LongGold
A longitudinal study on the development of musical abilities during adolescence

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Music connects to other psychological factors

- Well-documented positive associations between music and …
  - Intelligence (Schellenberg, 2004; 2006; Ruthsatz et al., 2008)
  - (Verbal) memory (Chan et al., 1998; Ho et al., 2003)
  - Phonological awareness (Dege & Schwarzer, 2011)
  - Personality (Greenberg et al., 2015)
  - Pro-social behaviour (Kirschner and Tomasello, 2010; Williams et al., 2015, Gembris, 2015; Schellenberg et al., 2015)
  - Academic performance (Gardiner et al., 1996; Hille & Schupp, 2014)

Does music engagement have far transfer effects to all these domains?

Problems with the empirical evidence in the literature

- Cross-sectional studies: Correlation ≠ Causation
- Experimental studies: Confounding variables and control group
- Music interventions in experimental studies: Is there a magic formula for music teaching?

Does music make you smart?

Meta-analysis Sala & Gobet (2017)

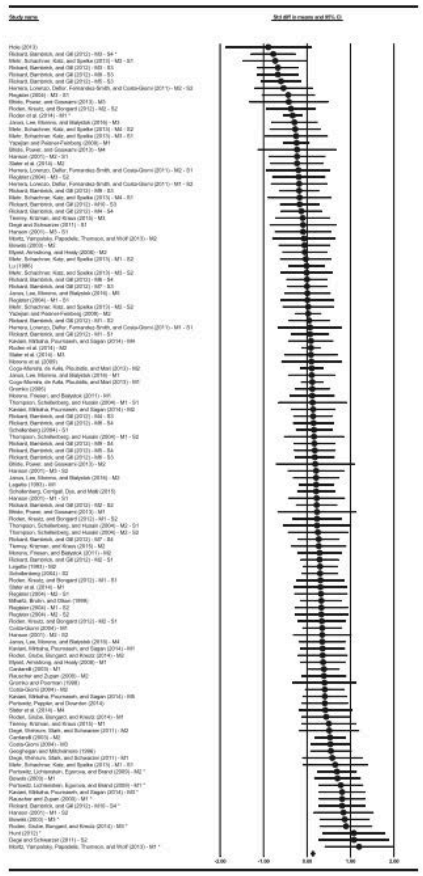


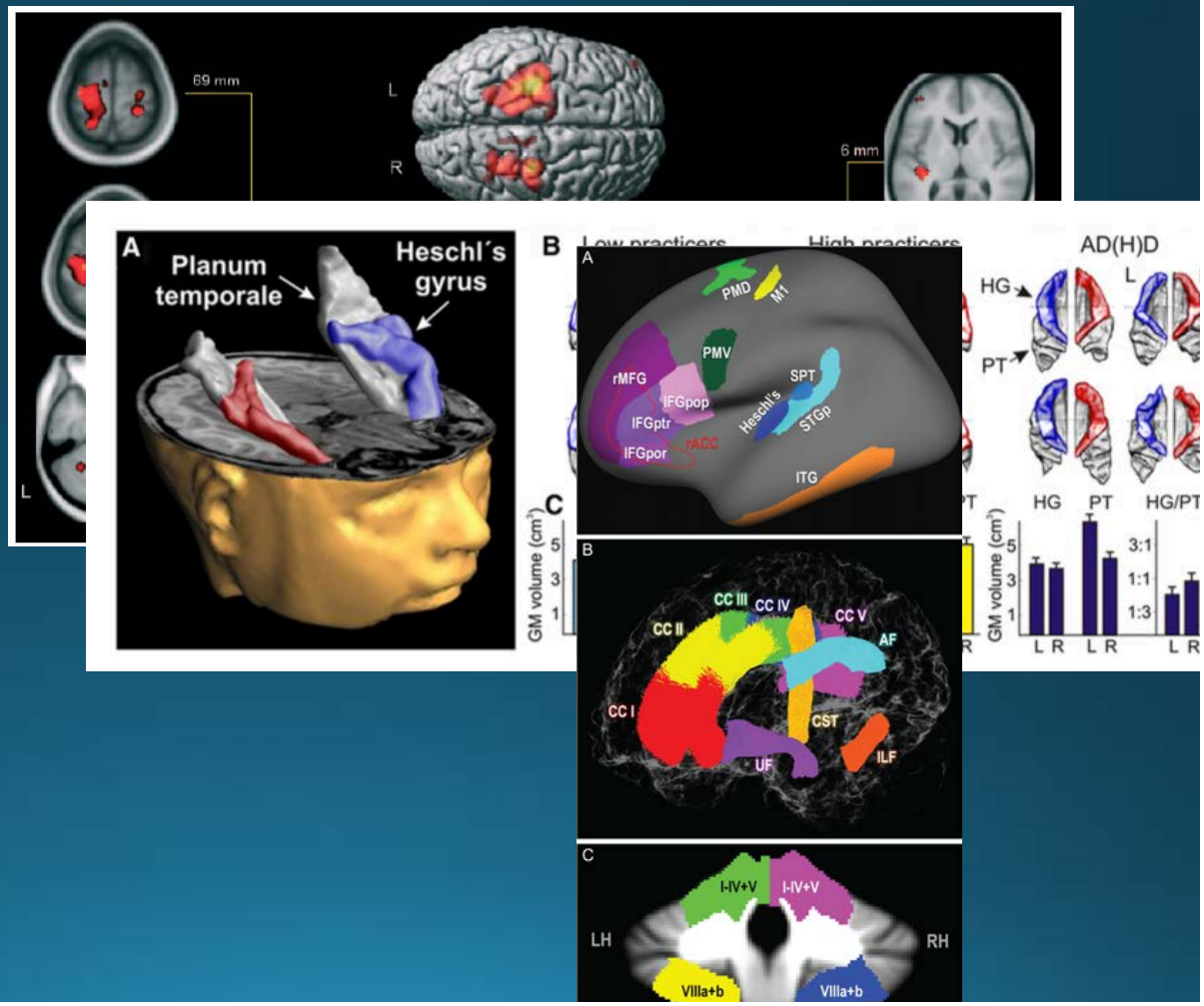
Fig. 1. Overall effect size ($\bar{d}$) for music training groups compared to control groups. Cohen's *ds* (circles) and 95% CIs (lines) are shown for all the effects entered into the meta-analysis. The diamond at the