WARWICK BUSINESS SCHOOL
THE UNIVERSITY OF WARWICK

Masters Programmes

Dissertation Cover Sheet

Degree Course: Business Analytics

Student ID Number: 1855196

Title: Coventry Household Survey 2018: The Causal Relationship between Cultural Participation and Mental Wellbeing

Dissertation Code: IB93Y0

Submission Deadline: 11/09/2019

Word Count: 8151

Number of Pages: 43

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Abstract

The aim of this dissertation is to investigate the causal relationship between cultural participation and mental wellbeing, provide more insights about the behavior of Coventry households for Coventry City Council based on our result, help City Council better prepare the City of Culture 2021 and support their future survey development. The data we used was based on Coventry Household Survey 2018, which was collected by M.E.L Research Company. Before analyzing the causal relationship, several statistical test methods were used to explore the association between cultural participation, as well as mental wellbeing, and other factors to provide an overview for all the relationships among factors. By viewing the previous association results, findings in the academic papers, expert opinions and our hypotheses, we built the causal model by applying path analysis and principle component analysis. Finally, the results showed that the direct causal relationship between cultural participation and mental wellbeing is weak, the strongest causal path appears through exercise and physical health to mental wellbeing. The more cultural participation will first contribute to more exercise, then leads to better physical health, and finally improve the mental wellbeing. In addition, we used word clouds to explore the attitudes for households about the local area. The result suggested that the city safety, especially the areas like City Centre, Hillfield, and Woodend should pay more attention.

Coventry Household Survey 2018: The Causal Relationship between Cultural Participation and Mental Wellbeing

1. Introduction

Household surveys play an important role in Council policy decisions, since it provides a picture of city and help organization better understanding social and economic situation. In order to track feedbacks from current services, identify the key problems and provide more efficient services in the future, Coventry City Council has developed Household survey for more than 30 years, and each year the survey is modified based on the previous year's analysis, which means the questions are about 20% different from the previous year. For example, in the past years, safety was the main issue in the city, respondents were asked to answer 3 or more questions about safety, such as 'to what extent do you agree with that crime in my neighborhood has increased over the last 12 months', and 'how much of a problem or a crime are the following in your neighborhood'. According to the analysis of Coventry City Council, safety problem was to some extent correlated to the outdoor activity and social media. With the popularity of social media, outdoor activity declined and therefore, reduced the potential criminal behavior. For 2018 Household survey, safety is no longer the top concern in the survey, but cultural participation is.

Since 2016, Coventry City Council has paid attention to cultural participation and started to add relevant questions to Household surveys. In December 2017, Coventry triumphed over Swansea, Stoke-on-Trent, and the town of Paisley to host the prestigious title of UK City of Culture 2021, and has three years to prepare its year-long program of activity for 2021. Therefore, in order to better understand households cultural participation in the city, this dissertation will mainly focus on the relationship between cultural participation and other household information in 2018 survey, and investigate the causality between cultural participation and mental wellbeing.

In recent years, policy makers have begun to express a stronger interest in the value and impact of culture. On the personal side, as the report of German parliament about cultural sector in Germany, cultural activity is one of the key influence factors that affect individual educational level, cognitive ability and general health (German Federal Parliament, 2007). DiMaggio (1982) also provided empirical support that cultural capital impacts educational attainment, such as students' high school grades. Moreover, cultural participation has positive impacts on quality of life. Many empirical studies found that cultural activities benefits individual subjective wellbeing, for example, Kim and Kim (2009) reported that culture activities would influence the happiness and life satisfaction of the households.

From a city or country perspective, a large amount of public expenses goes into culture-related areas every year. For example, in 2009, around 9 billion euros subsidies in Germany spent on theaters and museums (Federal Statistical Office, 2012). Jeannotte (2003) argued that culture capital investment has collective benefits and has significant contribution to social cohesion. In addition, according to the analysis in the 53rd Annual Meeting of the Italian Economists, cultural participation is strongly associated with tourism flows (Borowiecki and Castiglione, 2014). During the meeting presentation, theatre-type activities would significantly increase the number of domestic tourists, museums or concerts activities are correlated with the growth of foreign tourists, and exhibitions expose a positive association with both domestic and international tourists. Based on the study of 2008 European Capital of Culture, a major event have significant economic and socio-cultural impacts on the host society (Liu, 2014). Therefore, with the influence of City of Culture 2021, Coventry can improve the quality of life of its household and city development by intervening in cultural participation.

Another focus for Coventry City Council is the causal relationship between cultural participation and mental well-being. Previous researches showed that there is a significant link between cultural event attendance and mental wellbeing. Both attending museum or exhibition, and sports events are positively associated with better living satisfaction, and lower sense of anxiety or depression (Hansen et al., 2015). And thus culture activity is also important in public health promotion. Recent studies has brought cultural participation into health policies and medical therapy. Especially in men, attending cultural activities reflected stronger association with all kinds of health outcome (Cuypers et al., 2012). Coventry City Council has been collecting household mental well-being data by using the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) for more than 30 years, and thus is interested in the direct or indirect impact of cultural participation on mental wellbeing.

However, merely testing the correlation is not enough to prove causation, statistical correlations may reflect spurious relationship. There could be other potential factors that exist between cultural participation and mental health, and link the relationship, for example, deprivation. Therefore, in this dissertation, different models are used to examine the pathway between these two variables.

