Slides:

faculty/sanja/Boulder_2012/Moderating_covariances_IQ_SES/Slides

Moderating covariances: practical

Turkheimer, E., Haley, A., Waldron, M., D'Onofrio, B., & Gottesman, I.I. (2003). Socioeconomic status modifies heritability of IQ in young children. *Psychological Science, 14(6), 623-628.*

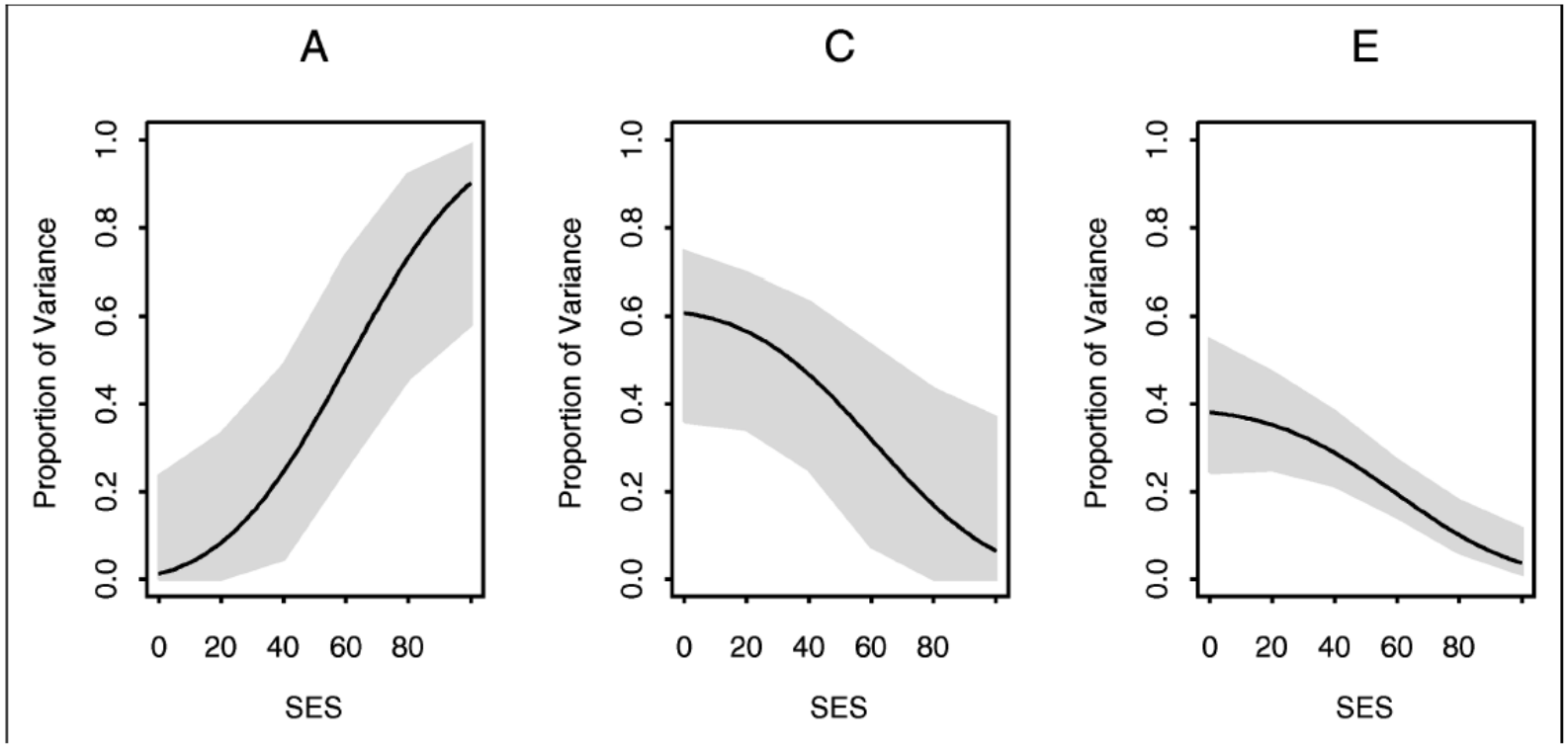


Fig. 3. Proportion of total Full-Scale IQ variance accounted for by A, C, and E plotted as a function of observed socioeconomic status (SES). Shading indicates 95% confidence intervals.