bottom indicates the meta-analytically weighted mean $\bar{d}$. When studies had multiple samples, the table reports the result of each sample (S1, S2, etc.) separately. Similarly, when studies used multiple outcome measures, the table reports the result of each measure (M1, M2, etc.) separately. Asterisks indicate adjusted (Winsorized) outliers.

Overall effect size: d = 0.17

A small effect!

But: Musical training changes the brain

- Musicians more grey matter volume in superior parietal and inferior temporal cortex (Gaser & Schlaug, 2003)
- Larger Heschl's gyrus in high-practicing Jeki kids (Seither-Preisler & Schneider, 2014)
- Brains of identical twins discordant for musical training differ strongly (Manzano & Ullen, 2017)
- …



Open Questions

- What about near-transfer effects (to what degree do musical listening skills benefit from music training?)
- Where do musical abilities come from?
- How do musical abilities, intelligence, social skills, and personality develop together over adolescence?

⇒*Lack of longitudinal studies on musical development across teenage years*

The LongGold Study

- Track development of musical abilities, intelligence, and social skills in longitudinal study across adolescence

=> *How do musical abilities develop?*

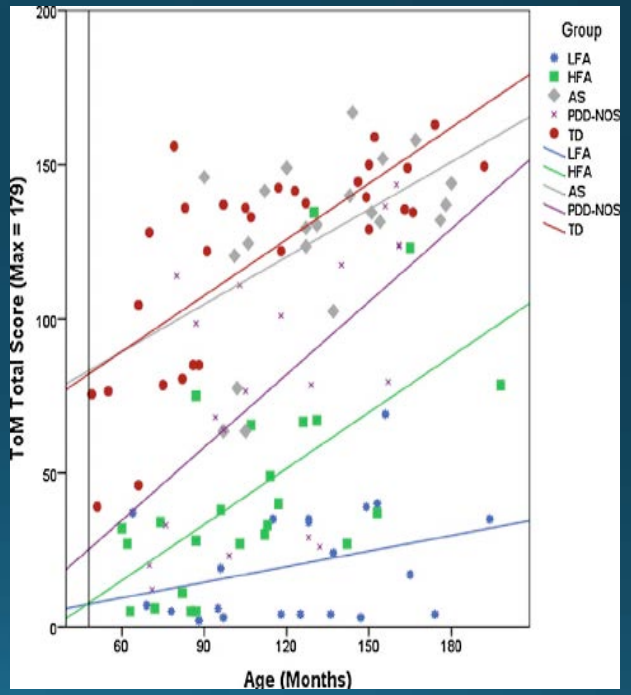
=> *Where does self-motivation for music come from?*