The remainder of this dissertation is organized as follows: Section 2 describes the research questions and the hypotheses. Section 3 shows the empirical evidence on the association of cultural participation with mental wellbeing, and the studies that discuss other potential factors that may affect either cultural participation or mental well-being. Section 4 outlines the approaches adopted in this dissertation. We mainly rely on Chi-Square test for cultural participation, and nonparametric

tests for mental health. By using the test results, we are thus able to build Path Analysis model and examine the causal effect. In addition, seven open-ended questions are investigated by word cloud. Section 5 details the sample data and the definitions of the new variables we created. We use survey data which includes information about equalities and communities, culture participation and community safety, health and well-being and demographic data. Section 6 discusses the estimation results and findings. And finally section 7 concludes.

2. Research objectives and Hypotheses

In this dissertation, we mainly focus on three questions. Firstly, we would investigate what factors may affect cultural participation and mental wellbeing respectively. Based on the results, we would generate an impression about the factors that can be included in the causal model. Secondly, we would examine whether cultural participation directly influences mental wellbeing, and if not, what is in between. This is the most important question we want to solve. Thirdly, we would analyze the attitudes for households in city development based on their answers in open-ended questions.

The aim of this dissertation is to provide insight on what may affect cultural participation and how the increase of cultural participation by public organizations affect the level of mental wellbeing of residents. Coventry City Council can use the results as support of intervention that encourage households to engage in the cultural evens while enhance their mental wellbeing, thus enlarge the influence of City of Culture 2021 and improve the city reputation. This dissertation will also provide an overview of what other factors are significantly associated with mental wellbeing. Finally, based on the subjective answers of household in the questionnaire, this dissertation will analyze their feedbacks on city development, social influence, and safety by building word clouds, and thus inform policy makers about the subjective attitude of households and provide references for future questionnaire design.

Before we started to build and analyze the causal model, we made two hypotheses. Since lots of articles were devoted to the effect of poverty and since Coventry City Council has been paid high attention poverty, therefore, we argue that:

H1: Cultural participation leads to high levels of mental wellbeing by reducing poverty.

And because the causal model was built according to the findings in academic papers and export opinions, some scholars or experts hold two opposite opinions for the direction of causality, for

example both direction of causality between life satisfaction and mental wellbeing problems are tested to be true. Therefore here we propose the following hypothesis in our causal model:

H2: The direction of causality between living satisfaction and mental wellbeing can be both.

3. Literature Review

3.1. Cultural participation in relation to other variables

Previous studies from various countries have shown a strong interest in exploring cultural participation. By analysis of 557 persons from different ethnic family background living in the city of Utrecht, Van Wel (1996) argued that factors like ethnicity, gender, educational level and the participation of family members are significantly associated with cultural participation. According to their findings, Dutch people show little interest in participate art or cultural events. Persons who received higher educational level tend to attend more cultural activities. And girls are more interested in attending cultural events. He also highlighted cultural transmission within a family. Especially in the research of Van Beek and Knulst (1991), the relationship between cultural participation of mother and that of their children are strongly correlated. Van Wel (1994) further found that this kind of generation transmissions operates on sex-specific lines, which means the cultural behaviors are passed from father to son and from mother to daughter. Friends and neighbors can also arouse the interest in cultural events. By analyzing arts attendance in England, Brook (2016) concluded that the people living in an area participate more cultural activities may due to the better local provision and the attendance of friends and neighbors. Thus, better communication with neighbors or better community relationship tends to positively influence the household cultural participation.

In addition to the influence between people, the big events in the city will also boost the interest in cultural events. Based on the evidence form the 2008 European Capital of Culture in Liverpool, Liu (2014), the big cultural events contribute to better cultural inclusion, stronger sense of belonging and local identity, and higher quality of life, which includes higher participation and interest in cultural activities. Moreover, attend more cultural events will positively influence the quality of life, such as poverty and civic engagement. According to European Communities (2006), participate more cultural events can help households or communities to reduce poverty and social exclusion, since attending cultural activities helps building skills and self-confidence. During the activity process people can improve skills like teamwork ability or interpersonal communication. Moreover, some countries also provide project or workshops during the cultural activities to encourage employment, such as the drama workshops in France, training in digital media in UK and the creation of rap music

centres in Germany. Lewis (2013) described the effect of participatory art-making programs to civic engagement. This kind of programs benefit the social networks, quality of life and citizen engagement. The Make Music New York program, attract citizens to participate more than one thousand music making events in one day, and has significantly improved civic engagement for the city.

3.2. Mental wellbeing in relation to other variables

People, especially those who work for city development, has paid more attention to the mental wellbeing of city households. Björklund (1985) highlighted the connection between unemployment and the increasing mental wellbeing problems. The test result showed that the unemployment is significantly correlated to different mental wellbeing problems, and the unemployed have worse mental wellbeing than the employed. In addition, social safety also has substantial impacts on wellbeing. As Jenkins et al. (2008) argued the sense of safety or the fear of crime are potential linkage between neighborhood characteristics and mental wellbeing. Several researches have showed that the lower sense of safety is associated with both lower mental and physical health (Ross, 1993; Chandola, 2001; Ross and Mirowsky, 2001; Green et al., 2002; Beatty et al., 2005). Stafford et al. (2007) applied ten thousand London civil servants data from 2002 to 2004 to explore the effect strength of the association. As a result, with 95% confidence, the participants with lower sense of safety are 1.93 times more likely to have mental problems than those with higher sense of safety. They tend to have less exercise, less frequency to visit friends, and less attendance in social activities. However, the pathways between sense of safety and wellbeing are tested to be indirect (Lorenc et al., 2012). Evans (2003) and Halpern (1995) also noticed the relationship between wellbeing and built environment, which also includes the threat of crime. They tested the association and concludes that wellbeing can be affected by the environment stressors, such as noise, traffic, poor housing condition and overcrowding. In addition, mental wellbeing can also affected by their sense of internal control, which relates to how much people are involved in social decision-making.

