# Predictive Cost-Effectiveness Analysis of Vida Plena (external appendix)

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The Happier Lives Institute evaluated the cost-effectiveness of StrongMinds (McGuire & Plant, 2021b) in terms of subjective wellbeing. They combined data from StrongMinds' programs with data from similar g-IPT programs. They also combine this with a meta-analysis of studies included in the Happier Lives Institute's report on psychotherapy in low- and middle-income countries (McGuire & Plant, 2021a). This serves as indirect evidence for StrongMind's effect based on general background estimates of the effect of psychotherapy in low- and middle-income countries (i.e., a form of prior). They combine these data using weights representing their evaluations of the relative importance and quality of each source of data.

Providing psychotherapy to an individual is likely to benefit the rest of their household (McGuire et al., 2022a); hence, we want to estimate *spillover effects* as well so that we capture a larger picture of the good that Vida Plena can do. McGuire et al. (2022a) argue that psychotherapy can benefit the household directly because the recipient's improved mood and behaviours will result in better impersonal relationships and indirectly because they are more likely to be able to participate in society and benefit the household economically.

The figures we obtain for this analysis come from McGuire et al. (2022a). What we use is their methodology, the individual effect they obtained, and their household spillover ratio, which we combine with our own estimate of the average household size in Ecuador.

**McGuire et al.'s method**

The Happier Lives Institute's analysis is in *effect sizes*, or *standardised mean differences (Cohen's d)*. These represent the magnitude of an intervention's effect; namely, how much, in standard deviations (SD), psychotherapy improves wellbeing compared to a control group. Using Cohen's *d* means that findings from different studies, measures, and interventions are comparable. Results in Cohen's *d* are difficult to interpret by themselves, but they allow us to compare results with other interventions evaluated in Cohen's *d*, plus, we will convert the findings to WELLBYs (see the core text).

The Happier Lives Institute obtained an *initial effect*: the average improvement due to psychotherapy (compared to a control group) at Time 1, just after the end of the intervention. Namely, these are the SDs of wellbeing gained from psychotherapy.

Psychotherapy also improves wellbeing (compared to a control group) over time. Hence, they model the effect of time on the average difference between the treatment and the control group. They find that the improvements of psychotherapy exponentially decay over time, and that the advantage of psychotherapy compared to a control group disappears after about five to six years[1]. By combining the benefits at Time 1, and across time until the advantage of psychotherapy reaches zero (~five to six years), we can obtain the *total effect* in SD-years (the cumulated increase in SDs over time in years) of subjective wellbeing gained for the recipient of psychotherapy. Looking at Table 2 of McGuire et al., we see the recipient's benefit (total effect) for StrongMinds is a 1.69 (95% CI: 0.67, 2.83)[2] SD-years increase in subjective wellbeing.

McGuire et al. estimated the *spillover ratios* of psychotherapy and cash transfers: how much of the benefit of an intervention will spillover from the recipient to another member of the household. With this, they can calculate the overall benefit that the household obtains from the intervention on one of their members. 53% (95% CI: 11%, 108%) of the effect of psychotherapy (StrongMinds) spillover to a member in the household. This can be combined with the total effect and an estimate of the non-recipient household size (the household size minus the one individual who receives the intervention) to obtain the overall household benefit:

*Household benefit = total effect + total effect * spillover ratio * non-recipient household size*

**Calculating the household size of Ecuador**

To calculate the average household size in Ecuador we briefly searched for official data about household size and collected them in this spreadsheet. We used seven data points from the United Nations Population Division (ranging from 1974 to 2010), one 2012 data point from the CEIC, and one 2013 data point from the Global Data Lab.

For our estimate of the average household size in Ecuador in 2022, we modelled the effect of time (date in years) on household size with a linear regression. Based on the coefficients we imputed the year 2022 and obtained an estimated household size of 100.389 +

[1] This is possible if psychotherapy's effect diminishes because participants 'forget' some of its benefits, it is also possible if time in general also improves the wellbeing of the control group, or if psychotherapy recipients adapt to the benefits they have received (hedonic adaptation).

[2] Note that McGuire et al. provides results with measures of uncertainty; namely, 95% confidence intervals based on Monte Carlo simulations. Each element of the analysis that is likely to be normally distributed has its probability distribution simulated by sampling 10'000 values from a normal distribution with the point estimate as the mean and the standard error as the variance. Then the 2.5th and 97.5th percentiles of the distributions are obtained to form their confidence interval. If the simulations are interpreted as probability distributions, we can say that - according to the models (models are always simplifications of the world with specific assumptions) - there is a 95% probability that the modelled value is between these two percentiles. Using Monte Carlo simulations for uncertainty is useful because uncertainty can be propagated to elements of the analysis for which one does not have a specific distribution to sample from (e.g., the cost-effectiveness ratio). We use the values from McGuire et al. to also use 95% confidence intervals.

2022*-0.048 = 3.12. Hence, the non-recipient household size (the household members who did not receive g-IPT but might benefit via household spillovers) is 3.12 - 1 = 2.12.

To obtain a standard deviation in order to simulate the probability distribution of the household size we used the percentage information provided by the United Nations Population Division. They provide a percentage for households with 1, 2-3, 4-5, and 6+ members. We use this information in the same way as McGuire et al. (2022, see Appendix B, 2nd paragraph), except we do this for multiple points for Ecuador (not multiple countries) and get an average of all the obtained standard deviations as our general standard deviation:

> "The United Nations Population Division (2019a) also provides percentages of households with 1, 2-3, 4-5, 6+ members for each country. We sample 100 values for each country, based on these percentiles, to obtain standard deviations values for each country. For the 2-3 category, we treat 2 members as 40% and 3 members as 60% of this category. For the 4-5 category, we treat 4 members as 60% and 5 members as 40% of this category. For the 6+ category, we treat 6 members as 40%, 7 members as 30%, 8 as 20%, and 9 as 10% of this category."

We obtain a standard deviation of 2.05. We use this to simulate the non-recipient household size with a truncated normal distribution so that simulated non-recipient household sizes cannot be below zero (one can live on their own, but one cannot live with -1 household members). We obtain an average non-recipient household size of 2.17 (95% CI: 0.17, 6.20) in Ecuador.