

4541534 / EP12.05

Long-term Neurodevelopmental Outcomes in Monochorionic Diamniotic Twin Pregnancies Complicated by Selective Fetal Growth Restriction: A Systematic Review and Meta-Analysis

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Background: Selective fetal growth restriction (sFGR) complicates 10–15% of monochorionic diamniotic (MCDA) twin pregnancies. Data on long-term neurodevelopmental outcomes remain scarce. We aimed to evaluate long-term neurodevelopment in MCDA twin pregnancies complicated by sFGR by comparing the smaller growth-restricted twins with their appropriately grown co-twins.

Methods: MEDLINE (OVID), Scopus, and Web of Science were searched from inception to March 20, 2026. Eligible studies reported neurodevelopmental outcomes beyond age 12 months with extractable twin-level comparisons between the smaller and larger co-twins. Random-effects meta-analyses evaluated neurodevelopmental impairment (NDI) and cognitive abilities. To address the non-independence of outcomes between twins, clustering was adjusted using design-effect (DEFF) approach with a prespecified intracluster correlation coefficient (ICC) of 0.5. Sensitivity analysis was performed across a range of ICC values to assess the robustness of findings.

Results: Fifteen studies comprising 632 MCDA twin pairs were included. Follow-up data beyond age 12 months were available for 402 smaller and 509 larger co-twins. Smaller twins had a significantly higher risk of NDI (10 studies; RR 1.61, 95% CI 1.12–2.31, p=0.015; I²=0.0%) (Figure 1). The risk was more pronounced among those managed expectantly (RR 1.93, 95% CI 1.06–3.51, p=0.037) than among those with prenatal fetal intervention (p=0.266) (Figures 2 and 3). Cognitive score differences were statistically significant but clinically negligible (approximately 0.75 points on standardised cognitive scales; SMD -0.05, 95% CI -0.09 to -0.01, p=0.032) (Figure 4).

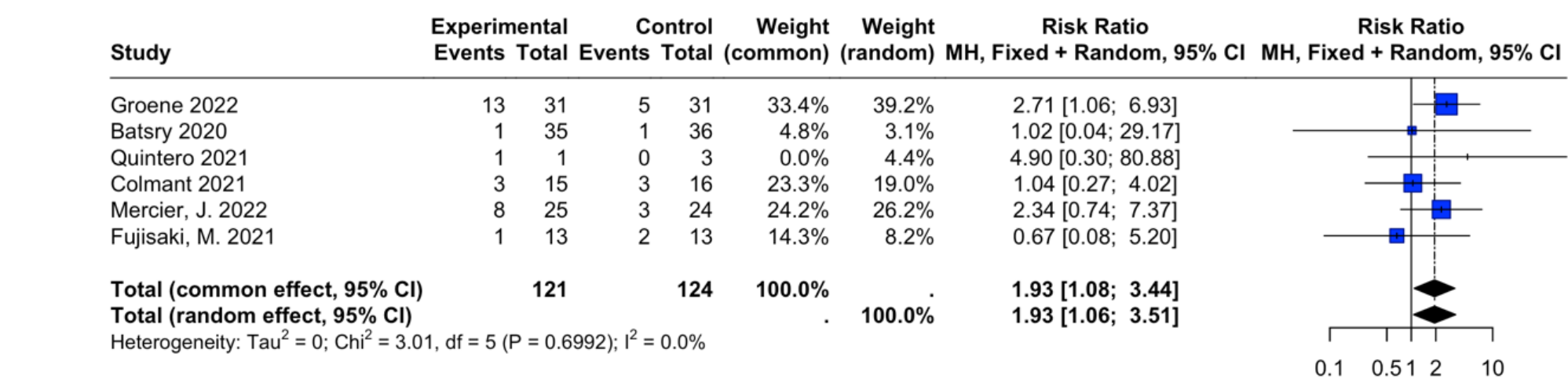


Figure 2. Forest Plot of the neurodevelopmental impairment in monochorionic diamniotic (MCDA) twin pregnancies complicated by selective fetal growth restriction (sFGR) Subgroup Analysis (By Management Strategy: Expectant)

