**Documents A: Research Q3 part 1**

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My supervisors’ comments about the part one and things she wanted me to do which I believe that I have addressed them but not sure:

*You now need to:*

*a) Run tests all as parametric - see my comment above regarding Central Limit Theorem. DONE*

*b) Adjust the presentation - take out the tables and just put means or SDs into the text (or medians and IQRs if you keep as non-parametric).DONE*

*c) Correct the reporting for the correlations*

*d) Individually none of the variables contribute (and we knew this from the other work on RQ3),  so it is debatable whether we should be doing a regression at all - usually regressions help to pick out which has the strongest connection from a set of variables that have an effect on language score.  However, because in total they explain 17% of the variance, we may want to argue that despite the fact none were significant using simple analyses, we want to see whether together they have an impact on language scores*

**RQ3 What factors associate with language difficulties in vulnerable children?**

In order to explore the specific factors that are relevant to children’s language difficulties and gather in-depth knowledge about the subject areas, question two were explored in two parts. The factors used were identified through the results of the literature review and scoping review that was conducted in Chapter 2 and Chapter 3.

As mentioned previously, the language questioners used in the study consisted of 19 questions. In order to obtain the total total scores, responses given for each question were coded as: ‘0; never ‘1 to ‘likely’ and 2 ‘always’; the researcher added these given responses together to establish the total scores for children language scores. Based on that, zeros and ones counted as ‘1’ and twos were counted up as ‘2’ and based on that ‘1’was taken as the lowest and highest was 32 for total language scores.

**4.4 Data Analysis**

Data analyses were conducted using SPSS. Both parametric and non-parametric techniques were employed. In order to determine what specific factors were relating to children’s language difficulties, various statistical tests were run. The factors involved were gender, ethnicity, livin conditions, enviroments, time spent in schools, age, accessing school meals, accessing counsellings and speaking second language.

**1.1 Normality test and skewness**

The first step was to check whether all the data were distributed normally. Some skewness is expected in this cohort of the current study. Thus, when skewness was within ± 2.58, a parametric test was used (Tabacknick & Fidell, 2013), and non-parametric tests were not used even though some of the variables exceeded this skewness which they were provided in the descriptive statistic table below (see table 1.2). This is because the sample size in this study is large; Central Limit Theorem suggests that parametric tests will be sufficiently robust. Following this, T-tests and ANOVAs were conducted as parametric tests to see if any of the factors and total language scores show significant differences between them. Then, Cohen's d effect size for each of the factors was calculated. All data analyses were performed using the SPSS Statistics version 26 for the MAC OS software package. An alpha level of p = 0.05 was used unless otherwise stated. To summarise the characteristics and performance of the participant, descriptive statistics were utilised.

The effect sizes were calculated in use of comparison analysis and partial eta squared(ηp2) use is used for ANOVAs via using SPSS which interpreted based on basic rule involves that:

* η2 = 0.01 indicates a small effect;
* η2 = 0.06 indicates a medium effect;
* η2 = 0.14 indicates a large effect.

For T-tests- Cohen’s D’s guidelines followed which the basic rules involved:

* d = 0.20 indicates a small effect;
* d = 0.50 indicates a medium effect;
* d = 0.80 indicates a large effect.

For correlations were interpreted based on Cohen (1988) guidance which if an r = 0.10 indicates a small effect: if an r = 0.30 indicates a medium effect and if an r = 0.50 indicates a large effect.

**1.2 Process of exploring the factors associate with language difficulties in thes population**

In order to explore the specific factors that relevant to children’s language difficulties and gather in-depth knowledge about the subject areas, question 3 explored in two parts and 3 phases.