Finally, as Headey, Kelley and Wearing (1993) argued life satisfaction is quite strongly correlated with depression. One can never be both satisfied with life and depressed. The result of Fergusson et al. (2015) further support the relationship between living satisfaction and mental wellbeing. By exploring the data from the Christchurch Health and Development Study, Fergusson found the significant associations between repeated measures of living satisfaction and the depression. After applying the structural equation model to test the direction of causation between life satisfaction and mental wellbeing problems, it showed that life satisfaction influences mental wellbeing, and that mental wellbeing influences life satisfaction.

3.3. Cultural participation and mental wellbeing

From a theoretical perspective, cultural participation can affect mental wellbeing through different mechanisms. Abel (2008), Khawaja and Mowa (2006), Bourdieu (1984), and Wilkinson (1999) holds an opinion that the art attendance will reflect socioeconomic status or social stratication, which can be described as households with higher income or better educational level are observed to be healthier. In order to maintain this social status, people keep investing cultural goods, such as art exhibition and museum. This behavior further generates social hierarchies, which is harmful to both physical health and mental wellbeing, since this kind of social hierarchies are associated with mental stress and aggressiveness.

However, cultural events provide more opportunities to deal with living problems, and then benefit mental wellbeing. The result of Cuypers et al. (2012) further support the relationship between cultural participation and mental wellbeing. By using logistics regression, Cuypers found that creative cultural activities help to enhance general health, improve living satisfaction, and help to lower the sense of anxiety or depression for both males and females. Moreover, Kawachi et al. (2008) suggested that cultural activities participation will improves the social interactions and interpersonal relationships. For example, the frequency of personal communication positively affect mental wellbeing. Finally, poverty also has significant association with mental wellbeing. By analyzing 49,000 households living in Germany from 1992 to 2012, Clark, D'Ambrosio and Ghislandi (2019) argued that the poverty is one of the reasons for the decline in life satisfaction, the household who suffered from poverty in the past few year tends to report lower life satisfaction today, and the cumulative effect continues to reduce levels of mental wellbeing.

4. Methodology

4.1. Correlation and association test

Before analyzing causality, we are interested in the relationship between cultural participation, as well as mental wellbeing, and other factors. All the tests used in this dissertation are described in the Figure 1 below (Campbell and Shantikumar, 2016).

		Outcome variable					
		Nominal	Categorical (>2 Categories)	Ordinal	Quantitative Discrete	Quantitative Non-Normal	Quantitative Normal
Input Variable	Nominal	X^2 or Fisher's	X^2	X^2-trend or Mann - Whitney	Mann-Whitney	Mann-Whitney or log-rank[a]	Student's *t* test
	Categorical (2>categories)	X^2	X^2	Kruskal-Wallis[b]	Kruskal-Wallis[b]	Kruskal-Wallis[b]	Analysis of variance[c]
	Ordinal (Ordered categories)	X^2-trend or Mann - Whitney	*	Spearman rank	Spearman rank	Spearman rank	Spearman rank or linear regression[d]
	Quantitative Discrete	Logistic regression	*	*	Spearman rank	Spearman rank	Spearman rank or linear regression[d]
	Quantitative non-Normal	Logistic regression	*	*	*	Plot data and Pearson or Spearman rank	Plot data and Pearson or Spearman rank and linear regression
	Quantitative Normal	Logistic regression	*	*	*	Linear regression[d]	Pearson and linear regression

Figure 1: Correlation (association) test

In terms of cultural participation, the test relies on Chi-Square, Chi-Square trend and logistic regression depending on the data type. Cultural participation, as the outcome variable, is binary. 1 means the household has attended cultural events at least three times in the last 12 months, while 0 means they haven't. Therefore, for the nominal input variables such as gender, economic status, and religion, we applied crosstabs analysis, and used Chi-Square statistic to test the association between categorical variables. The principle of chi-square test of independence is to put the observed frequencies and expected frequencies into a formula and computes how the pattern of observed frequencies differs from that of expected frequencies. The key assumption for Chi-Square test is that each subject contributes data to only one cell. In our dataset, the sum of all cell frequencies in the table is the same as the number of subjects, which meets the assumption. The null hypothesis of the Chi-Square test is that no relationship exists on the categorical variables in the population, which means they are independent. If the p-value is less than or equal to the probability of the error rate (0.05), we can reject the null hypothesis and conclude that there exist a statistically significant relationship between the categorical variables. Most of the data in the sample are measured on five or more point scale, such as the satisfaction of living in the local area, the frequency of doing exercise and the sense of security. For this ordinal input variables, we also used the Chi-Square test for trend as reference, which is also known as Cochran-Armitage test for trend (Koletsi and Pandis, 2016). The usual Pearson chi squared test will not take account of any trend between the binary variable and ordinal variable. The chi squared test for trend examines for a linear trend against the null hypothesis of no trend, thus for ordinal data, we both tested whether the

relationship is significant and whether it is linear. Finally, some variables in the dataset are continuous, such as the number of family members. Therefore, logistic regression is used to test the relationship between a continuous input variable and a binary variable. Since logistic regression does not make many of the key assumptions of linear regression such as linearity, homoscedasticity and normally distributed error terms, and multicollinearity does not need to be considered for univariate logistic regression, then the following test results are valid to show the relationship.

