Adding interactions between variables to our model

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Improving our model further

- Intercept model: $height_i = \beta_0$
- Age model: $height_i = \beta_0 + \beta_{age} Age_i$
- Age and male $height_i = \beta_0 + \beta_{age}\, age_i + \beta_{male}\, male_i$

$$male_i = \begin{cases} 1, & child\ is\ male \\ 0, & Otherwise \end{cases}$$

- Age and male interaction

$$height_i = \beta_0 + \beta_m\, male_i + \beta_a\, age_i + \beta_{m \times a}\, male_i \cdot age_i$$

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$$height_i = \beta_0 + \beta_m\, male_i + \beta_a\, age_i + \beta_{m\times a}\, male_i \cdot age_i$$

$male_i = 1$

$$height_i = \beta_0 + \beta_m\ + \beta_a\, age_i + \beta_{m\times a}\, age_i$$

$male_i = 0$

$$height_i = \beta_0 + \beta_a\, age_i$$

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$$height_i = \beta_0 + \beta_m\, male_i + \beta_a\, age_i + \beta_{m\times a}\, male_i \cdot age_i$$

$male_i = 1$

$$height_i = \beta_0 + \beta_m\ + (\beta_a + \beta_{m\times a})\, age_i$$

$male_i = 0$

$$height_i = \beta_0 + \beta_a\, age_i$$

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$$height_i = \beta_0 + \beta_m\, male_i + \beta_a\, age_i + \beta_{m\times a}\, male_i \cdot age_i$$

$$male_i = 1$$

$$height_i = \beta_0 + \beta_m\ + (\beta_a + \beta_{m\times a})\, age_i$$

$$male_i = 0$$

$$height_i = \beta_0 + \beta_a\, age_i$$

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$$height_i = \beta_0 + \beta_m\, male_i + \beta_a\, age_i + \beta_{m\times a}\, male_i \cdot age_i$$

$male_i = 1$

$$height_i = \beta_0 + \beta_m\ + (\beta_a + \beta_{m\times a})\, age_i$$

$male_i = 0$

$$height_i = \beta_0 + \beta_a\, age_i$$

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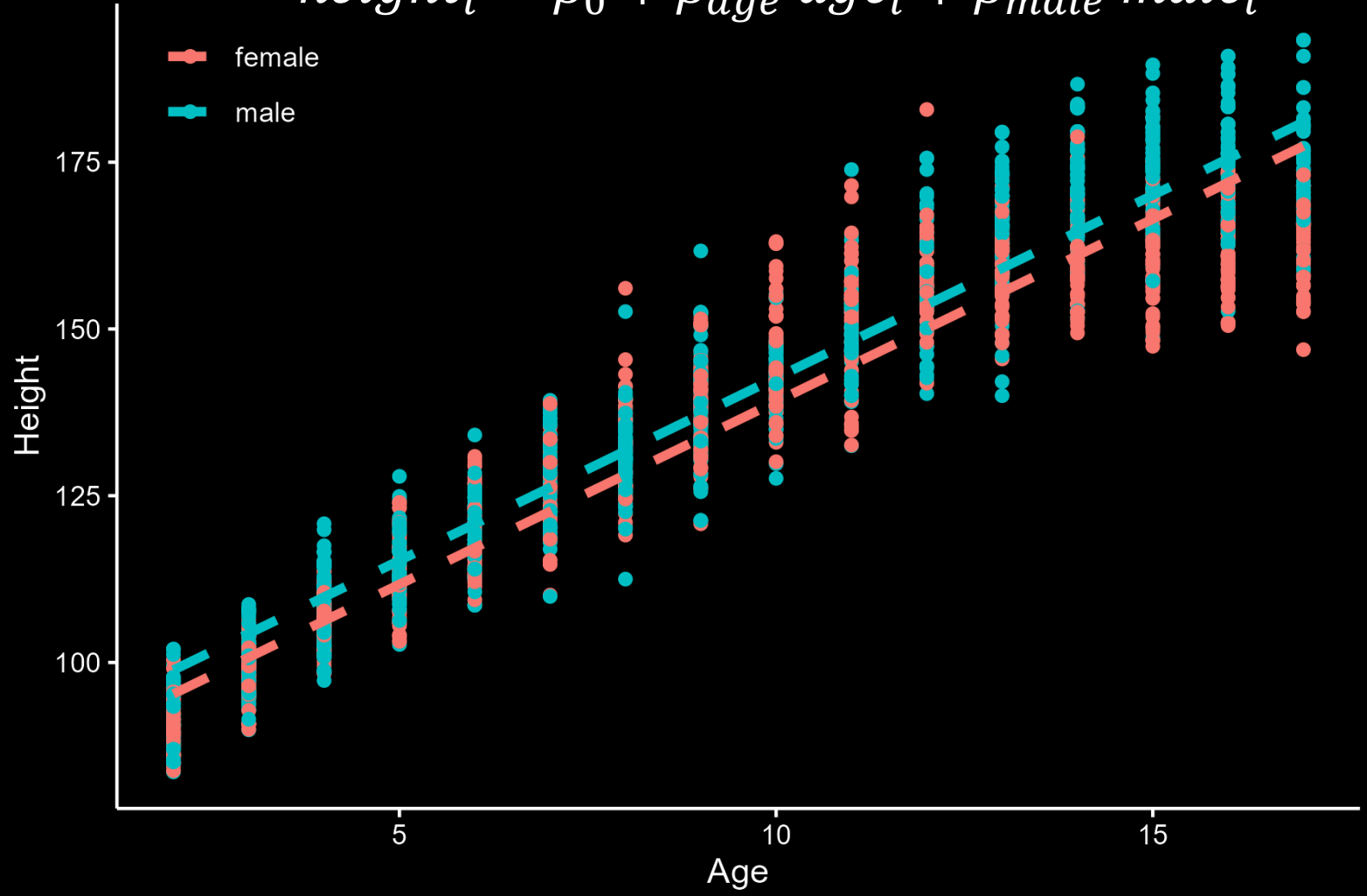
$$height_i = \beta_0 + \beta_{age}\, age_i + \beta_{male}\, male_i$$