**1.2 Research Q3 Part 1:**

Part 1 involved determining whether the three were any statistically significant differences between the means of total language scores differed based on demographic factors. The first step was to establish the total language scores. In order to obtain the total cognitive scores, responses given for each question were coded as: ‘0; never ‘1 to ‘likely’ and 2 ‘always’; the researcher added these given responses together to establish the total scores for children language scores. As there were only 19 questions and based on the coding, zeros and ones added up as ‘1’ and twos were added up as ‘2’, which the ‘1’ was taken as the lowest and highest was 32 for total syntactic language scores. Based on those, the highest results were represented more difficulties and lowest no difficulties. Following the establishment of the language scores, statistics were carried out. As the sample size of the current study was over 50 participants, parametric tests were preferred to determine whether there were differences between groups. This decision was based on the central limit theorem as it states that the distribution of sample means approximates a normal distribution as the sample size gets larger.

When analysing differences between total language scores of the demographic factors, independent-samples t-test and one-way ANOVA were used. As the common assumption in all these tests is that the dependent variable is approximately normally distributed for each of independent variable. To establish whether total language scores were normally distributed for all levels of each variable, the Kolmogorov Smirnov’s test was considered (The test result was demonstrated in Table 5.1 below).

The skewness of the variables was also assessed. Following, where appropriate, T-test and ANOVA run, Levene's test assessed the homogeneity of variances for each test to see if the assumption of homogeneity of variances is met (p > .05). Additionally, Pearson's correlation was employed to evaluate correlations between total language scores, time spent in schools and age.

 Appropriate guidance and tests were used when calculating the effect sizes of each analysis result.

**1.2.1 Normality assumptions**

To determine the normality assumptions, the Kolmogorov Smirnov normality tests and the normal Q-Q plot were conducted in the SPSS statistical package. The breakdowns of the test results of normality test results for total language scores and six variables are provided in table 5.1 below. From the results, in can be seen that the majority of the variables showed not normal distributions, except age.

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| --- | --- |
| **Table 5.1 The breakdown of normality (**Kolmogrov Smirnov**), p-values and shape of distribution** |  |
| **Variables** | **Groups** | **P (df)** | **Test statistic**  | **p-value** | **Shape of distribution** |
| Language scores and gender | Female | 35 | 0.203 | 0.041 | Not normal |
|  | Male | 43 | 0.117 | 0.068 | Not normal |
| language scores living conditions | Poor living conditionsLow SES conditions | 3637 | 0.1560.17 | 0.0260.008 | Not normalNot normal |
|  |  |  |  |  |  |
| Language scores and ethnicities | White  | 24 | 0.161 | 0.111 | Not normal |
|  | Black  | 27 | 0.197 | 0.009 | Not normal |
|  | Mix ethnicities  | 18 | 0.194 | 0.071 | Not normal |
| Language scores and environments  | Deprived environmentsChaotic environments | 4921 | 0.1380.231 | 0.0210.005 | Not normalNot normal |
| Language scores and | Children accessing counsellings | 6 | 0.536 | 0.001 | Not normal |
| Language scores and | Children receive school meals | 18 | 0.473 | 0.001 | Not normal |
| Language scores and | Children with second language | 2 | 0.54 | 0.001 | Not normal |
| Time spent in school |  | 78 | 0.151 | 0.001 | Not normal |
| Age  |  | 78 | 0.077 | 0.2 | Normal |

**5.2. Data analysis for total language scores and demographic factors**

As mentioned earlier, the overall analysis methods were chosen as parametric tests based on the central limit theorem. It states that the distribution of sample means approximates a normal distribution as the sample size gets larger, which current study sample was over 30 participants (n=78).

This resulted in using parametric tests when determining group differences in relation to children’s total language scores and gender, living conditions (poor conditions and low socio-economic conditions

), environments (deprived and chaotic environments), ethnicities (white, Black and mixed ethnic origins), age, time spent in school, receiving school meals, speaking second languages and accessing counsellings services.

 As seen from the normality table, the results of the tests revealed that for environment types, living conditions, and time spent in school were not normally distributed. Regarding the ethnicities, the total language scores were normally distributed for categories of White ethnicity, but not for the ethic categories involving Black and Mix ethnicities as assessed by the Kolmogorov Smirnov’s test (p < .05). The test of normality was also run to established whether total language scores were normally distributed for age. Following the normality tests results, for the ethnicity, one-way ANOVAs were considered to be the appropriate test. For the gender, environment types, living conditions, independent t-tests were used. In both parametric tests, the assumption of homogeneity of variance was evaluated through the Levene’s test. Additionally, Pearson's correlation was employed to evaluate correlations between total language scores, age and time spent in school. The results of the statistical data analyses are presented in table 1.5.2 below, after which the results are interpreted and discussed extensively.