=> *How can engagement with music make teenagers 'smarter'?*

Why do we need the LongGold study?

- No quantitative study on musical development across teenage years yet
- Track musical development across teenage years
- What are causal factors driving musical development?
  - => *Who will take up music seriously?*
  - => *Who will give it up again?*

Trajectories of musical development



Listening Abilities

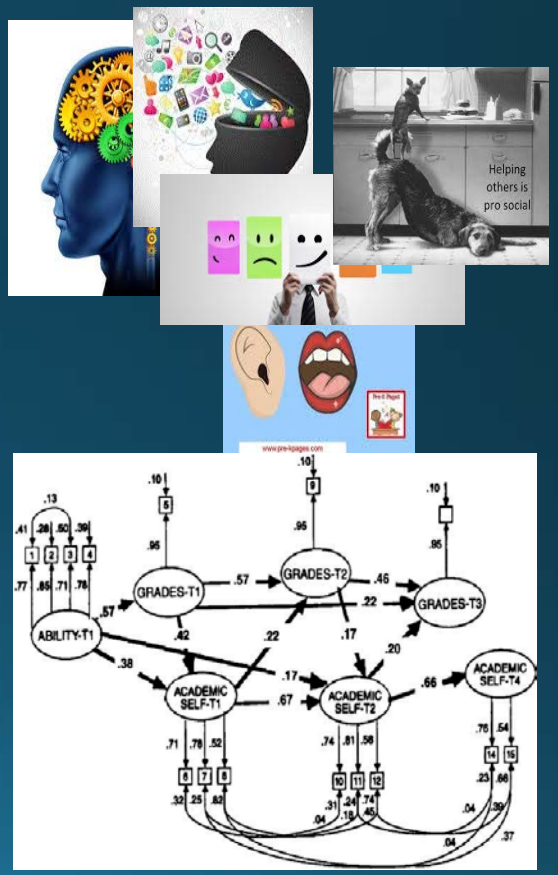
Musical Training

Why do we need the LongGold study?

- How do personality, cognitive and social skills co-develop with musical abilities?

  => *Answers to causal questions on transfer effects from longitudinal design*

- How does academic achievement benefit from engagement with music?
- How does music compare to sports and other leisure activities?
- No prescribed specific music intervention, no focus on specific music genre/style