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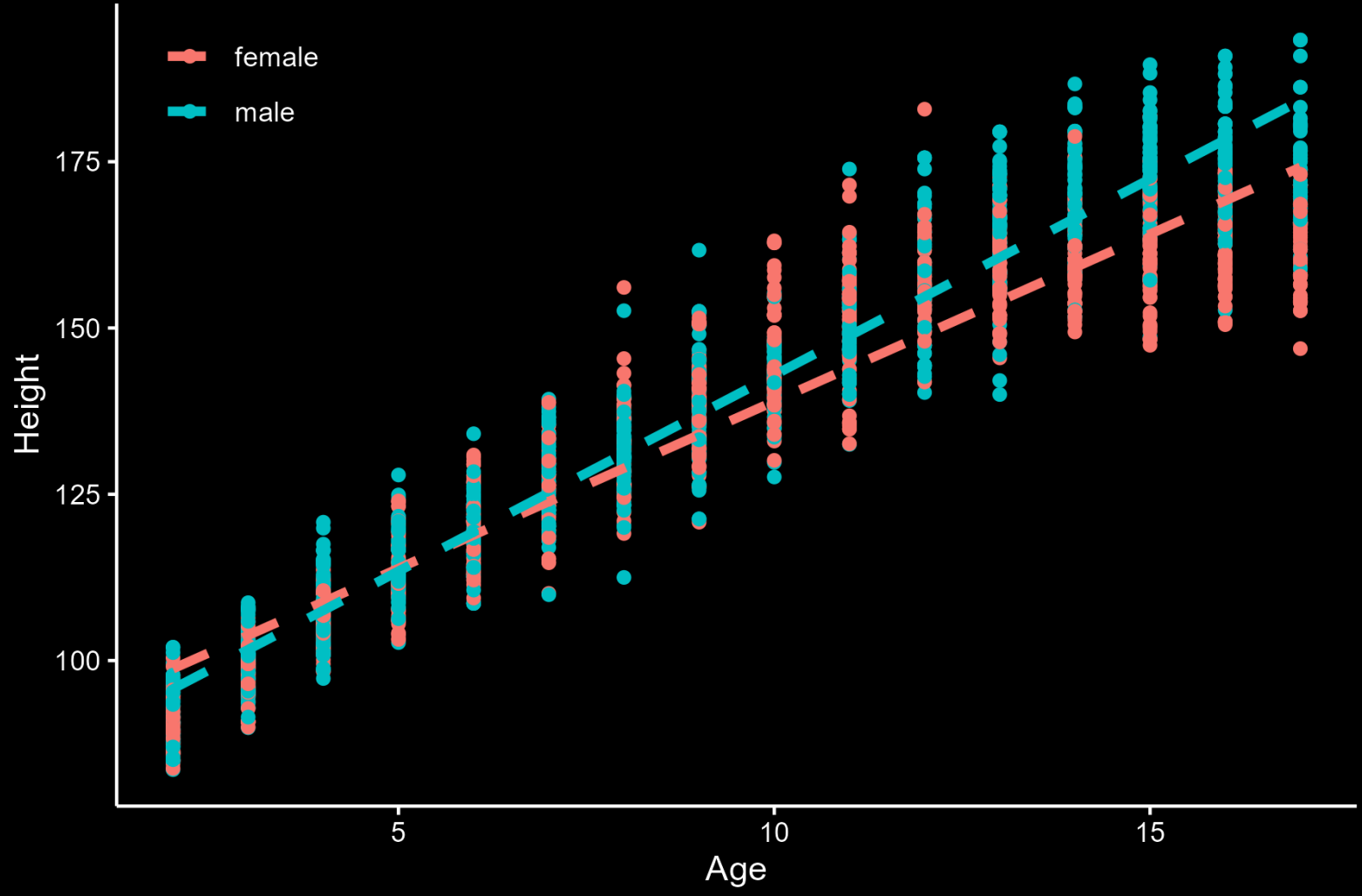
$$height_i = \beta_0 + \beta_m \, male_i + (\beta_a + \beta_{m \times a} \, male_i) \cdot age_i$$