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| --- | --- | --- | --- | --- | --- | --- |
| **RQ3 part 1: What factors associate with language difficulties in vulnerable children** |  |  |  |  |  |  |
| ***Questions*** | ***Groups*** | ***Mean*** | ***SD*** | ***df*** | ***F*** | ***p*** | Effect sizes | ***Skewness*** |
| Language scores | Female  | 18.43 | 3.506 | 35 |  |  |  | 0.687 |
|  | Male | 17.7 | 3.136 | 43 | t (76) =-857 | 0.394 | d = 0.169854 | 0.386 |
| Language scores | poor conditions  | 18.14 | 3.523 | 36 | t (71) =-.407 | 0.685 | d = 0.094942 | 0.555 |
|  | Low SES conditions | 17.76 | 3.235 | 37 |  |  |  | 0.616 |
| Language scores | Deprived environments | 18.78 | 3.508 | 49 | t (2,68) = -.067 | 0.947 | d = 0.016197 | 0.322 |
|  | Chaotic environments | 16.62 | 2.418 | 21 |  |  |  | 331 |
| Language scores | White  | 17.33 | 2.582 | 24 | f (2,68) = 0.866 | 0.425 | *η2* > 0.026 | 0.143 |
|  | Black  | 18.22 | 3.609 | 27 |  |  |  | 0.468 |
| Mix | ethnicities  | 18.67 | 3.97 | 18 |  |  |  | 0.512 |
| Language scores | Children receive school meals | 17.89 | 3.546 | 18 | *t* (74) = -.518 | 0.606 | d = 0.13922 | 1.118 |
|  | Not received school meals | 18.38 | 3.93 | 58 |  |  |  | 0.492 |
| Language scores | Children accessing counselling | 20.83 | 4.761 | 6 | *t* (71) = 2.064 | 0.043 | d = 0.713786 | -0.557 |
|  | Not accessing counselling | 17.91 | 33.18 | 67 |  |  |  | 0.675 |
| Language scores | Children with second language | 19.5 | 2.121 | 2 | *t* (71) = 0.226 | 0.822 | d = 0.198475 | . |
|  | Not with second language | 18.9 | 3.712 | 39 |  |  |  | 0.0211 |
|  |  |  |  |  |  |  |  |  |

 **5.2.1 Gender and language scores**

To determine if there were any differences between in total language scores amongst males and females, an independent-samples t-test was used.

There were 43 male participants and 35 females. The distribution of total language scores for males and females were almost similar, and a boxplot analysis revealed that there were no outliers in the data. The total language scores for each level of gender were not normally distributed, as shown by Kolmogorov- Smirnov (p <0.05), and the variances were homogeneous, as determined by Levene's test for equality of variances (p = 0.120). Further, it was observed that the mean scores of children were not statistically significantly different t (76) = -.729, p =0.468 between males (M=18.43 SD = 3.506) and females (M = 20.86, SD 4.279). Consequently, the mean total language scores between males and females were not statistically significant. The effect size was found to be small d= 0.169854. in accordance with Cohen’s d guidelines.

**5.2.3 Environments and language scores**

To test the hypothesis that the poor living conditions and low SES conditions were associated with statistically significantly different mean total language scores, an independent t-test was performed. As can be seen in Kolmogorov- Smirnov test (p <0.05) test results, the distributions of poor living conditions and low SES conditions were not normal and no outliers were identified in the data when a boxplot was visually assessed. There was n=36 poor living conditions and n=37 low SES conditions participants in the study sample. The assumptions of homogeneity of variances were tested and satisfied via Levene’s (p = 0.618). The independent sample t-test revealed that was not associated with a statistically significant effect, t (71) = -.407, p = 0.685. The mean total language score for poor living conditions (M = 20.25, SD = 3.767) is not statistically different from that of low SES conditions (M = 20.62, SD = 4.023). Cohen’s d is estimated at 0. 0.094942, which is a small effect size based on Cohen’s (1992 guidelines).

