (total GMV and WMV): CAT12, SPM12, MATLAB
- Moderation analysis : PROCESS macro in SPSS
 - to predict total GMV or WMV from mother-child relationship quality at T2 at different levels of the moderator – mother-child relationship quality at T1
- Covariates: total intracranial volume, maternal education, child sex

Results

Total WMV

- Moderation non significant

Total GMV

- Association between mother-child relationship quality at T2 and total GMV at T3:

➔ is significantly moderated by mother-child relationship quality at T1
 $t(26) = -3.58, p = .001, \Delta R^2 = .035$

➔ This association was significant and positive:
• only among children evolving in a low ($\beta = .56, p = .002$)
• or average quality relationship at T1 ($\beta = .21, p = .015$)

➔ This association was non significant
• in children evolving in a high quality relationship at T1

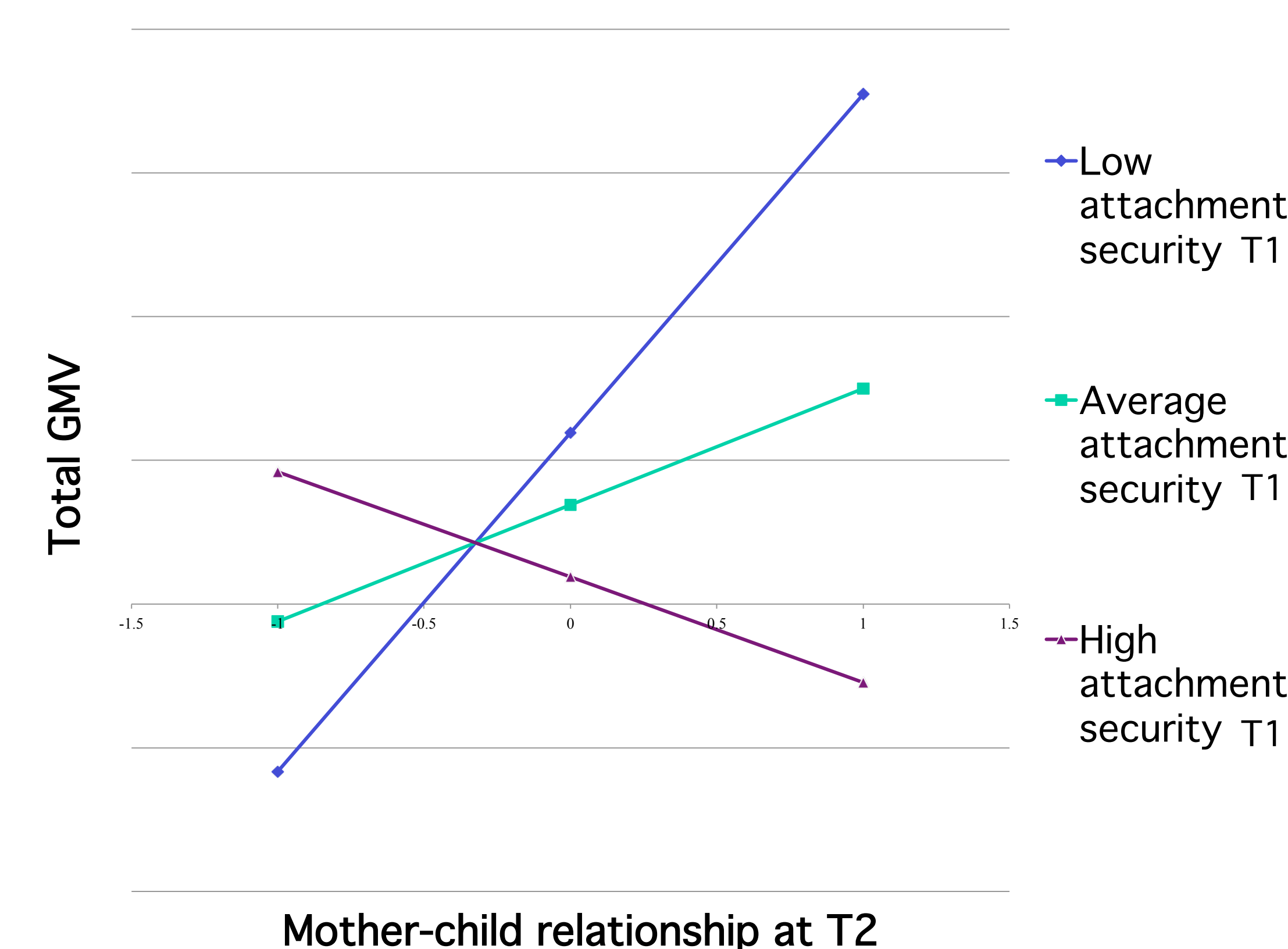


Figure 1. Association between mother-child relationship quality at T2 and total GMV at T3 at different levels of the moderator – mother-child relationship at T1

Conclusion

Interpretation

- Effect of ↓ quality relationship on brain development could be mitigated by subsequent caregiving experiences of ↑ quality
- Positive link between mother-child relationship quality at T2 and GMV in children who had a ↓ quality relationship at T1: compensatory neural mechanism?

Contribution

- First study to examine the interactive effect of caregiving experiences at different ages during childhood on brain volumes
- Consistent with the buffering effect of positive experiences on brain volumes in high-risk samples²

References

1. Tottenham et al. (2010). A review of adversity, the amygdala and the hippocampus: a consideration of developmental timing. *Frontiers in Hum Neurosci*, 3, 68.
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3. Smyke et al. (2010). Placement in foster care enhances quality of attachment among young institutionalized children. *Child Dev*, 81, 212-223.
4. Luby et al. (2016). Preschool is a sensitive period for the influence of maternal support on the trajectory of hippocampal development. *PNAS*, 113, 5742-5747.