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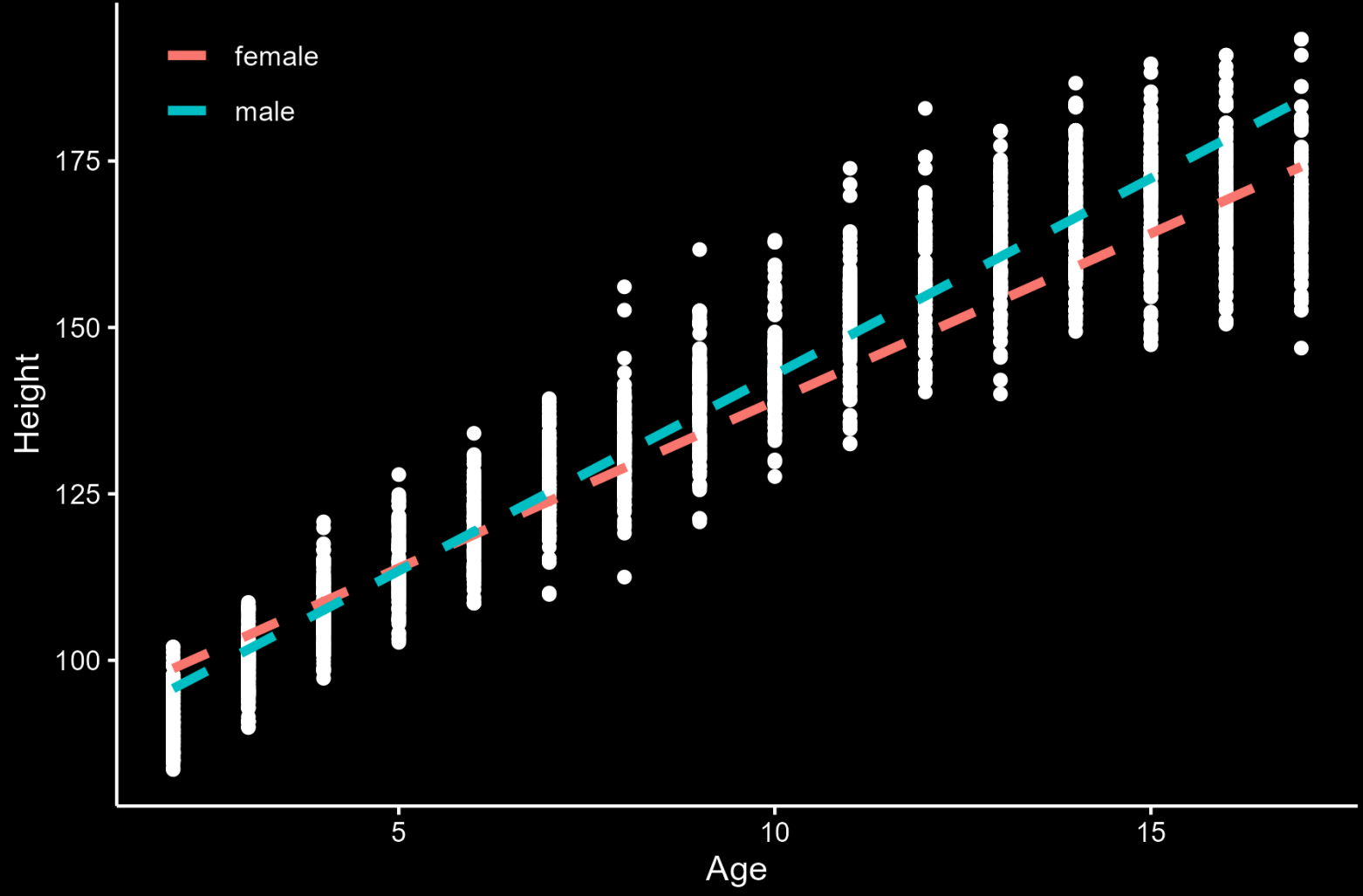
$$height_i = \beta_0 + \beta_m \, male_i + (\beta_a + \beta_{m \times a} \, male_i) \cdot age_i$$