In terms of measuring mental well-being, Coventry City Council used Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), which is continuous and ranges from 14 to 80, the higher the score, the healthier the mental well-being. When testing the normality for the well-being score by using Kolmogorov-Smirnov and Shapiro-Wilk, the results are significant, which means the null hypothesis that the population is normally distributed should be rejected (figure 2). Even if we tried to transform the score data by square root, logarithm and squared, the results of the two normality test also shows strong significance. Therefore, nonparametric tests such as Mann Whitney U Test, Kruskal Wallis and Spearman Rank are applied in exploring the relationship between other factors and mental health. Firstly, the variables such as gender or cultural participation for children are binary, and thus Mann Whitney U Test, which was designed in 1945 by Wilcoxon and further developed in 1947 by Mann and Whitney, is used to test whether the medians or the mean ranks are different between the two independent groups. Mann Whitney U Test requires that the continuous or ordinal level dependent variable, the independent variable which should consist of two categorical, independent groups, and independent the observations. All the assumptions above are met in this household dataset. In addition, the result can be interpreted as the differences in the distributions of two groups or the differences in the medians of two groups, based on the shape of distribution for both groups. If the two distributions have a different shape, the Mann-Whitney U is used to test the differences in the distributions of the two groups. However, if two distributions have a similar shape, the Mann-Whitney U test is used to illustrate the differences in the medians of the two groups. And as the distributions and box plots in appendix A and appendix B show, the distributions for male and female are similar, while the distributions for children participate and children not participate cultural events are relatively not similar. Thus for gender, the result shows their median difference, and for children participation, the result describes the difference in mean rank.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
WEMMEBS	.064	2912	.000	.980	2912	.000
square_root_score	.083	2912	.000	.957	2912	.000
ln_score	.105	2912	.000	.915	2912	.000
square_score	.058	2912	.000	.992	2912	.000

Figure 2: Normality test for mental wellbeing

As for the variables that has three or more categories, such as property and educational level, Kruskal Wallis test is used. Kruskal Wallis test, also called "one-way ANOVA on ranks", has the same testing logic as the Mann-Whitney U test but can be applied to illustrate differences between two or more groups of an independent variable on a continuous variable. Since Kruskal Wallis test is an extension of the Mann-Whitney U test and is much less sensitive to outliers, the assumptions for Kruskal Wallis test are also met. And as the box plots in appendix C to appendix I show, different economic status, property, marital status, sexual orientation, religion and ethnicity tends to have different distributions, but the distributions of distinct educational level are fairly similar. Thus, the results for economic status, property, marital status, sexual orientation, religion and ethnicity describe the difference of mean rank, and the result for educational level presents the difference in median.

Finally, in order to test the relationship with ordinal and continuous independent variables, such as living satisfaction and the number of family members, we applied Spearman's rank-order correlation, which is the nonparametric version of the Pearson product-moment correlation. One of the special assumptions for this test is the monotonic relationship between two variables. Different from linear relationship, a monotonic relationship is less restrictive. It only requires both variables to rise or fall at the same time (Figure 3). However, in our data, we cannot always be able to visually check whether variables have monotonic relationship. Since monotonic relationship is not strictly an assumption of Spearman's correlation, we run the Spearman's correlation first to check the results. The null hypothesis is that there is no (monotonic) association between the two variables. And meanwhile the Spearman correlation coefficient ranges from -1 to 1, 1 indicates a perfect positive association, and 0 indicates no association. The closer correlation coefficient is to zero, the weaker the association.

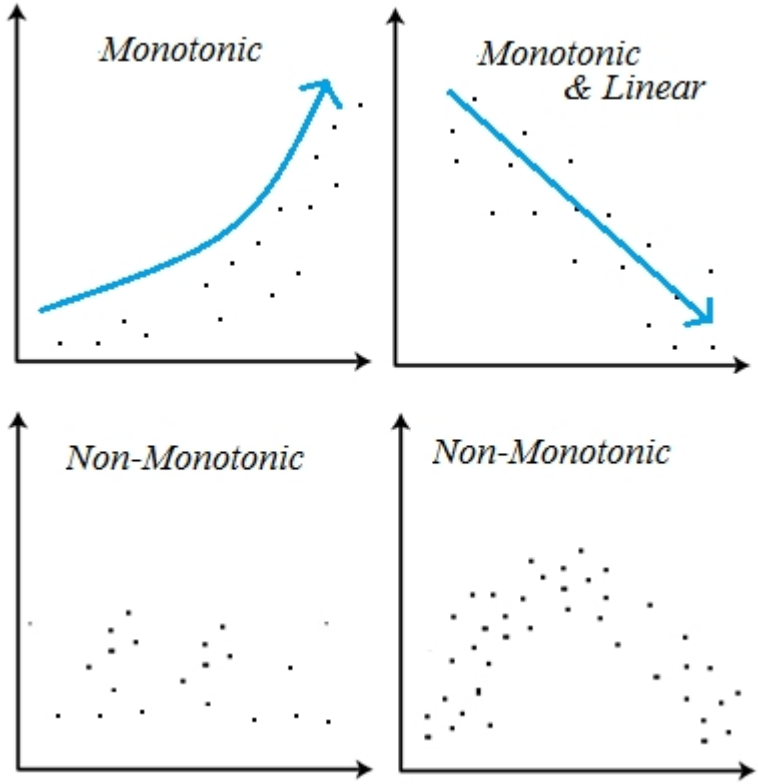


Figure 3: Monotonic relationship

4.2. Causal relationship and path analysis

However, we cannot infer causation from correlation alone. Correlation can only prove that the relationship exits, but cannot tell details behind the relationship. Ice cream sales is associated with homicides in New York, but this does not mean the increasing sales of ice cream will cause more number of homicides. The hidden factor that influence both variables behind this correlation is weather. Therefore, in order to test causal relationship, the most popular method in social science is granger causality test, which is used to determine whether the time series for one variable is useful in forecasting another (Granger, 1969). In reality, the "true causality" is deeply philosophical, but econometricians argued that one thing preceding another can be used as a proof of causation, then the granger causality test is used as "predictive causality" (Diebold and Francis, 2001). This test seek the direction of causality between variables. The mathematical model is as follow:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \cdots + a_m y_{t-m} + error_t$$