Current practical: Does SES modify variance components of IQ in 5 year old children?

Data:

zygosity	socioeconomic status	IQ twin 1	IQ twin 2
zyg	**ses**	**iq1**	**iq2**
1	3	-0.88	-1.36
2	3	0.1	-0.11
2	3	1.14	0.44
2	2	0.1	-0.18
1	3	-0.39	-0.74
1	3	0.1	1.7
…			

N = 430 twin pairs (205 MZ, 225 DZ)

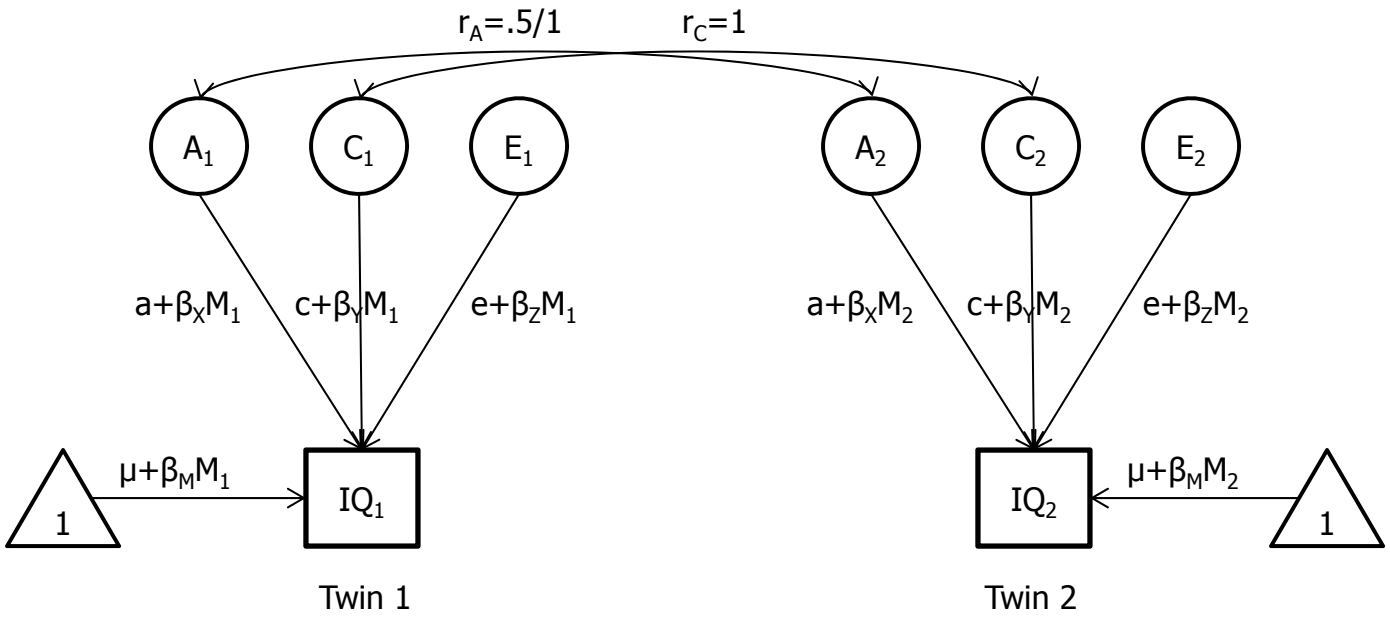
IQ scaled to have mean = 0 and variance = 1

SES measured on a 5-point scale (1 = low, 5 = high)

Is the magnitude of variance components modified by the children's SES?

Current practical: Does SES modify variance components of IQ in 5 year old children?

Model:



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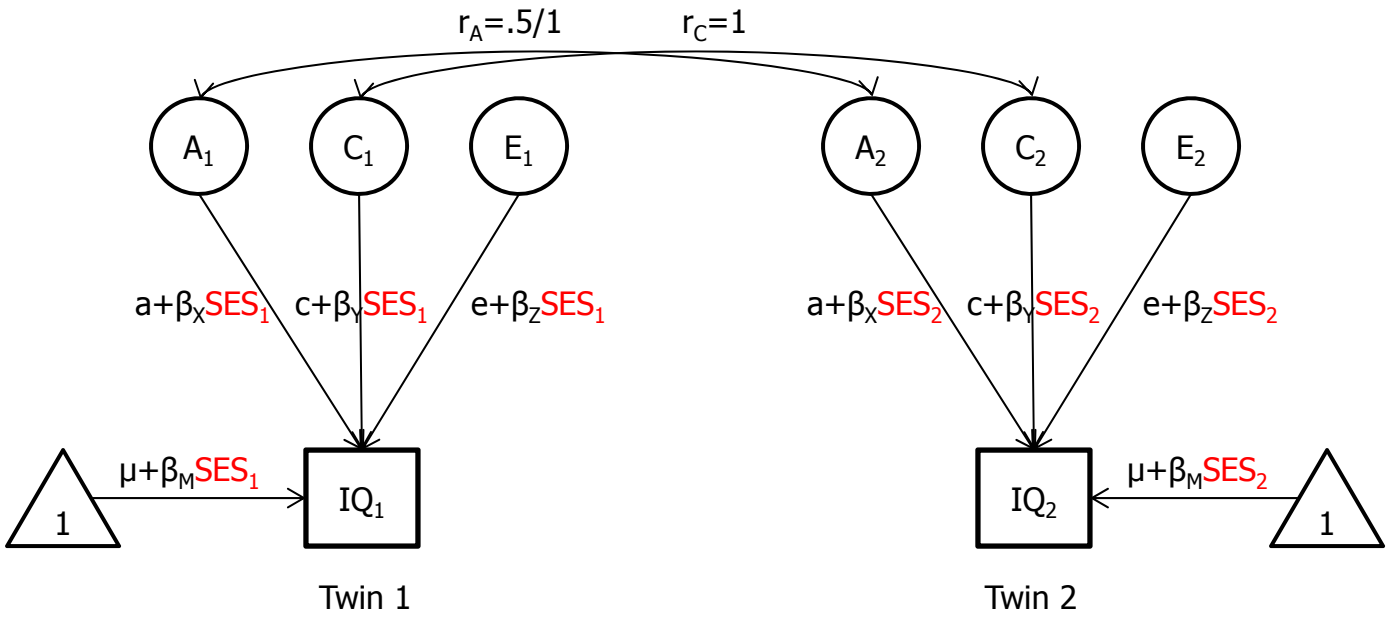

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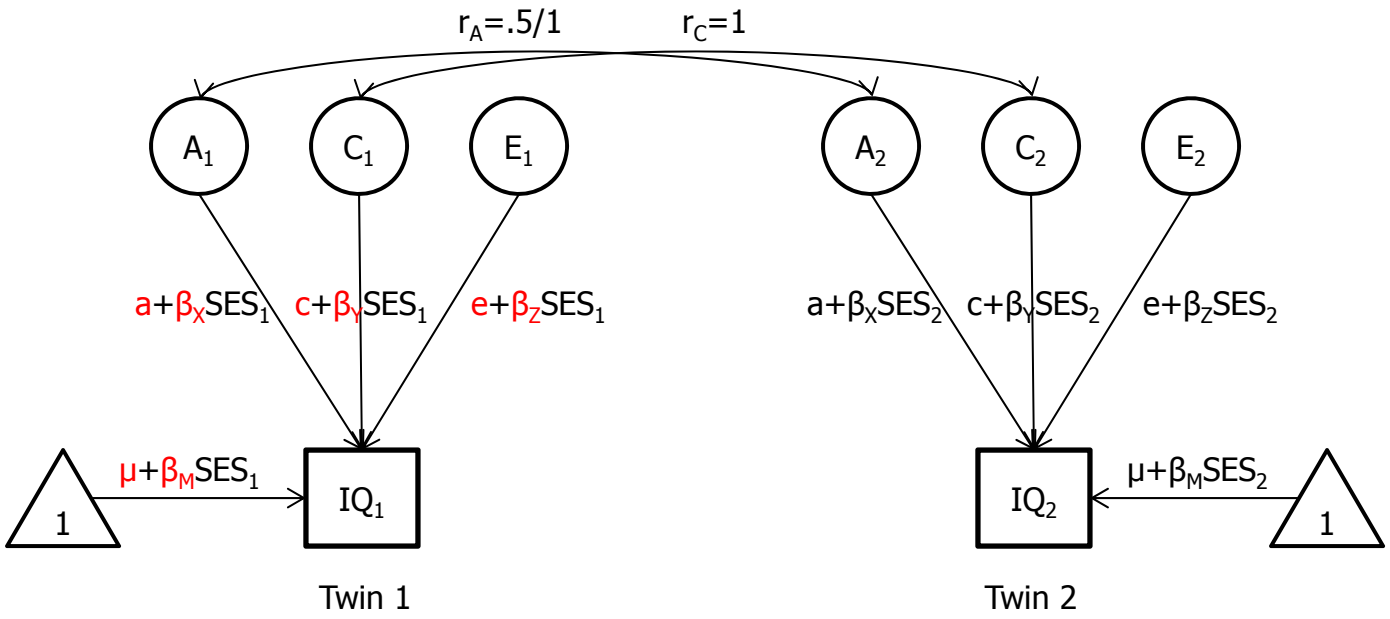
Parameters to estimate:



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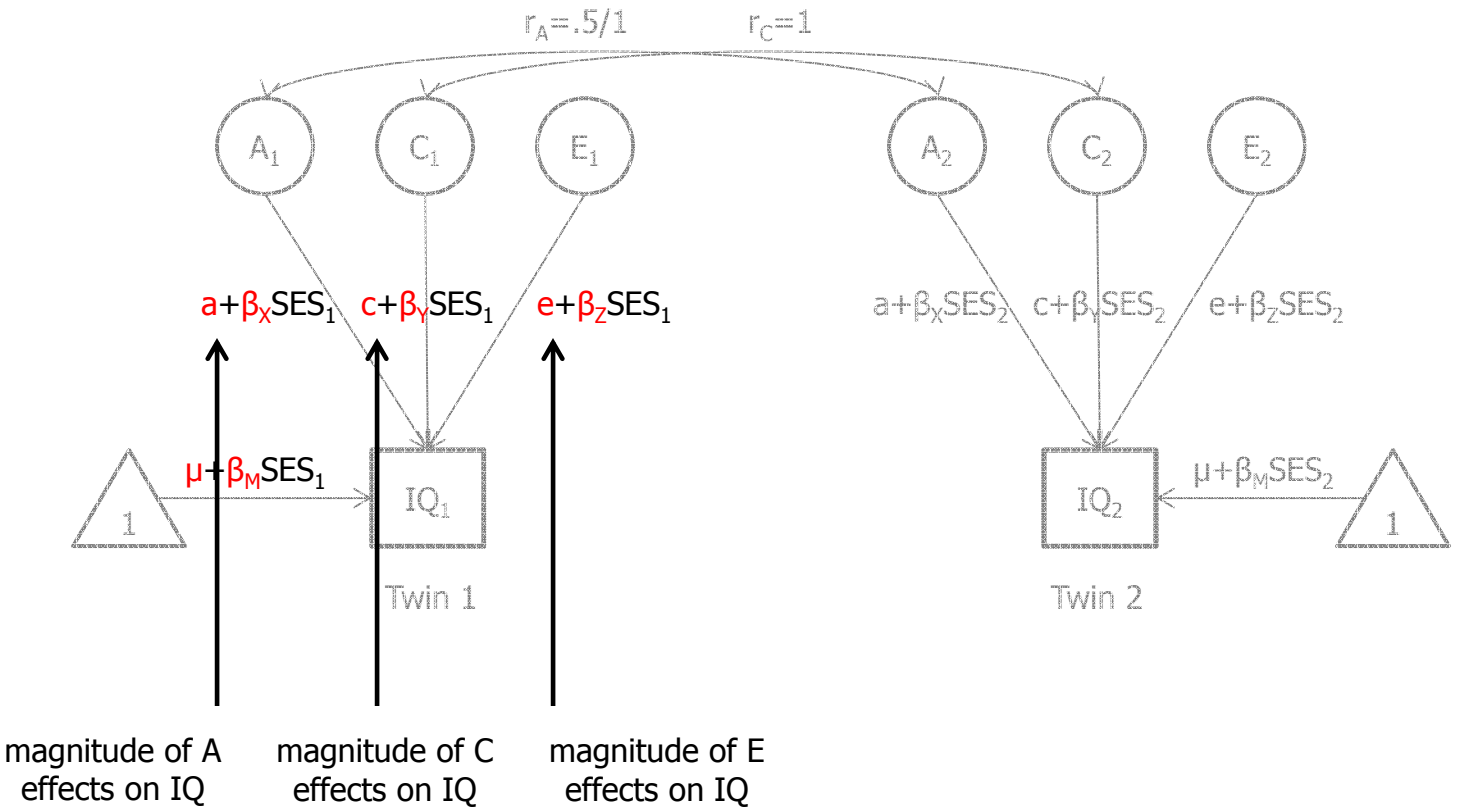