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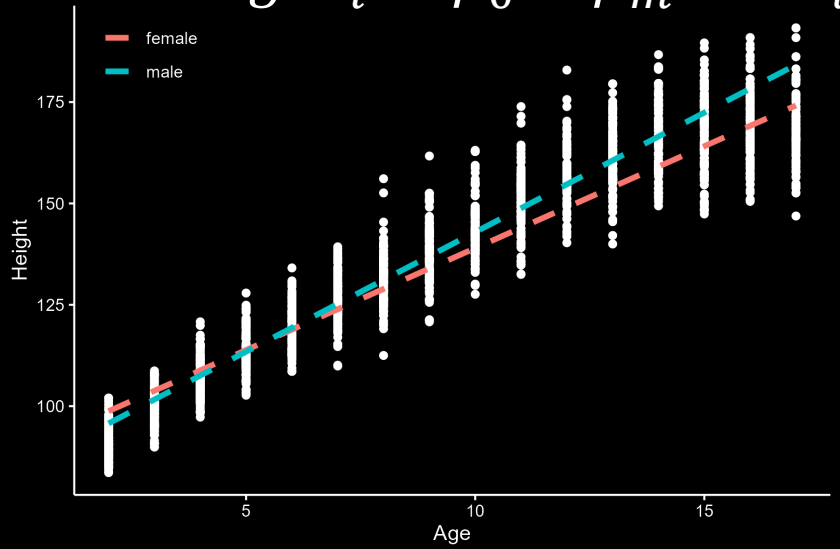
$$height_i = \beta_0 + \beta_m \, male_i + (\beta_a + \beta_{m \times a} \, male_i) \cdot age_i$$



		coef	std err	t	P>|t|
β_0	Intercept	86.7936	0.499	173.801	0.000
β_m	Gender[T.Male]	-2.8803	0.711	-4.050	0.000
β_a	AgeInYearsAtScreening	5.1739	0.049	105.593	0.000
$\beta_{m \times a}$	AgeInYearsAtScreening:Gender[T.Male]	0.6536	0.069	9.431	0.000

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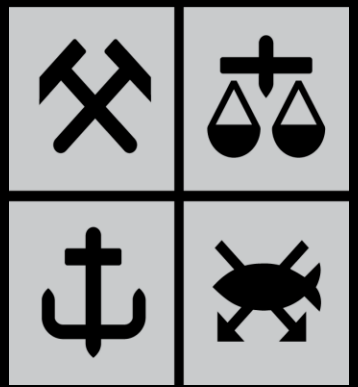

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