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A novel approach used outcome distribution curves to estimate the population-level impact of a public health intervention

Anna Sarkadi
Filipa Sampaio
Michael P Kelly
Inna Feldman

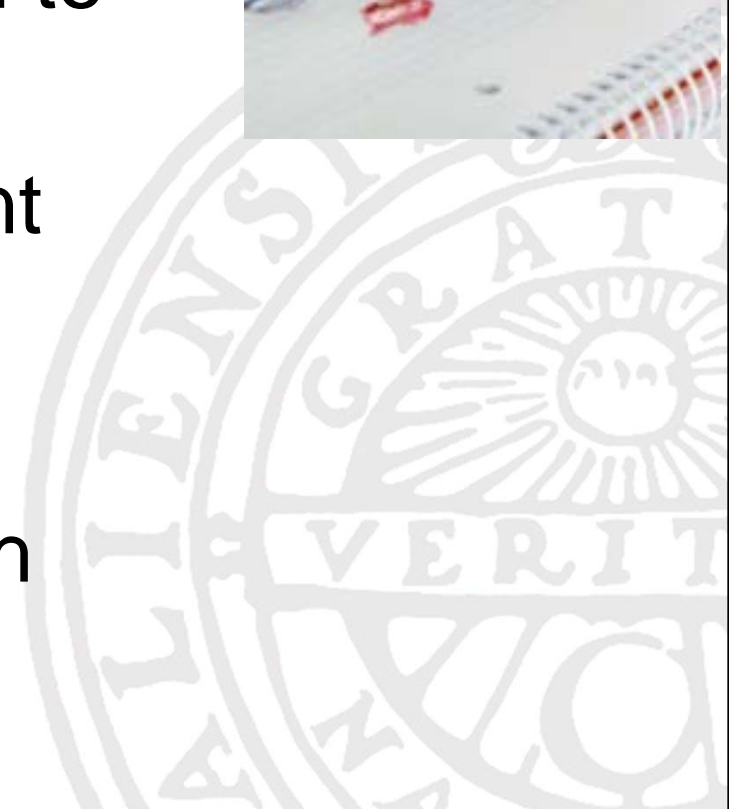




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The frustration

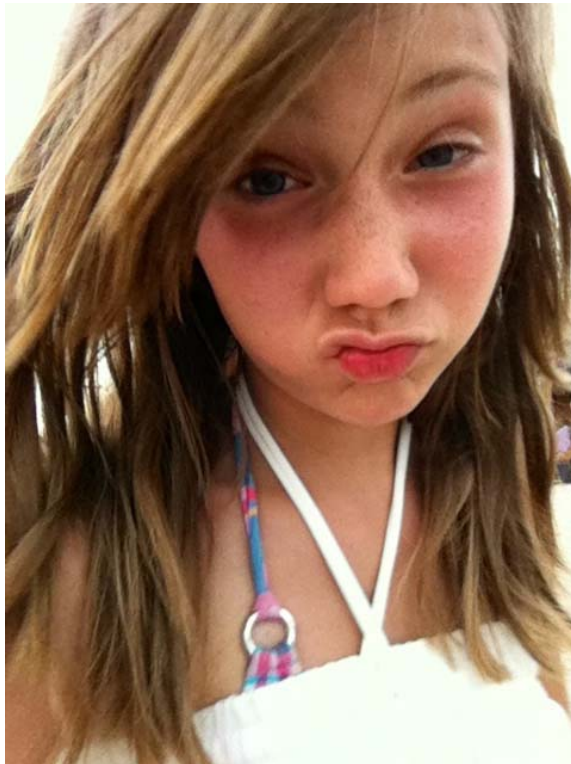
- **Because in real life there is:**
 - Self-selection to exposure
 - Not always a true intention to treat
 - Little room for improvement
 - Outcomes often clinical
 - No simple cause-effect relationship in public health





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What to do?