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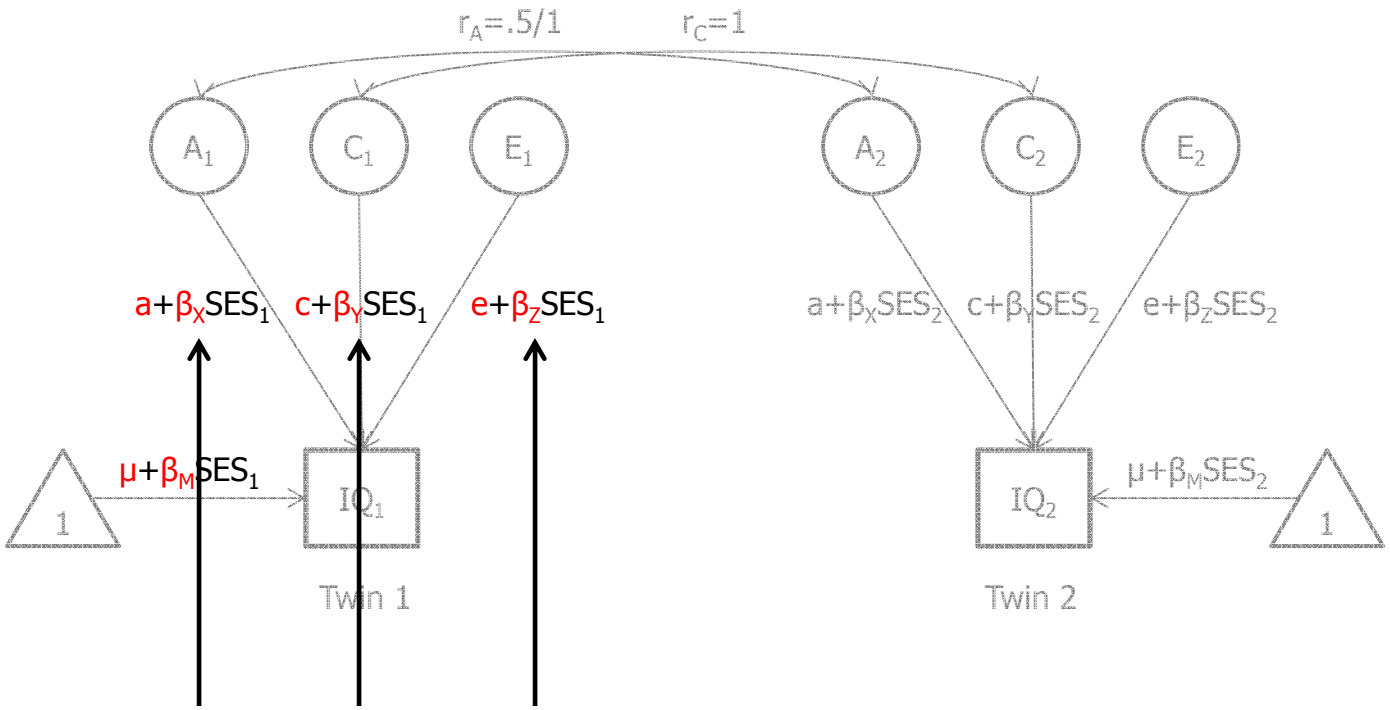