Where y is stationary time series. This first step for this model is to find a lagged value for y based on information criterion, such as the Akaike information criterion or the Schwarz information criterion. In this model, y_t is predicted by only using lagged y.

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \cdots + a_m y_{t-m} + b_p x_{t-p} + \cdots + b_q x_{\square-q} + error_t$$

Here x is another stationary time series. And now the new autoregression model includes lagged values of x. y_t is predicted by both using lagged y and x. If predictions of y_t based on its own past values and also the past values of x are better than the predictions based only on its own past values, then the time series x is said to granger cause y, so in this case, the null hypothesis of no granger causality is rejected. In addition, according to the t-test for selecting significant lagged variables, and the F-test for checking explanatory power improvement to the model, the final result can also be neither variable granger causes the other, or each of the two variables Granger-causes the other.

However, in this case, we can only get 6 discrete years' household survey data (2018, 2016, 2013, 2012, 2010 and 2009), and the question related to household cultural participation only appears in 2018 and 2016, which means we only have 6 observations for mental wellbeing and 2 observations for cultural participation, thus the result of the granger test will perform without any power. So we tried another alternative method, which is called path analysis.

Path analysis, which is developed in 1918 and further improved in 1920 (Wright, 1921), is used to evaluate causality by examining the relationships between a dependent variable and two or more independent variables based on multiple regression. It explores the direct and indirect relationships between independent variables and dependent variables through the decomposition of the direct correlation. In other words, the correlation between independent x and dependent y is equal to the sum of their direct path coefficient and all indirect path coefficients. The strength of each of these indirect pathways is calculated as the product of the path coefficients along that pathway. Compared to granger test, path analysis is theoretically useful. It is useful in testing theory rather than generating theory. Before analyzing a path model, one need to first build the input path diagram based on their hypothesized relationships. One arrow is used from variable A to variable B in the input path diagram, indicating that variable A is assumed to influence or cause variable B. After the statistical analysis, an output path diagram should be built, describing the relationships among variables.

Figure 4 shows a simple example of path model. Independent but not dependent variables in the model is called 'exogenous', which graphically appear at left outside edges of the model and have only unidirectional arrows exiting from them ($\mathrm{E}x_1$ and $\mathrm{E}x_2$). The double-headed arrow between two exogenous variables presents their correlation. The solely dependent variables, or both dependent

and independent variables, are called 'endogenous', which graphically appears at the right or the middle of the model and have at least one arrow pointing at them (En_1 and En_2). In addition, since the endogenous variables may also be affected by factors that outside the model, such as external effects, then "e", which means error terms, is used to measure the magnitude of these unconsidered factors. Some arrows that represent small effects in the output path diagram can be deleted, and then the fit of both input model and output model need to be compared statistically.

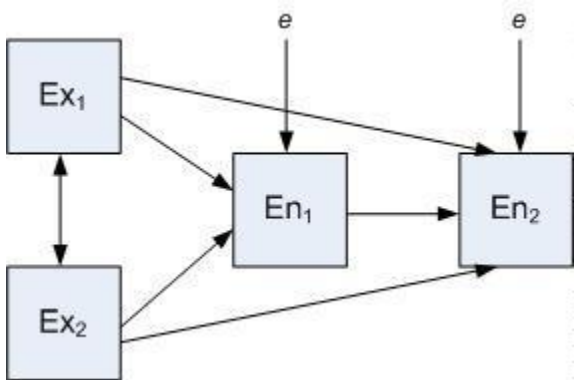


Figure 4: Sample of path model

Since path model is built based on multiple regression, it is limited by the assumptions of regression. And in this dissertation, we only selected several variables that have strong relationship with cultural participation and mental wellbeing based on the above correlation test, and use PCA to reduce dimension and integrate different questions that related to the same topic. Here we just test the assumptions by using these new variables. However, according to figure 5, variables are not normal distributed, since the results of Kolmogorov-Smirnov and Shapiro-Wilk tests significant reject the null hypothesis that the population is normally distributed. In addition, some relationships are hard to see if they are linear. Here we just keep them in mind and check whether normality and linearity cause problems during regression analysis. The third assumption is that variables are not highly correlated, it better not exceed 0.7 (Kerlinger and Pedhazur, 1973), and according to figure 6, multicolinearity is not a problem in this dissertation. During the analysis, Variance Inflation Factor was also used to check how much the variance of the regression coefficients is inflated by multicollinearity problems. A maximum acceptable VIF value would be 10, anything higher than 10 would indicate a problem with multicollinearity. The fourth assumption is about error terms, the independence of error terms was tested by Durbin-Watson, and the homoscedasticity and normality of error terms was checked by scatter plots and P-P plots. According to the results, regression analysis is fairly robust, and thus the violation of either of these assumptions is allowable. The final assumption is relevant to path analysis, the relationship between the variables is additive, not multiplicative, which means variables do not interact. The test for interaction effects was done by checking increase in R^2 and the

significance of interaction term in the regression (Kerlinger and Pedhazur, 1973). In addition, Wright (1934) also proposed the path tracing rules, which indicates that one can never pass out of one arrow head and into another arrow head and that each variable in the model can only be passed once. The model should be a directed acyclic graph that only contains maximum one bi-directional arrow.

