**Summary of Results**

In the first part of the project, dataset of scores on 5 subscales of the Strengths and Difficulties Questionnaire was analyzed by SAS. The subset which was used in this project was obtained by filtering the master dataset according to unique number (=17). To obtain the completeness for each assessment point, the number of percentage of each assessment point as well of the total number of all assessment points were computed. The results indicate that everyone completed the Baseline assessment (100%), and that the percentage of completeness decreased though following four assessments. As shown in Table 1, among 189 children, there were 80.42% of Exit, 60.32% of FollowUp1 and only 51.32% of FollowUp2. In Table 2, 11.1% of children only did one assessment; 23.81%, 26.98%, 38.10% of children did 2, 3, and 4 assessments, respectively. According to the frequencies and percentages for each ‘combination’ of completed assessments in Table 3, most children did baseline and exit (80.42%) as well as baseline and followup1 (60.32%). Furthermore, the mean and standard deviation for each SDQ subscale for total, female, and male children were obtained separately in Table 4. Overall, SDQ of ESS, CPS, IHA, PPS decreased but PSB increased as along as assessment points. To evaluate whether statistically significant improvement was observed from baseline to last available assessment time point, paired t-test of each subscale score was done to get the p-value in Table 5. Null hypothesis in this case is “subscale scores of the baseline are same as subscale scores of the last assessment”. Each p-value was compared to 0.05 to get if the null hypothesis is rejected. At 5% of significant level (α = 0.05), p-values of ESS, IHA and PSB were small enough to reject null hypothesis, which mean there were statistically significant improvement for those scores. However, p-values of CPS and PPS were not smaller than 0.05, so there is no evidence to reject null hypothesis.

In the third part of the project, a R function oneRoundTest(sampleSize, probMissingOne, probMissingTwo) was created to simulate the single round of process described in Part 2. The variables in this function corresponded to sample size, proportion corresponding to the percentage in the first missing data mechanism as well as vector corresponding to the proportions specified for the second missing data mechanism, respectively. The output of oneRoundTest is the p-value for this single round of test. To compute the rejection percentage of 500 rounds on different sample size and the proportion for the first missing data mechanism, a second R function manyRoundTest (sampleSize, probMissingOne, probMissingTwo) was created to call oneRoundTest by 500 times. It then collects the rejections and output the rejection rate. Note it is possible to get NAN p-value from oneRoundTest when probMissingOne is too high and that there were too many missing values. These NAN p-value tests were excluded from denominator when computing rejection ratio in manyRoundTest function.

Rejection rate of Emotional Symptoms Subscale (ESS) score according to different sample size was computed by using manyRoundTest with different sampleSize (from 10 to 200 with step of 5) and shown as Figure 1. According to Figure 1, rejection rate increased as the sample size got larger, and it reached about 100% when sample size was larger than 150. This is expected as larger sample size will yield more statistical difference, resulting in larger rejection rate until reaching to 100%. Figure 2 shows the rejection rate of ESS score according to different proportion of first missing data mechanism. According to Figure 2, the rejection rate decreased as the missing proportion get larger, and it reached to 0% when the missing proportion is 98%. This is expected as the more the missing data, the less the difference of two assessment points.

Rejection rate of Prosocial Behavior Subscale (PBS) score on different sample size and missing probability were included in Fig. 3 and Fig. 4, respectively. The rejection rate for PBS have the similar trend with ESS. However, it reached to 100% when sample size is larger than 60.

**Part 1 result:**

1. Table 1. What number and percentage of children completed assessments at each of the 4 assessment time points (BASELINE, EXIT, FOLLOWUP1, and FOLLOWUP2)?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | BASELINE | EXIT | FOLLOWUP1 | FOLLOWUP2 |
| Number | 189 | 152 | 114 | 97 |
| Percentage | 100% | 80.42% | 60.32% | 51.32% |

1. Table 2. How many children completed only one assessment? How many children completed 2 assessments? 3? 4?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 |
| Number | 21 | 45 | 51 | 72 |
| Percentage | 11.11% | 23.81% | 26.98% | 38.10% |

1. Table 3. What were the frequencies and percentages for each ‘combination’ of completed assessments present in the data?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | BL&EXIT | BL&FU1 | BL&FU2 | EXIT&FU1 | EXIT&FU2 |
| Number | 152 | 114 | 97 | 100 | 86 |
| percentage | 80.42% | 60.32% | 51.32% | 52.91% | 45.50% |
|  | **FU1&FU2** | **BL&EXIT&FU1** | **BL&EXIT&FU2** | **BL&FU1&FU2** | **EXIT&FU1&FU2** |
| Number | 81 | 100 | 86 | 81 | 72 |
| percentage | 42.86% | 52.91% | 45.50% | 42.86% | 38.10% |