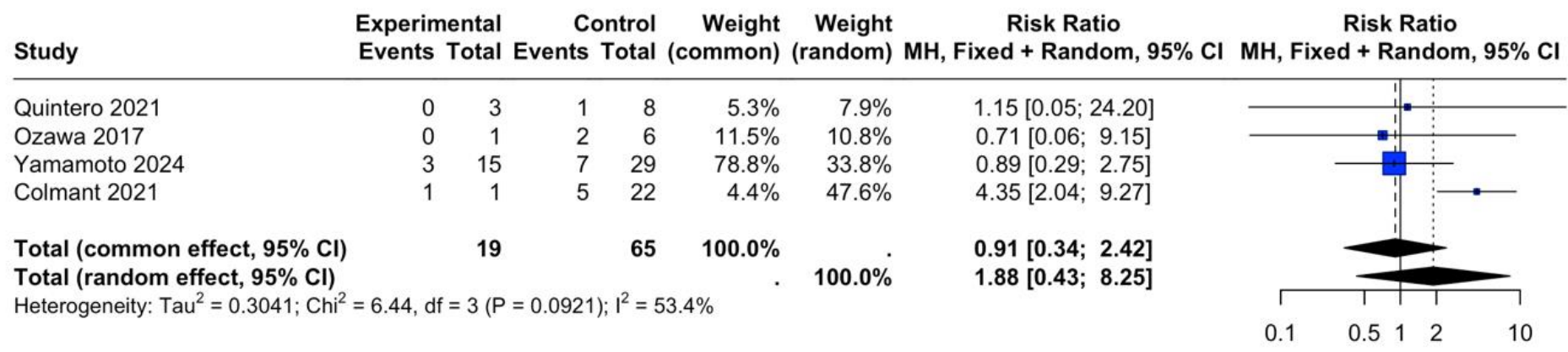


Figure 3. Forest Plot of the neurodevelopmental impairment in monochorionic diamniotic (MCDA) twin pregnancies complicated by selective fetal growth restriction (sFGR) Subgroup Analysis (By Management Strategy: Intervention)

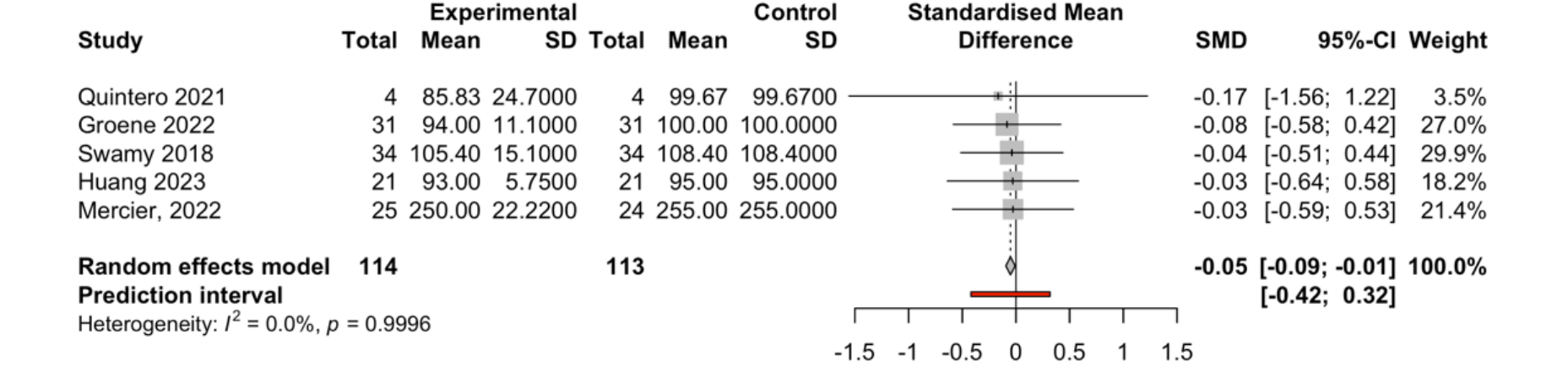


Figure 4. Forest Plot of the overall cognitive performance in monochorionic diamniotic (MCDA) twin pregnancies complicated by selective fetal growth restriction (sFGR)

Conclusion: The smaller twin faces a 61% higher risk of NDI and statistically significant but clinically negligible differences in mean cognitive scores compared with their co-twins. The NDI risk is almost double when sFGR is managed expectantly. Larger studies stratifying risk based on fetal Doppler and management strategies are warranted.



Figure 1. Forest Plot of the overall neurodevelopmental impairment in monochorionic diamniotic (MCDA) twin pregnancies complicated by selective fetal growth restriction (sFGR)