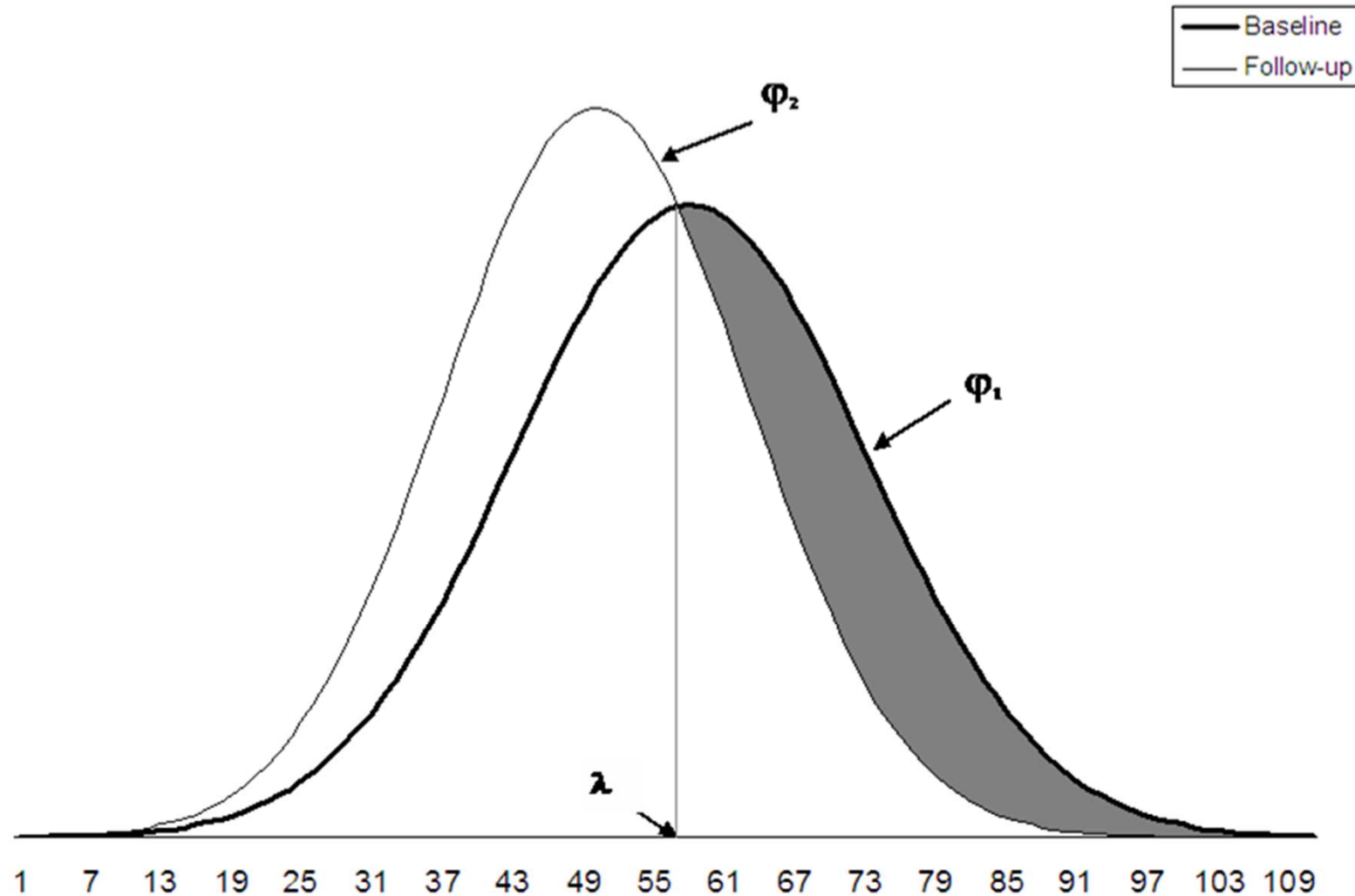
Stress Reduction Kit

**Bang
Head
Here**

Directions:

1. Place kit on FIRM surface.
2. Follow directions in circle of kit.
3. Repeat step 2 as necessary, or until unconscious.
4. If unconscious, cease stress reduction activity.

The distribution curve as outcome measure!