New variable	Kolmogorov-Smirnov	Shapiro-Wilk
PCAsafety	0.000	0.000
PCAphysicalhealth	0.000	0.000
PCAneighbor	0.000	0.000
PCAexercise	0.000	0.000
PCAlivingsatisfaction	0.000	0.000
PCApoverty	0.000	0.000
PCAhealthydiet	0.000	0.000
PCAcivicengagement	0.000	0.000
PCAdiversefriendshipgroup	0.000	0.000

Figure 5: Normality test for new variables

	Mental wellbeing	PCAsafety22	PCAphysicalhealth2740	PCAneighbor810	PCAexercise37	PCAlivingsatisfaction23	PCApoverty	PCAeatinghealth3031.3	PCAcivicengagement45	PCAdiversefriendshipgroup1213	culture
Mental wellbeing	1.000	-.199	-.400	-.056	.300	-.209	-.269	-.168	-.088	.020	-.211
PCAsafety22	-.199	1.000	.154	.134	.034	.452	.112	.059	.144	.025	-.006
PCAphysicalhealth2740	-.400	.154	1.000	.023	-.295	.155	.161	.059	.148	-.097	.147
PCAneighbor810	-.056	.134	.023	1.000	-.071	.113	.081	.153	.165	-.058	.067
PCAexercise37	.300	.034	-.295	-.071	1.000	.028	-.113	-.113	-.054	.124	-.269
PCAlivingsatisfaction23	-.209	.452	.155	.113	.028	1.000	.055	.011	.281	.007	.044
PCApoverty	-.269	.112	.161	.081	-.113	.055	1.000	.154	.020	.082	.038
PCAeatinghealth3031.3	-.168	.059	.059	.153	-.113	.011	.154	1.000	.067	.020	.075
PCAcivicengagement45	-.088	.144	.148	.165	-.054	.281	.020	.067	1.000	-.100	.087
PCAdiversefriendshipgroup1213	.020	.025	-.097	-.058	.124	.007	.082	.020	-.100	1.000	-.115
culture	-.211	-.006	.147	.067	-.269	.044	.038	.075	.087	-.115	1.000

Figure 6: Correlation test for new variables

But the path analysis still has its limitations. Firstly, the model can only evaluate the causal hypotheses, which means it cannot determine the direction of causality. All the directions in the model are drawn according to literature reviews or hypotheses. Secondly, the prerequisite for path analysis is that all causal relationships between variables must go in one direction only. Therefore, we cannot test whether variables have two-way causality.

The path analysis model we built is used to investigate two questions, does cultural participation directly or indirectly affects mental health? And does living satisfaction help to explain mental wellbeing or it should be affected by mental health.

4.3. Text analysis

Household survey also includes lots of open-ended questions, such as why do households feel local area better or worse to live in, what make it easier for households to influence decisions in the local area and why don't households chat to their neighbors more often. These questions may also include

important information, but they have never been analyzed. Thus, in this dissertation, we use word clouds to visually present the results for these questions and provide some recommendations for both future decision making and survey design. Word cloud is built based on the frequency of token word appears in a source of textual data. The greater the frequency, the bigger and bolder it appears in the word cloud. Sometimes the words have positive or negative sentiments, the word cloud can also separate different sentiment groups, and directly reflect the results.

5. Project Set-up and Data Collection

5.1. Description of the sample

This dissertation uses survey data collecting by M.E.L Research Company in 2018. The Coventry Household Survey has been used for monitoring Coventry residents' views of quality of life in the city and has also incorporated questions to understand more about residents' perceptions of their health and wellbeing. The survey data contains 3007 samples from Coventry households. Random locational quota sampling method was applied so that the sample reflects the distribution of households across deprivation deciles and Middle Layer Super Output Areas (MSOAs). The survey splits the data into 5 sections, equalities and communities, culture, community safety, health and wellbeing and general profile. The descriptive statistics of our main sample appear in appendix J. In our data, the ratio of men to women is 1:1, which is representative. Half of the sample households are Christian, and approximately 33% of the sample is no religion. 64% of the residents are White and British. Approximately 54% are employed at the moment of the survey, and 17% of the sample have worried about money quite often or almost all the time.

In our sample, the majority of the sample has attended cultural events (77.6%) at least three times in the last 12 months. The most known and visited attractions are: the Coventry Transport Museum (90% awareness and 76% visited), followed by the Belgrade Theatre (90% awareness and 66% visited) and Coventry Cathedral (88% awareness and 66% visited). And the most known and attended events are: Godiva Festival (87% awareness and 72% attended, Christmas Lights Switch On (88% awareness and 58% attended) and Motofest (58% awareness and 28% attended). Taking different age group into account, adults usually go to pubs, clubs and bars, or to the cinema (both 52%). A third (33%) also goes to museums and galleries. Their children usually go to the cinema (54%), museums and galleries (39%) or attend activities organized by arts-based community groups (30%).The mean well-being score for all adults is 52.68, which is higher than the England average score of 49.9.