1. Table 4. Calculate the mean and standard deviation for each SDQ subscale separately for each assessment time point.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| For the Total Sample of Children | | | | | |
|  | **Baseline\_ESS** | **Baseline\_CPS** | **Baseline\_IHA** | **Baseline\_PPS** | **Baseline\_PSB** |
| Mean | 3.6561 | 2.3492 | 4.6614 | 2.3175 | 6.7566 |
| STD | 2.2081 | 1.8115 | 2.6741 | 1.7427 | 1.9877 |
|  | **EXIT\_ESS** | **EXIT \_CPS** | **EXIT \_IHA** | **EXIT \_PPS** | **EXIT \_PSB** |
| Mean | 2.5066 | 1.9342 | 3.2434 | 1.7763 | 8.0592 |
| STD | 2.2960 | 1.7928 | 3.0231 | 1.8168 | 2.1166 |
|  | **FU1\_ESS** | **FU1\_CPS** | **FU1\_IHA** | **FU1\_PPS** | **FU1\_PSB** |
| Mean | 2.4211 | 1.5877 | 3.1667 | 1.6754 | 8.5000 |
| STD | 2.4419 | 1.9992 | 2.9084 | 1.9800 | 2.3771 |
|  | **FU2\_ESS** | **FU2\_CPS** | **FU2\_IHA** | **FU2\_PPS** | **FU2\_PSB** |
| Mean | 2.4433 | 2.3608 | 3.3608 | 2.1134 | 8.0000 |
| STD | 2.9225 | 2.3944 | 3.4677 | 2.5490 | 2.8431 |
| For the Total Sample of Male | | | | | |
|  | **Baseline\_ESS** | **Baseline\_CPS** | **Baseline\_IHA** | **Baseline\_PPS** | **Baseline\_PSB** |
| Mean | 3.2105 | 2.5263 | 5.0947 | 2.2526 | 6.4737 |
| STD | 2.1826 | 1.8728 | 2.7447 | 1.7982 | 1.9066 |
|  | **EXIT\_ESS** | **EXIT \_CPS** | **EXIT \_IHA** | **EXIT \_PPS** | **EXIT \_PSB** |
| Mean | 2.1579 | 2.1316 | 3.8553 | 1.5789 | 7.7237 |
| STD | 2.3892 | 1.6358 | 3.1904 | 1.7225 | 2.2006 |
|  | **FU1\_ESS** | **FU1\_CPS** | **FU1\_IHA** | **FU1\_PPS** | **FU1\_PSB** |
| Mean | 2.2203 | 1.6780 | 3.3898 | 1.5763 | 8.3390 |
| STD | 2.3124 | 2.1208 | 3.0287 | 1.6938 | 2.4887 |
|  | **FU2\_ESS** | **FU2\_CPS** | **FU2\_IHA** | **FU2\_PPS** | **FU2\_PSB** |
| Mean | 2.1346 | 2.5000 | 3.5192 | 2.2885 | 7.7500 |
| STD | 2.8147 | 2.6159 | 3.6380 | 2.6222 | 2.9497 |
| For the Total Sample of Female | | | | | |
|  | **Baseline\_ESS** | **Baseline\_CPS** | **Baseline\_IHA** | **Baseline\_PPS** | **Baseline\_PSB** |
| Mean | 4.1064 | 2.1702 | 4.2234 | 2.3830 | 7.0426 |
| STD | 2.1526 | 1.7391 | 2.5407 | 1.6919 | 2.0368 |
|  | **EXIT\_ESS** | **EXIT \_CPS** | **EXIT \_IHA** | **EXIT \_PPS** | **EXIT \_PSB** |
| Mean | 2.8553 | 1.7368 | 2.6316 | 1.9737 | 8.3947 |
| STD | 2.1584 | 1.9278 | 2.7317 | 1.8972 | 1.9872 |
|  | **FU1\_ESS** | **FU1\_CPS** | **FU1\_IHA** | **FU1\_PPS** | **FU1\_PSB** |
| Mean | 2.6364 | 1.4909 | 2.9273 | 1.7818 | 8.6727 |
| STD | 2.5774 | 1.8745 | 2.7813 | 2.2582 | 2.2612 |
|  | **FU2\_ESS** | **FU2\_CPS** | **FU2\_IHA** | **FU2\_PPS** | **FU2\_PSB** |
| Mean | 2.8000 | 2.2000 | 3.1778 | 1.9111 | 8.2889 |
| STD | 3.0346 | 2.1277 | 3.2911 | 2.4755 | 2.7188 |

1. Table 5. Using scores from this last available time point, calculate a t-test to determine if statistically significant improvement was observed from baseline to last available assessment time point. (Use 5% significant level)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Subscale | SDQ\_ESS | SDQ\_CPS | SDQ\_IHA | SDQ\_PPS | SDQ\_PSB |
| P-value | <.0001 | 0.1002 | <.0001 | 0.3288 | <.0001 |
| Conclusion | Reject | Not reject | Reject | Not reject | Reject |

**Part 3 Result:**



Fig. 1 Percentage significant treatment effect on sample size for ESS



Fig. 2 Percentage significant treatment effect on the probability of the first missing mechanism for ESS

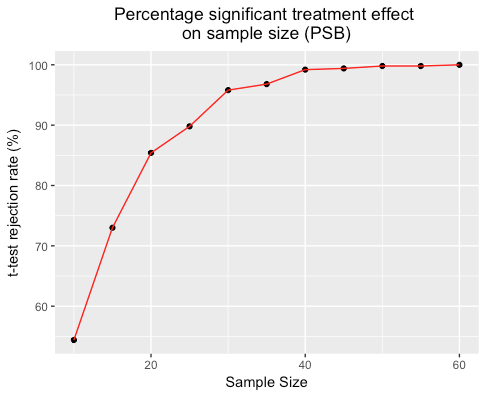


Fig. 3 Percentage significant treatment effect on sample size for PSB



Fig. 4 Percentage significant treatment effect on the probability of the first missing mechanism for ESS