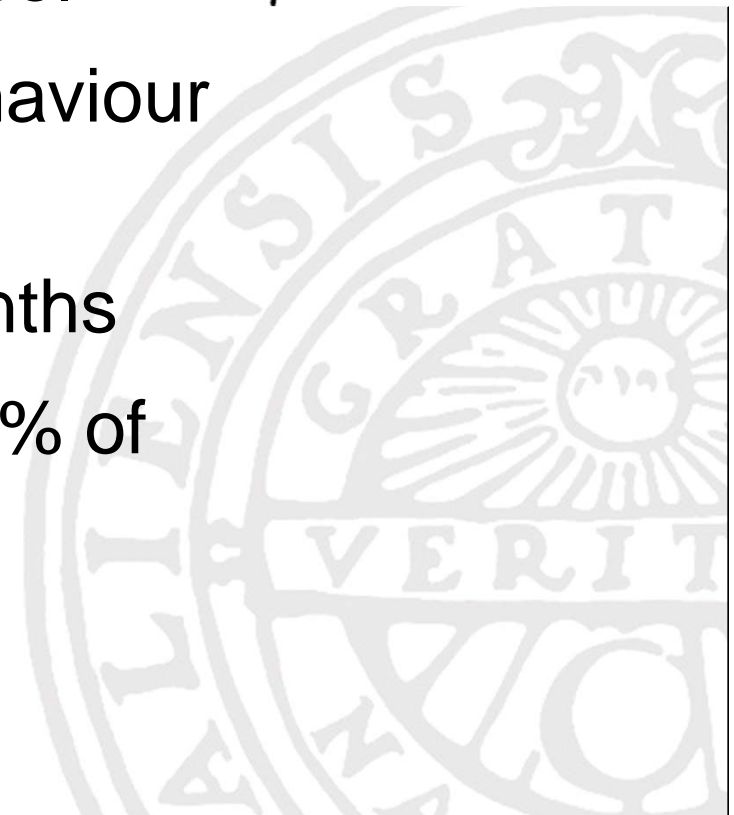
Sarkadi A, Sampaio F, Kelly MP, Feldman I. J Clin Epidemiol. 2014 Jul;67(7):785-92.



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The intervention: Triple P – Positive Parenting Program