**5.2.2 Environments and language scores**

An independent sample t-test was performed to determine whether there were differences between total language scores and deprived environment (n=49) and all chaotic environments (n=21). A visual examination a boxplot showed that there were no outliers in the data. Kolmogorov- Smirnov test (p >.05) found that total language scores and each environment level were not normally distributed. Levene's test of homogeneity for equality of variances found that variances were homogeneous (p = 0.120). T-test results indicated that mean total language score for deprived environment environment (M = 20.27, SD = 4.112 was not statistically different from that of chaotic environments (M = 20.33, SD = 3.246), with a none statistically significant effect, t (68) = -.067, p = 9.47. The calculated and found to be as d =0.016197., which is a small effect size based on the Cohen's d guidelines.

**5.2.6 Ethnicity and language scores**

A one-way ANOVA test was conducted to determine whether the total language scores of vulnerable children differed among ethnic groups. The assumption of the normality was examined using the Kolmogorov- Smirnov test and a histogram, which found the ethnicity variable (p > 0.05) to be tenable, and there was homogeneity of variances assessed by Levene's test for equality of variances (p = .819). The ANOVA test results indicated that there was no significant difference between total language scores based on ethnicity, F (2,68) = 0.765, p= 0.469). This result was also reflected in the mean total language scores for each ethnicity categories namely white (M = 20.92, SD, 3.611), Black/ African/ Caribbean/ Black British (M = 19.67, SD = 3.942) and mix ethnic groups (M = 20.38, SD = 3.843). Post hoc results showed no significant differences between variables. The differences in the mean scores between groups were large based on Cohen’s (1973 and 1988) convention for interpreting the effect size of ANOVAs (η2 partial > 0.023). The results of the ANOVAs are presented in table 5.5 below.

**Table 5.6 ANOVAs for results of language scores and ethnicity**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Ethnicities*** | ***Mean*** | ***SD*** | ***df*** | ***F*** | ***p*** | **ηp2** |
| White | 20.92 | 3.611 | 24 |  |  |  |
| Black | 19.67 | 3.942 | 27 | F (2,68) = 0.765 | = 0.469 | 0.023 |
| Mix ethnic groups  | 20.38 | 3.843 | 18 |  |  |  |

**Children who had received school meals and language scores**

To determine whether the total language scores of children who had received school meals (n=18) differed from those who did not, an independent sample t-test was performed (n=58). A visual examination of a boxplot showed that there were no outliers in the data (some outliers I need to ask Nicola, P 58) Kolmogorov- Smirnov test ((p < .05) found that total language scores and accessing counsellings were not normally distributed. Levene's test of homogeneity for equality of variances found that variances were homogeneous (p = 0.053). T-test results indicated that mean total language score for accessing counsellings (M = 17.89, SD = 3.546 was not statistically different from that of children who did not (M = 18.38, SD = 3.493), with a none statistically significant effect, t (74) = -.518, p = 0.606. The calculated and found to be as d = 0.13922., which is a small effect size based on Cohen’s d guidelines.

**Accessing counsellings services and language scores**

In regard to children who accessed counsellings services at the time or priory to language screenings, an independent sample t test was performed to determine whether there were differences between total language scores of children accessing counsellings (n=6) and children who did not have access (n=72). A visual examination a boxplot showed that there were no outliers in the data. Kolmogorov- Smirn ov test ((p < .05) found that total language scores and accessing counsellings were not normally distributed. The Levene's test of homogeneity for equality of variances found that variances were homogeneous (p = 0.241). T- test results indicated that mean total language scores for children accessing counsellings (M = 20.83, SD = 4.833) was not statistically different from that of children who were not accessing counsellings (M = 17.91, SD = 3.180), with a statistically significant effect, *t* (71) = 2.064, p = 0.043. The calculated and found to be as d = 0.713786., which is a small effect size based on the Cohen’s *d* guidelines. But these results could be problematic as the sample size for children accessing the counsellings very small.