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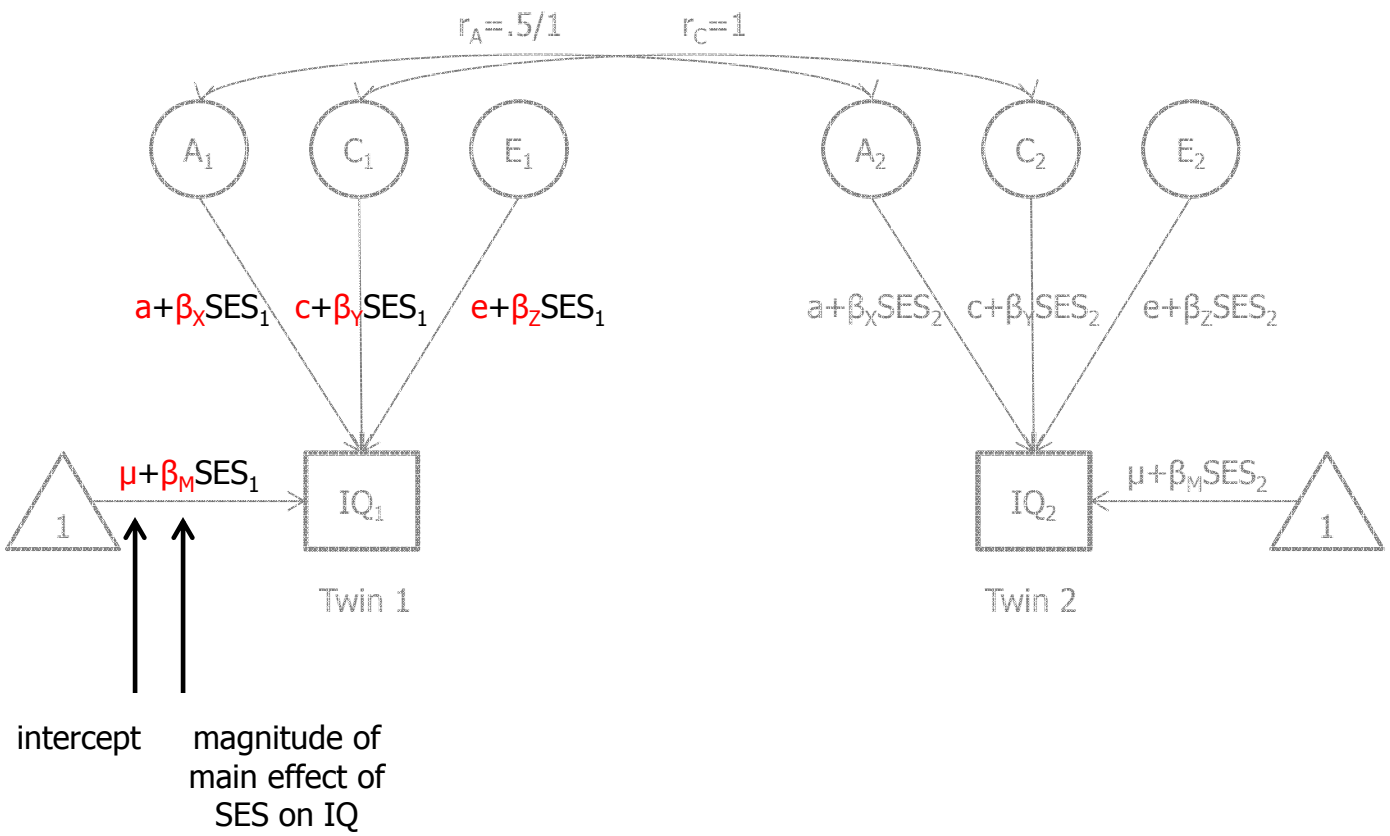