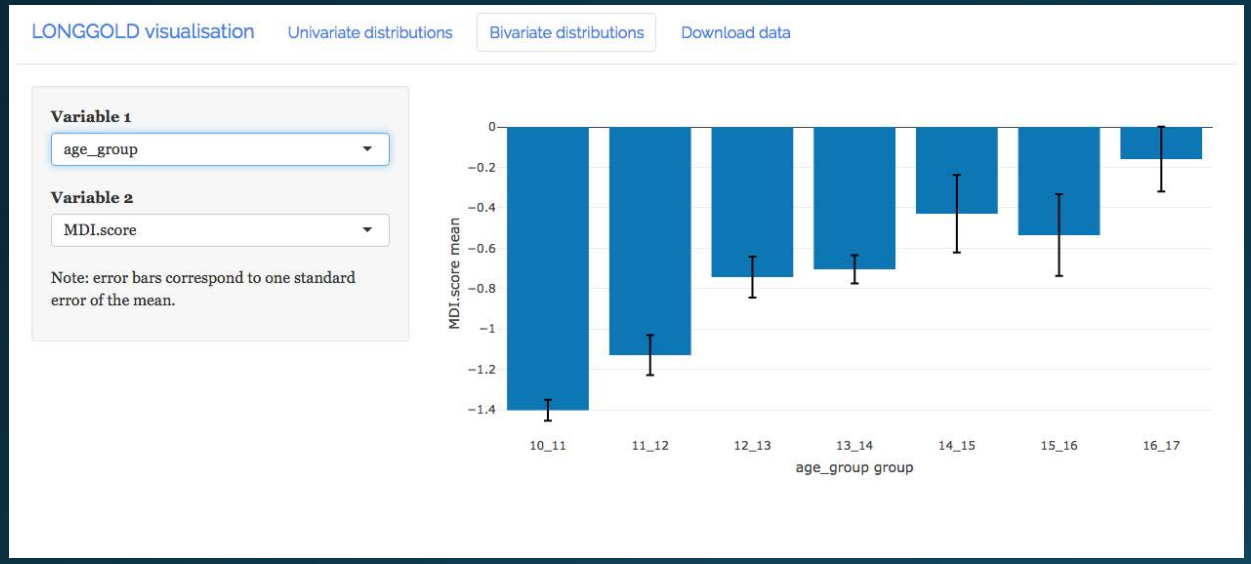
The LongGold Project

Longitudinal Assessment of

- Musical abilities (adaptive tests)
- Cognitive skills (IQ, memory)
- Personality
- Attitudes, mental well-being, social skills
- Musical and leisure activities

- Secondary school years (7 years)
- Schools in UK (since 2015), Germany (since 2018)
- Outline and first results: Müllensiefen et al., (2015)

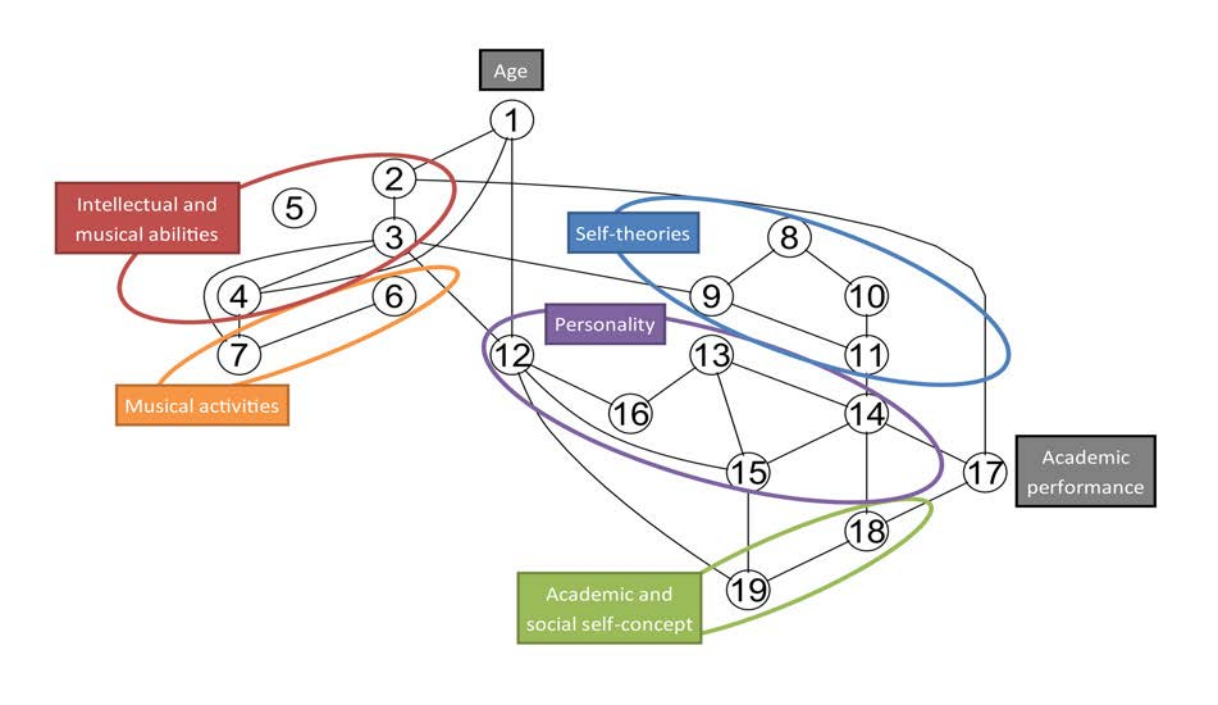
Test locations



Online Data collection and scoring

- Classroom testing
- Browser-based interface
- Data collection and processing on central server
- Data visualisation and download