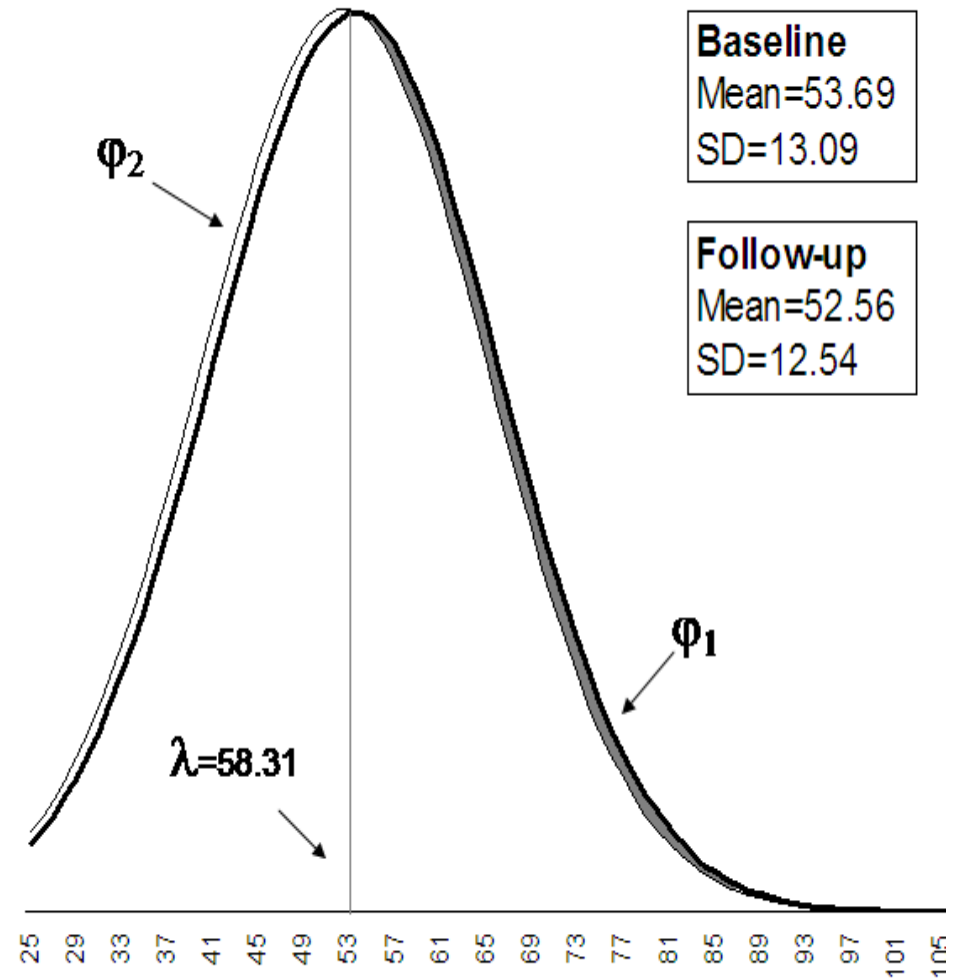
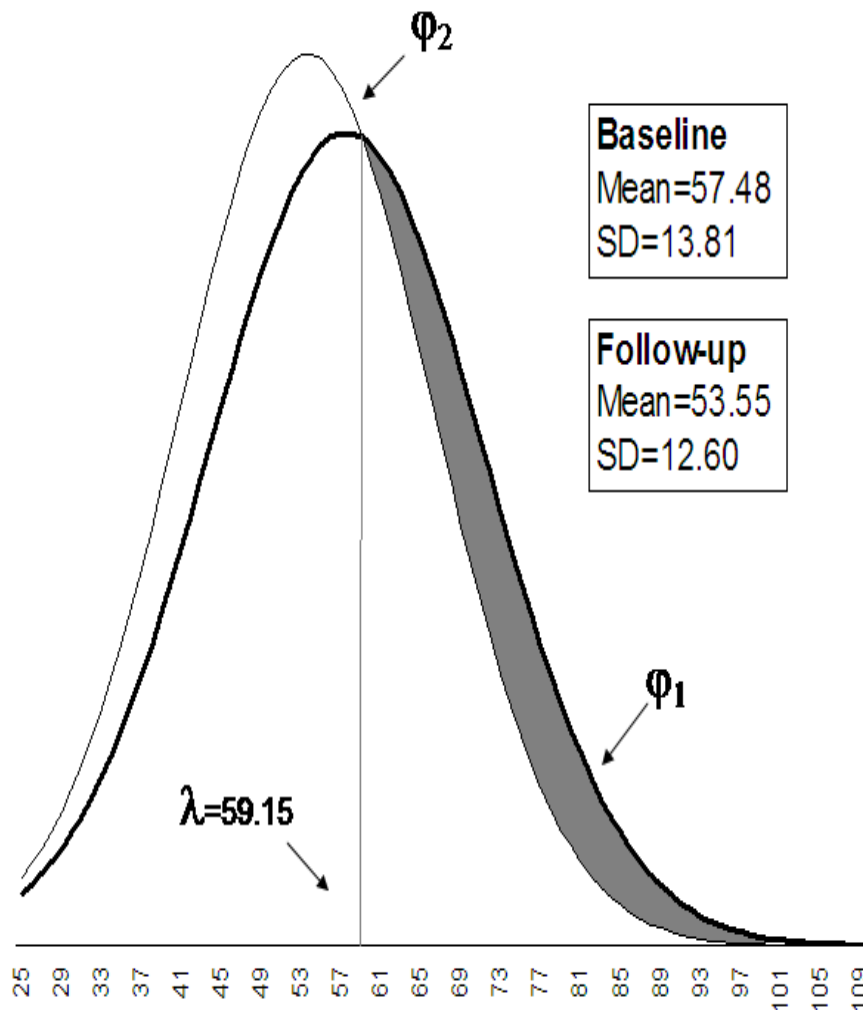
- A multilevel parenting intervention
- Cluster-RCT with preschools randomised to Triple P or control
- Standard measure of child behaviour problems (ECBI-22)
- Follow-up at 6, 12, and 18 months
- Data used from 12 months (87% of the intervention)





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Trial data – intervention versus control