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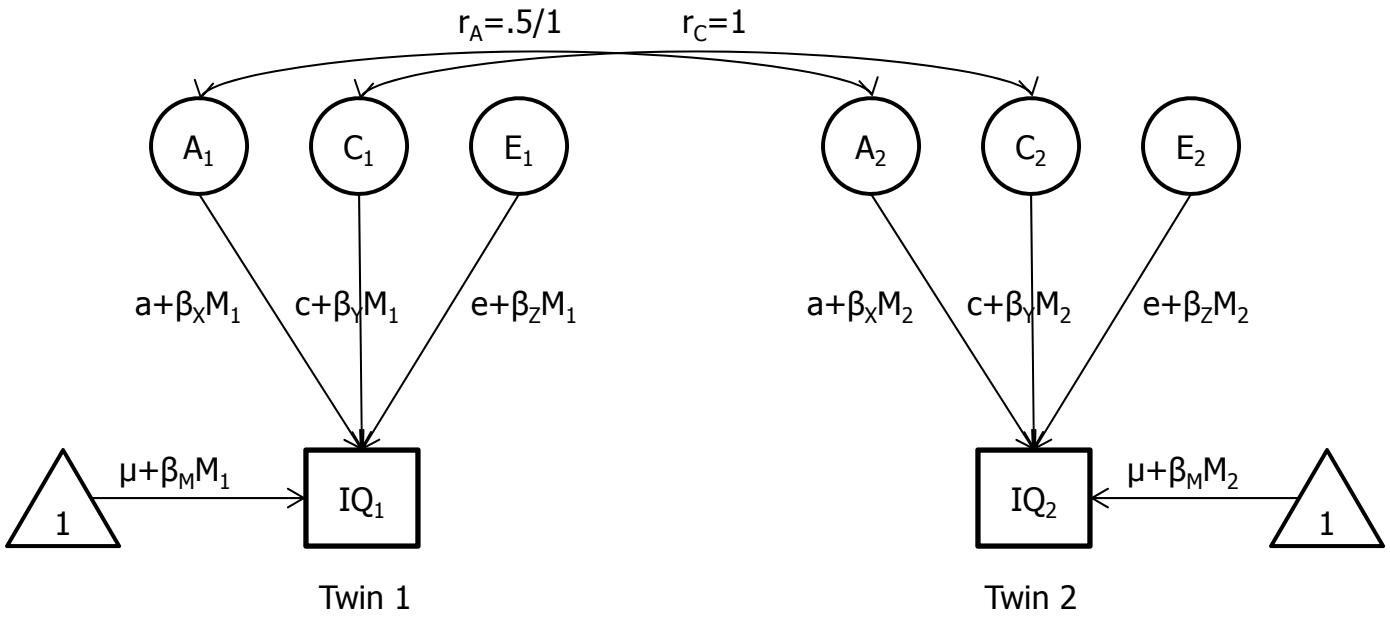

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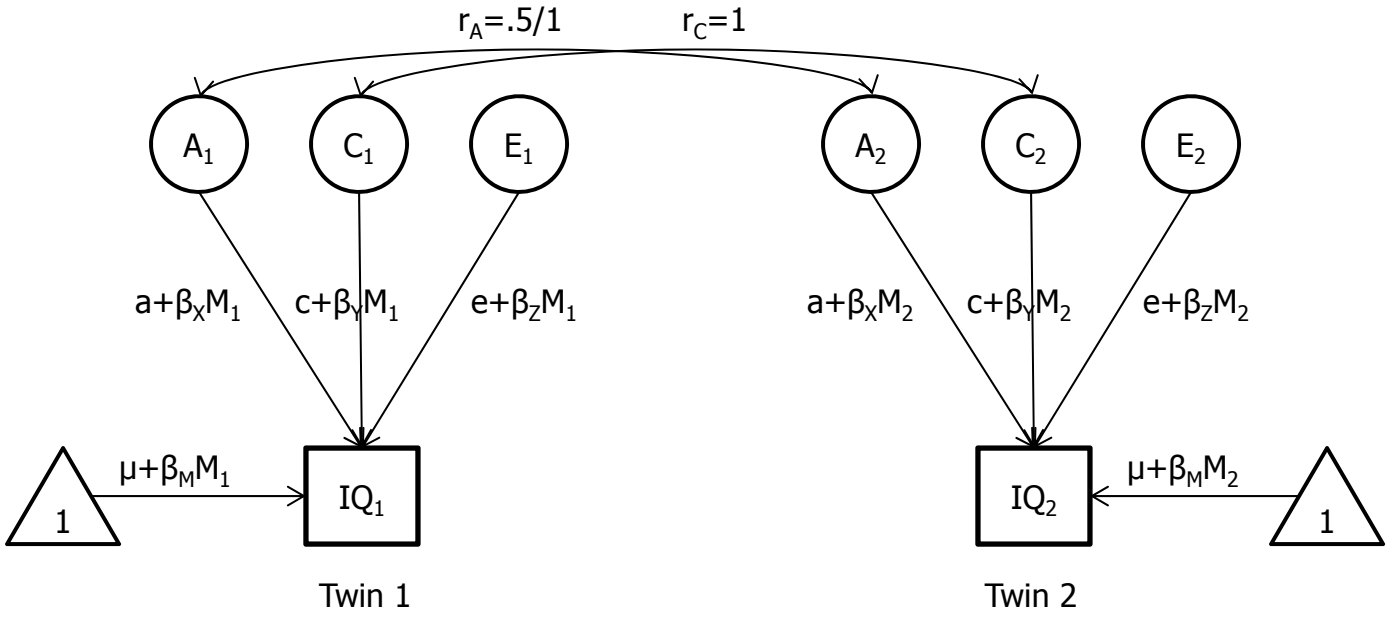