Results: Network model of traits and skills *(Müllensiefen et al., 2015)*

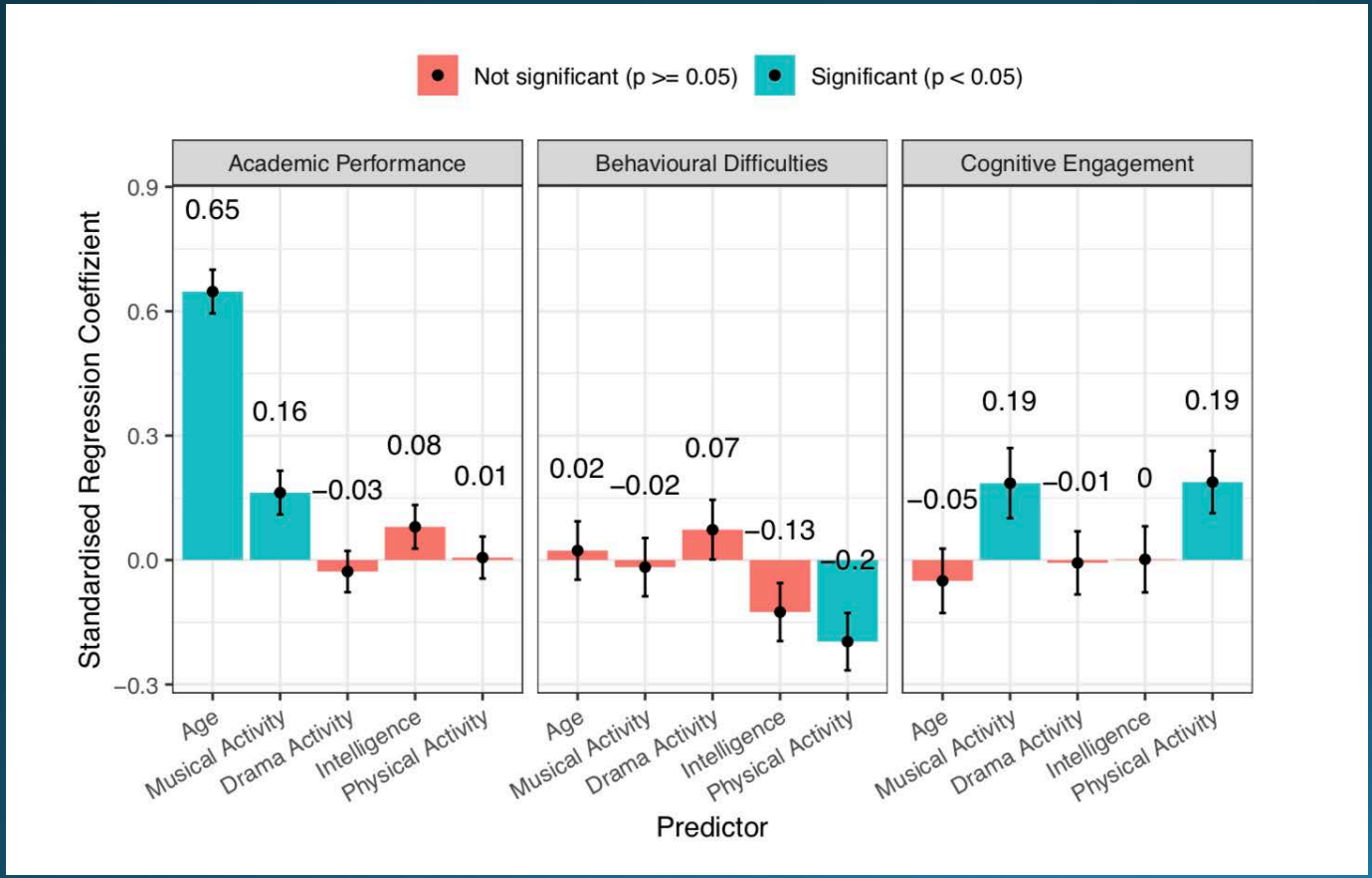


Results:

- Growth mindset attitudes and musical ability closely connected
- Chain from attitudes to conscientiousness to academic performance

1, Age; 2, Intelligence; 3, Melodic Memory; 4, Beat Perception; 5, Sound Similarity Perception; 6, Concurrent Musical Activities; 7, Musical Training; 8, Musical Goals; 9, Theory of Musicality; 10, Academic Goals; 11, Theory of Intelligence; 12, Extraversion; 13, Agreeableness; 14, Conscientiousness; 15, Emotional Stability; 16, Openness; 17, Academic Achievement; 18, Academic Self-Concept; 19, Social Self-Concept.