Health gain – reduction in ECBI points

Finally, we can rewrite the functions in the expression (A5) in the form

$$F_2 - F_1 = \left\{ \frac{1}{2} + \frac{1}{\sqrt{2\pi}} \int_0^{\frac{\lambda-\mu_1}{\sigma_1}} \exp\left\{-\frac{y^2}{2}\right\} dy \right\} - \left\{ \frac{1}{2} + \frac{1}{\sqrt{2\pi}} \int_0^{\frac{\lambda-\mu_2}{\sigma_2}} \exp\left\{-\frac{y^2}{2}\right\} dy \right\} =$$
$$\frac{1}{\sqrt{2\pi}} \int_0^{\frac{\lambda-\mu_1}{\sigma_1}} \exp\left\{-\frac{y^2}{2}\right\} dy - \frac{1}{\sqrt{2\pi}} \int_0^{\frac{\lambda-\mu_2}{\sigma_2}} \exp\left\{-\frac{y^2}{2}\right\} dy$$

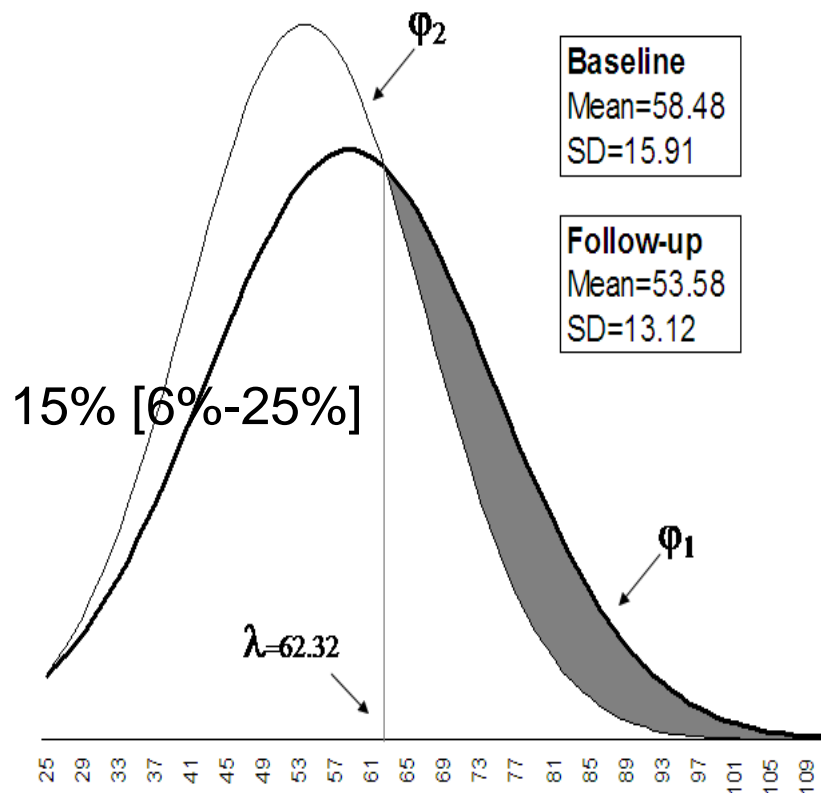
- Expressed as % of the population having health gain with CI
- 12% [9%-17%] for the intervention group
- 3% [1%-7%] for the control group