In other respects, 84% are satisfied with their local area, which is significantly higher than national LGA figure of (81%). 39% of the sample households agree that they can influence the decisions affecting their local area, which is higher than the national figure of 26%. In addition, combined with the open-ended questions, 29% of the residents say it might make it easier for them to influence the decisions if the local council got in touch with them and asked them. In terms of the interpersonal relationship, 86% of the sample households chat to their neighbors at least once a month and 46% generally borrow things or exchange favors with their neighbors, and these figures are higher than the national figures (73% and 39% respectively). The households that have same ethnic or religious friendship group are about 17% and 15%, both these two figures are lower than national figures, which shows that households in Coventry tend to make friends from diverse backgrounds. For the sense of safety, 94% feel safe in their neighborhood during the day, while 74% at night. Taking the open-ended questions into account, out of those who felt unsafe in the last 12 months, 70% felt unsafe outside, such as on the street, in parks or grounds. Finally, in terms of their physical health, 78% of the sample households consider that their general health is “very good” (24%) or “good” (53%). Most residents agreed with the importance of healthy food, having everything they need in their kitchen to cook a meal from scratch and the importance for families to eat together every night. Residents are most likely to do everyday activities like walking or cycling as a form of transport (31%) and cultural and social activities (28%) for more than 2.5 hours a week, while 41% and 60% respectively saying that they have not got involved with active recreation or sport at all.

5.2. Definitions of the principle component variables

In the survey data, different questions may describe similar factor. Before modeling, we summarized problems into one dimension by using principal component analysis. The definitions of the principle component variables and the correlations between the original variables and the principle component variables are as follow:

New Variable	Original Variable	Correlation
PCAsafety	How safe do you feel in your neighbourhood during the day?	0.906
	How safe do you feel in your neighbourhood at night?	0.906
PCAphysicalhealth	Would you say in general your health is?	0.876
	Are you day-to-day activities limited because of a health problem or disability?	-0.876
PCAneighbor	How often do you chat to your neighbors, more than to just say hello?	0.850
	Generally, I borrow things and exchange favours with my neighbors	0.850
PCAexercise	Everyday activity	0.681
	Active recreation	0.820
	Sport	0.760
PCAlivingsatisfaction	Generally, how satisfied are you with your local area as a place to live?	0.826
	Do you think that over the past two years your area has?	0.826
PCApoverty	Which of the following statements best describes the food eaten in your household?	0.825
	How often would you say you have been worried about money during the last few weeks?	-0.825
PCAhealthydiet	How many portions of fruit or vegetables would you say you eat in a typical day?	0.826
	It is important to me to eat healthy foods	0.826
PCAcivicengagement	Do you agree or disagree that you can influence decisions affecting your local area?	0.919
	To what extent do you agree or disagree that there are opportunities for you to be actively involved in improving your local area?	0.919
PCAdiversefriendshipgroup	What proportion of your friends are of the same ethnic group as you?	0.930
	What proportion of your friends are of the same religious group as you?	0.930

Figure 7: Definitions of the PC variales

Averagely, the correlations between the original variables and new variables are above 0.8. And these high correlations show the representativeness of the new principle component variables.

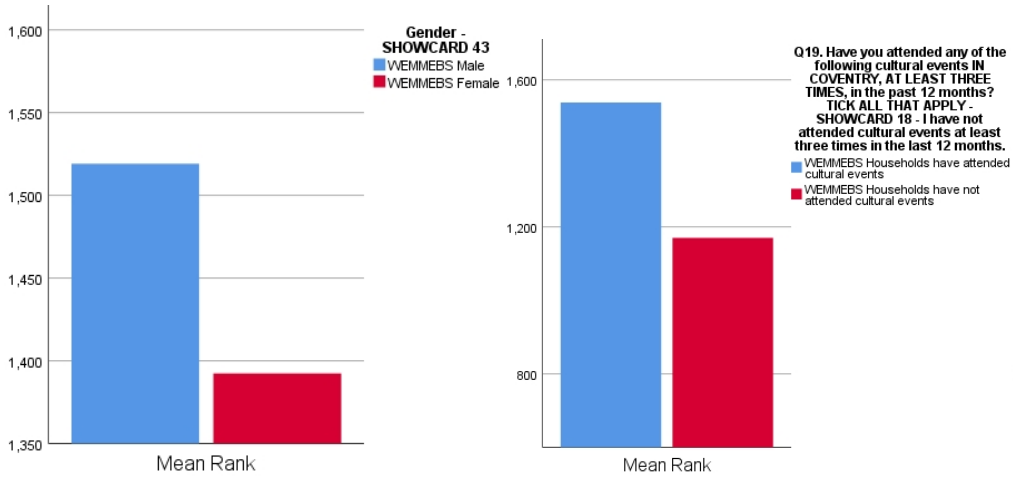
6. Findings and Discussion

6.1. Correlation (association) test

We first present results from testing association between other factors and cultural participation. As appendix K table 3 shows, duration of residence, living satisfaction, civic engagement, neighborhood communication, diversified friendship group, sense of belonging to neighborhood, their children cultural events participation, influence of big events, health, fruit eating, soft drinks, takeaway eating frequency, alcohol drinking, exercise, mental wellbeing, economic status, educational level, gender, age, marital status, religion and ethnicity are significantly associated with cultural participation. Shorter living year, higher satisfaction to the local area, more opportunities to influence the area decisions, higher civic engagement, better communication with neighborhood, diverse ethnic and religious friendship group and less sense of belonging to their neighborhood have positive effect to cultural participation. Big cultural events in the city, such as City of Culture 2021, tend to enhance the city reputation, and then enhance the participation and interest in cultural activities. Children cultural participation also has positive relationship with household participation. As van Hek and Kraaykamp (2015), cultural behaviors are transmitted through the generations. Households who are active in cultural activities arouse their children's interest in cultural events. Moreover, the relationship between health and cultural participation is strongly significant, this includes physical health, mental wellbeing, also healthy diet and exercises, such as fruit eating, everyday activity, active recreation and sport. Cultural participation also positively associated with the frequency of takeaway and the units of alcohol. Finally, in terms of the general profile, households under the age of 54 participate more cultural events than expected. Males are more likely to participate than

Females. The proportion of participation for single household is greater than married. Household with jobs or higher educational level are more interested in cultural activities, since they have financial resources and cognitive abilities to afford the cultural goods. As for religion and ethnic group, no religion, Buddhist, Jewish households attend more cultural events than expected, White and Mixed households are more likely to attend than Asian, Black and Arab.