**Speak second languages and language scores**

To determine if there were any differences between in total language scores of children who speak second languages (n=2) and children who did not (n=39), an independent-samples t-test was used.

Prioty to t- test, normality test was run and Kolmogorov- Smirn ov test ((p < .05) found that total language scores and accessing second language were not normally distributed. The Levene's test of homogeneity for equality of variances found that variances were homogeneous (p = 1.075). T- test results indicated that mean total language scores for children counsellings (M = 19.50, SD = 2.121) was not statistically different from that of children who were not counsellings (M = 18.90, SD = 3.712), with a none statistically significant effect, *t* (71) = 0.226, p = 0.822. The calculated and found to be as d = 0.198475., which is a small effect size based on the Cohen’s *d* guidelines. But these results could be problematic as the sample size for children accessing the counsellings very small.

**5.4. Correlational analyses**

The relationship between language scores, time spent in schools and age was investigated via using correlational analysis. Before calculating the correlations, it is necessary to show that all variables included in the correlation’s analysis are normally distributed and which was done using a Kolmogrov Smirnov test. Initial analysis revealed that the three was not a linear relationship where all three variables showed not normal distributions, as shown by the Kolmogorov Smirnov test (p >.05), and there were no outliers. Although the population is not normally distributed, Pearson's correlation was used to as the correlations analysis. As the researcher is followed Central Limit Theorem which apply if the populations numbers are larger than n > 30 where current study sample is consisted of n=78 children which meets the criteria of Central Limit Theorem. Therefore, using Pearson's correlation was the appropriate test of analysis to use in the current study. There was not a significant correlation between the ages of vulnerable children and their total language scores (*r* (78) = -.119, p =.0.299) Similar results were observed for time spent in schools and total language scores, was no statistically significant association between the two variables (r (78) =-.155, p =.0.174). Pearson correlation effect size for time spent in schools was found as 0.024025 and for age was 0.34496 which total language scores and age strongly correlated, but correlation for time spent in ca schools re and language scores was small.

|  |  |  |  |
| --- | --- | --- | --- |
| **Correlations** | Language scores | Age | Time spent in schools |
| Language scores | Pearson Correlation | 1 | -.119 | -.155 |
| Sig. (2-tailed) |  | .299 | .174 |
| N | 78 | 78 | 78 |
| Age | Pearson Correlation | -.119 | 1 | .306\*\* |
| Sig. (2-tailed) | .299 |  | .006 |
| N | 78 | 78 | 78 |
| Time spent in school | Pearson Correlation | -.155 | .306\*\* | 1 |
| Sig. (2-tailed) | .174 | .006 |  |
| N | 78 | 78 | 78 |

From the above table, it can be highlighted that the Pearson correlation value acquired for language scores and age, r = -.119; p = 0.299 > 0.05. Thus, it can be stated that the correlation between language scores and age is negative but statistically insignificant. This also indicates that an increase in age would have resulted a decrease in the language scores and vice-versa had the correlation been significant. Nonetheless, it can be concluded that the relationship between language scores and age is not significant.

Further, it can be outlined that the Pearson correlation value acquired for estimating the relationship between language scores and time spent in schools is r = -.155; p – value = .174 > 0.05. As the p-value is more than 0.05 level of significance, the relationship is insignificant. Moreover, a negative correlation coefficient depicts that an increase in language scores may be observed due to a decrease in time spent in school had the relationship been significant.

Lastly, the relationship between age and time-spent in school is measured. Here r = .306\*\*; p-value = 0.006 < 0.05 and 0.01. Thus, it can be delineated that the correlation between age and time spent in schools is positive which is statistically significant. This also illustrates that an increase in age will result in an increase in time spent in schools and vice-versa. Moreover, it can be concluded that the relationship between age and time spent in school is statistically significant.