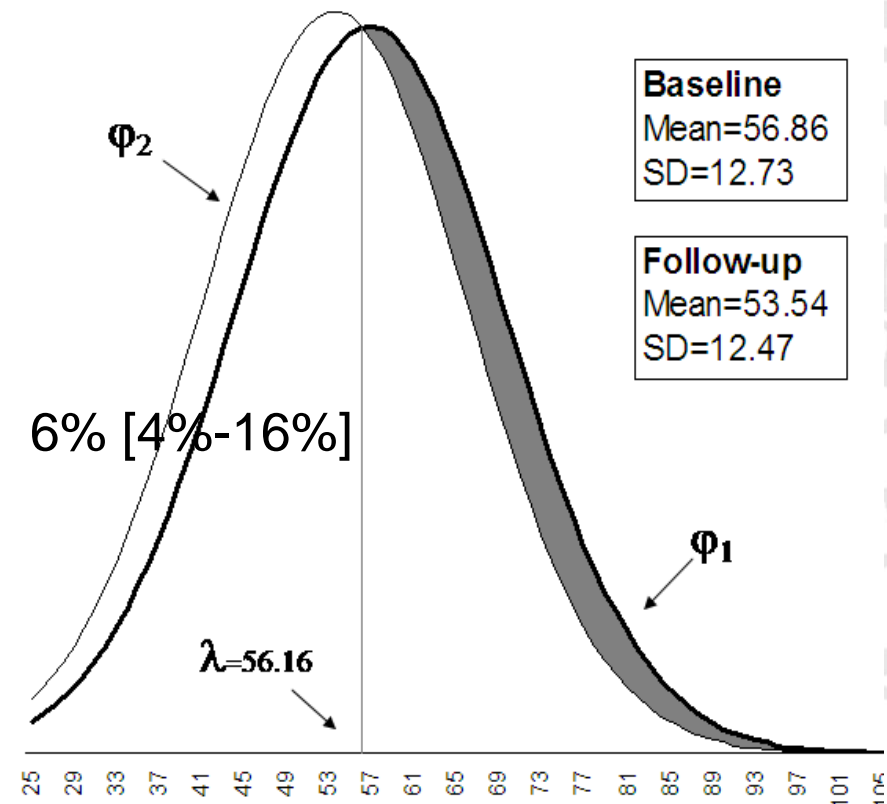
Further potential of the method

- Subgroup analyses

Education \leq 12 yrs



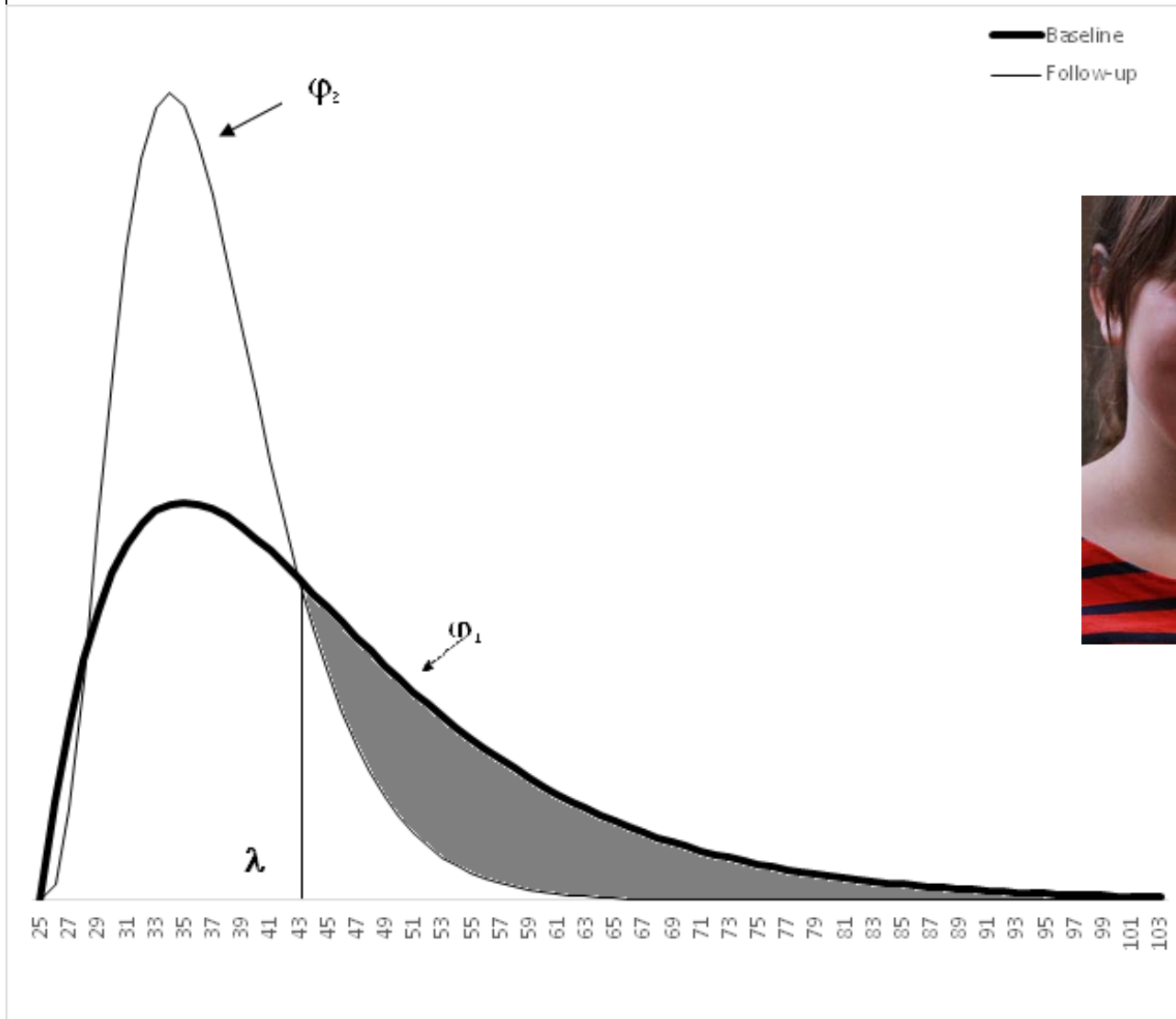
Education $>$ 12 yrs





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Works for other distribution types as well

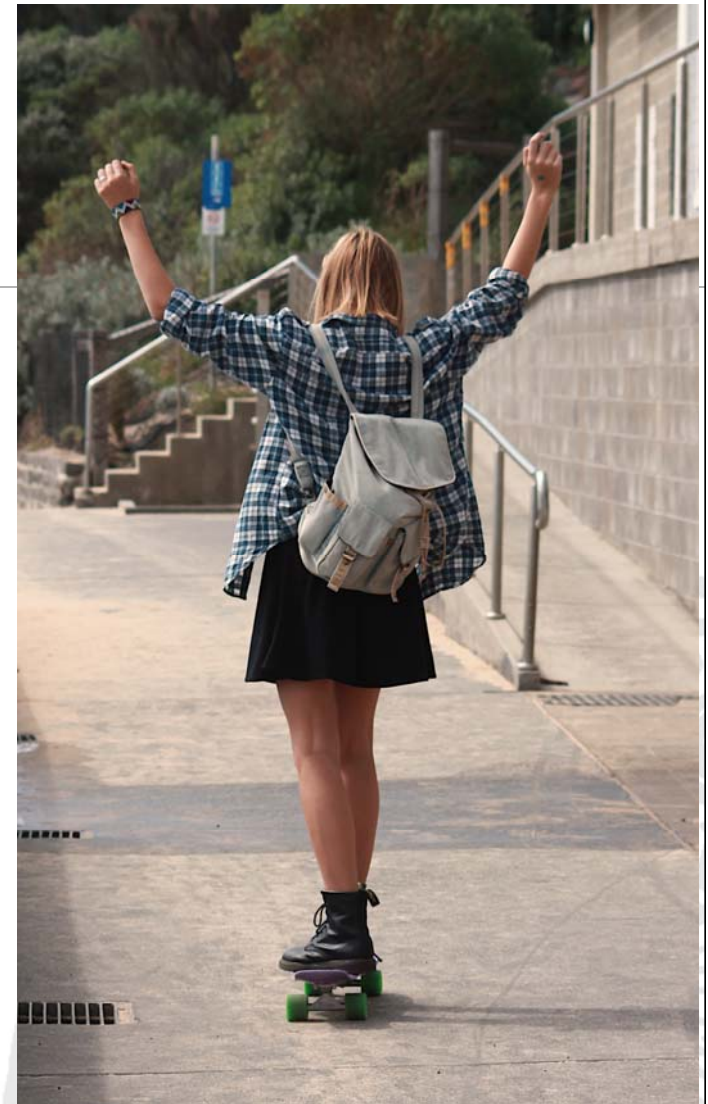




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Limitations

- Applying the normal distribution curve on the dataset is an approximation per se
- Does not solve basic design issues to do with causal inference





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Keep on drawing (distribution curves)!

- **It is possible to calculate the impact of public health interventions by using the distribution curve of as a measure of outcome**





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Thank you!

Research group of social paediatrics, Uppsala



annasarkadi.com