Expectations for means (conditional on the level of the moderator M_i):

$$\begin{aligned}\text{mean}(IQ_i|M_i) &= (a+\beta_X M_i)*\text{mean}(A_i) + (c+\beta_Y M_i)*\text{mean}(C_i) + (e+\beta_Z M_i)*\text{mean}(E_i) + (\mu+\beta_M M_i)*1 \\ &= (a+\beta_X M_i)*0 + (c+\beta_Y M_i)*0 + (e+\beta_Z M_i)*0 + (\mu+\beta_M M_i)*1 \\ &= \mu+\beta_M M_i\end{aligned}$$

for i = 1, 2 (twin 1, twin 2)

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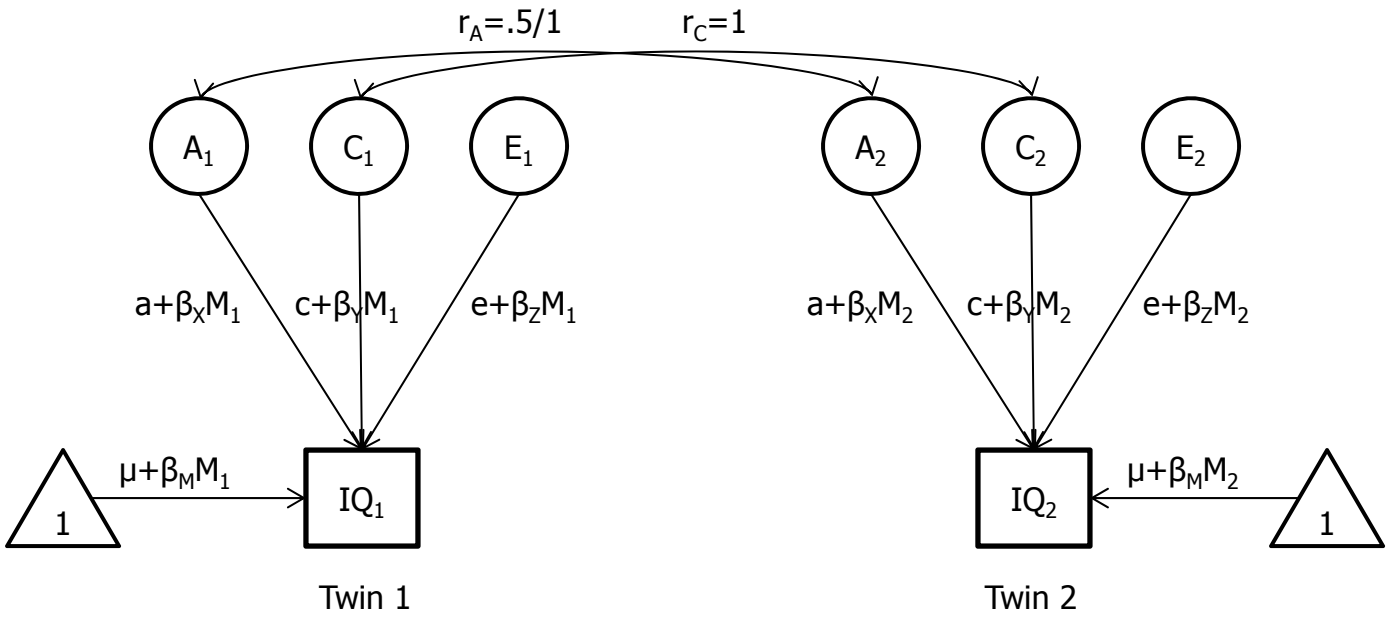

Expectations for variances (conditional on the level of the moderator M_i):

$$\begin{aligned}\text{var}(IQ_i|M_i) &= (a+\beta_X M_i)^2*\text{var}(A_i) + (c+\beta_Y M_i)^2*\text{var}(C_i) + (e+\beta_Z M_i)^2*\text{var}(E_i) + (\mu+\beta_M M_i)^2*0 \\ &= (a+\beta_X M_i)^2*1 + (c+\beta_Y M_i)^2*1 + (e+\beta_Z M_i)^2*1 + 0 \\ &= (a+\beta_X M_i)^2 + (c+\beta_Y M_i)^2 + (e+\beta_Z M_i)^2\end{aligned}$$

for i = 1, 2 (twin 1, twin 2)

Practical:

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