Results: Importance of musical activity



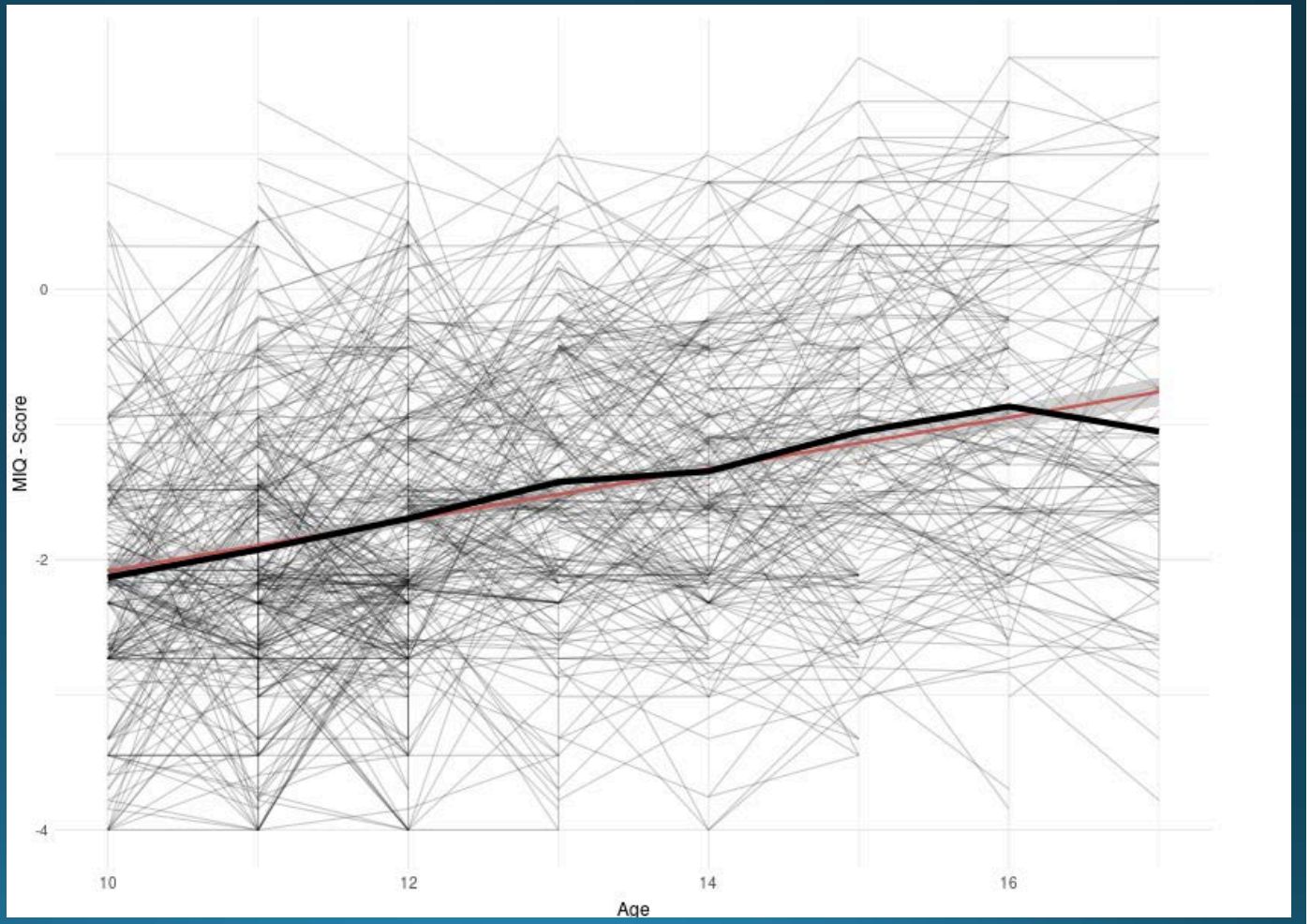
Results:

- Musical activity has positive influence on academic performance and cognitive engagement with school

Results: The development of intelligence and the role of music

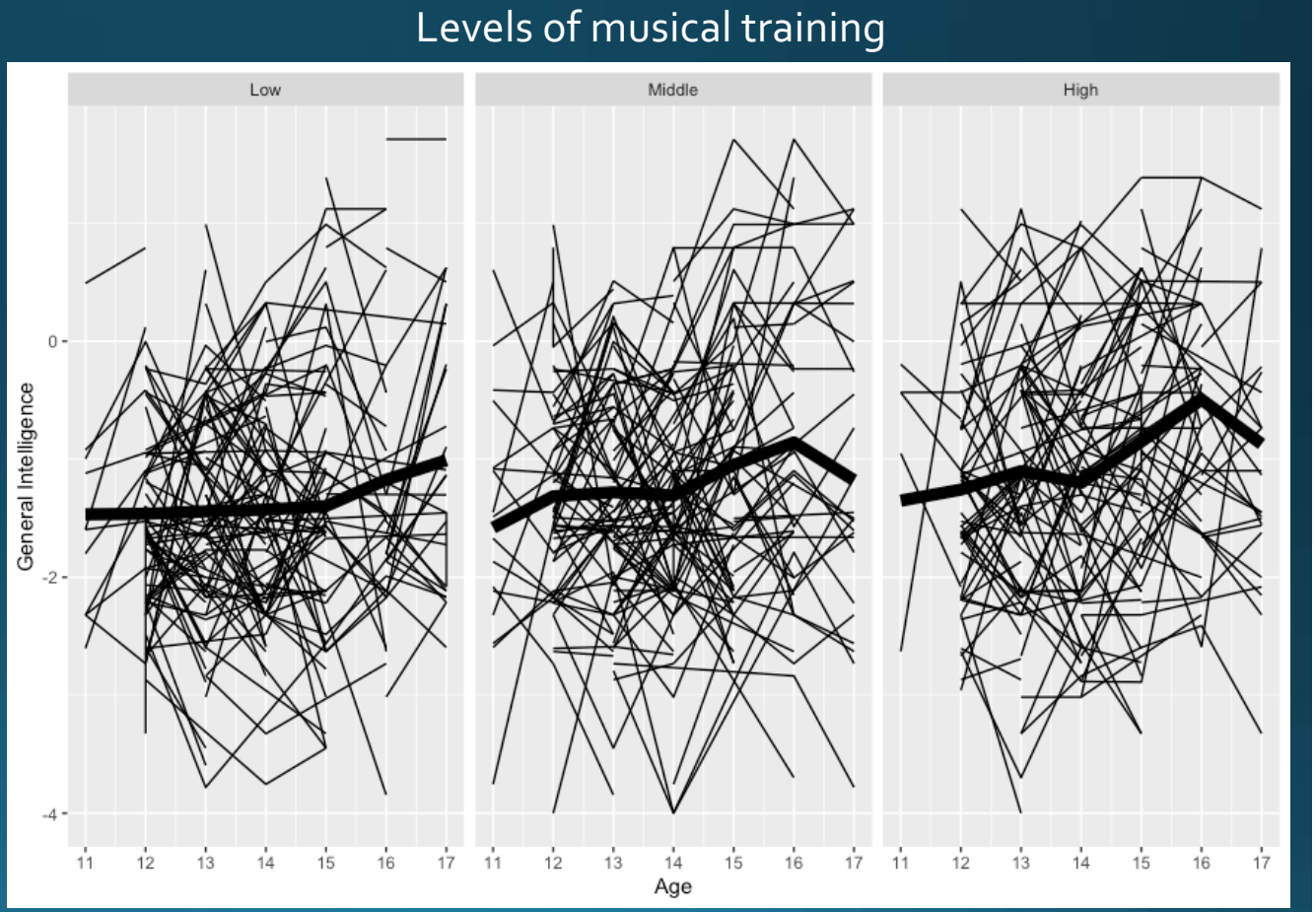
Intelligence grows with age

Growth rate is about 1/10 of a standard deviation per year (~ 1.5 IQ points/year)



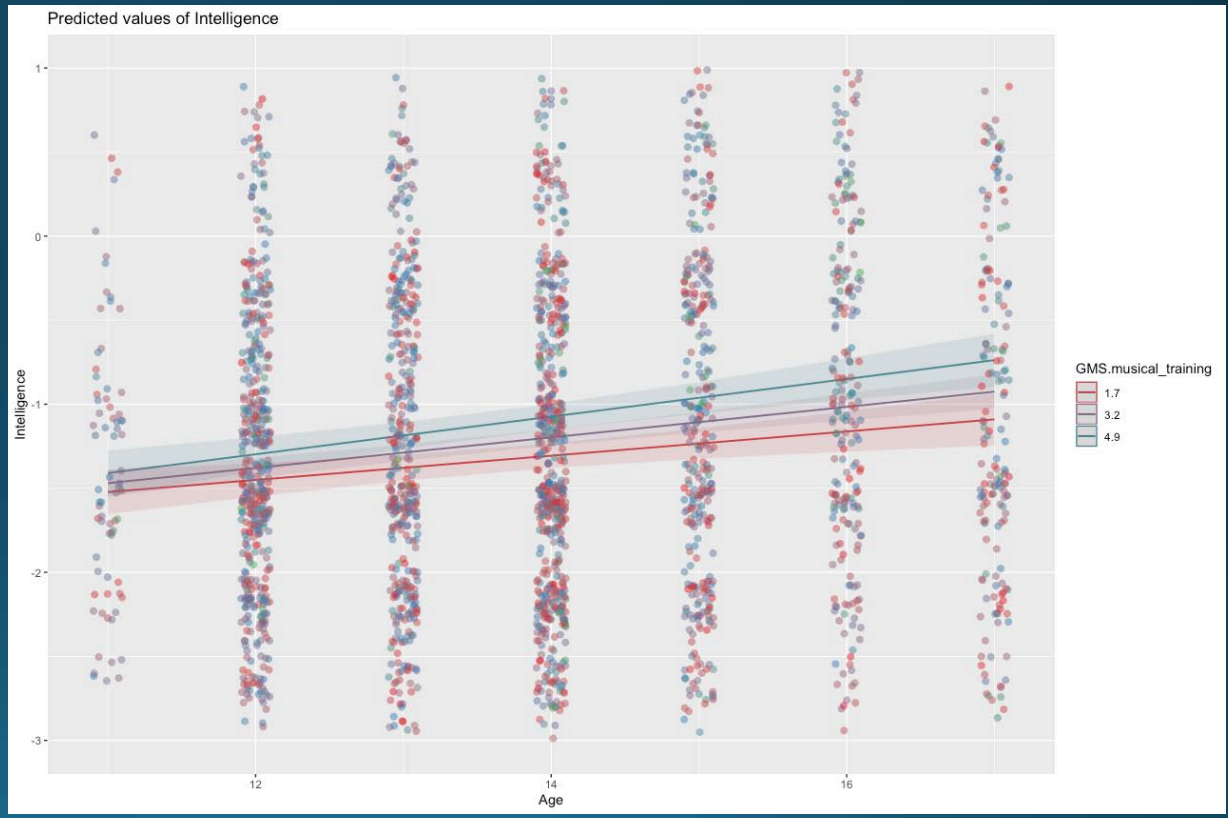
Both, age and musical training contribute to intelligence test scores

- Similar effect size for musical activity (standardized coefficient = 0.12) and age (standardized coefficient = 0.15)



A cause for faster growth in intelligence is musical training

- Intelligence grows with age, but intelligence grows faster for pupils who receive more musical training



Summary: Development of Intelligence

- Intelligence grows during teenage years
- Pattern of growth is similar for intelligence and musical abilities
- Higher levels of musical training are associated with higher intelligence scores
- The growth rates for intelligence are higher when more musical training is received

LongGold: Summary and Perspectives

- Integrate with ABCD study on adolescent development in US
- Compare musical development of highly gifted and normal adolescents in Russia
- Branch out to other European countries
- Apply results in music education
- Collaborate!

longgold.org

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