In terms of the correlation between mental wellbeing and other factors, compared with cultural participation, mental health is associated with more factors. According to appendix K table 4, Shorter living time, higher satisfaction, more chances to influence the community decisions, higher civic engagement, better communication with neighborhood, diverse ethnic, religious and neighborhood background, hold big cultural events, better physical health, more exercises, healthy eating habits and low frequency alcohol drinking have positive effect to mental wellbeing as well. However different from the association with cultural participation, households with strong sense of belonging to neighborhood have higher mental wellbeing score. In addition, higher for Coventry as a city centre, stronger sense of safety, no smoking and worry less about money associated with higher mental health. As for the general profile, the correlation coefficient between mental health and age is -0.211, which means younger people have better mental health in Coventry. According to figure 8, male household has better mental wellbeing than female, which is similar to the result of cultural participation. The households that are active in cultural activities have higher mental score. However, different from the result of cultural participation, households with children who are more likely to attend cultural events have lower score.



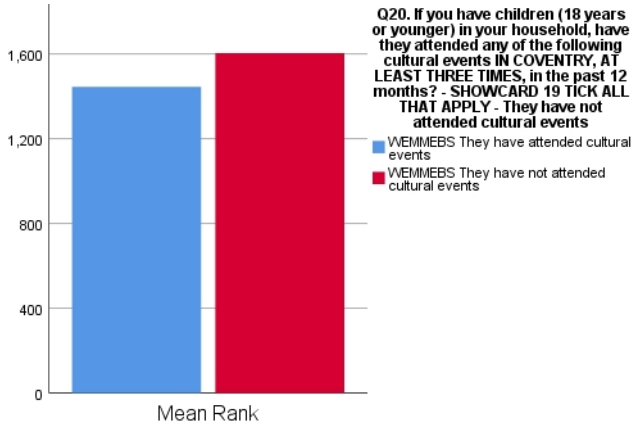


Figure 8: Relationship with gender, cultural participation and children participation

6.2. Causality between cultural participation and mental health

According to the relationships above, we selected some of the variables that are important to both cultural participation and mental wellbeing, such as communication with neighbors, health, exercise and healthy diet, and some of the variables that we are interested in, such as living satisfaction, safety and poverty. Most of these variables contain information from two or more questions. For example, there are two questions in the survey that relates to safety, both the sense of safety during the day and at night, so we applied principal component analysis to reduce variable dimension. As shown by the second column in table 1 below, the results of Kaiser-Meyer-Olkin statistic, which is used for evaluating the adequacy of the correlations and partial correlations to coalesce on components, are greater than 0.5, so variables have enough correlation to apply principal component analysis. The third column presents the results of Bartlett's test, which evaluates whether or not the correlation matrix is an identity matrix. All the p-values for Bartlett's test are less than 0.000, and thus the correlation matrix is significantly different from diagonal. After the principal component analysis, averagely, the new variables keep 75% of the variance. Both these information indicate that the original variables we used for principal component analysis are highly correlated, so there is basis for using PCA to reduce dimensionality and the new variables are valid to use in the following analysis.

Table 1: PCA

New variable	Kaiser-Meyer-Olkin	Bartlett's test	Cumulative variance %
PCAsafety	0.5	0.000	82.074
PCAphysicalhealth	0.5	0.000	76.736
PCAneighbor	0.5	0.000	72.322
PCAexercise	0.624	0.000	70.716
PCAlivingsatisfaction	0.5	0.000	68.307
PCApoverty	0.5	0.000	68.024
PCAhealthydiet	0.5	0.000	68.216
PCAcivicengagement	0.5	0.000	84.375
PCAdiversefriendshipgroup	0.5	0.000	86.405

Before the analysis, we firstly added all the variables into the regression model to explain mental wellbeing. Figure 9 shows the model summary. All the multicollinearity in the model has been removed by checking Variance Inflation Factor for each variable. This value measures to what extent the variance of the regression coefficients is affected by the multicollinearity problems. If VIF equals 0, then no correlation between the independent variables. The value of 1 means some association between predictor variables, but generally not enough to cause problems. A maximum acceptable VIF value would be 10; anything higher than 10 would indicate a problem with multicollinearity. In the final model, all the VIF values are less or about 3. All predictor variables explain 44.4% variability of the mental health, Durbin-Watson test is 1.827, which is about 2, then the residuals are considered to be uncorrelated. The p-value of ANOVA is 0.000, which is less than 0.05, hence the model explains significant amount of variability of the mental health. The residuals seem to follow normal distribution (figure 10), and have relatively homoscedastic variance (figure 11).

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15166.759	89	170.413	3.857	.000[b]
	Residual	18997.808	430	44.181		
	Total	34164.567	519			

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.666[a]	.444	.329	6.647	1.827

Figure 9: Model summary

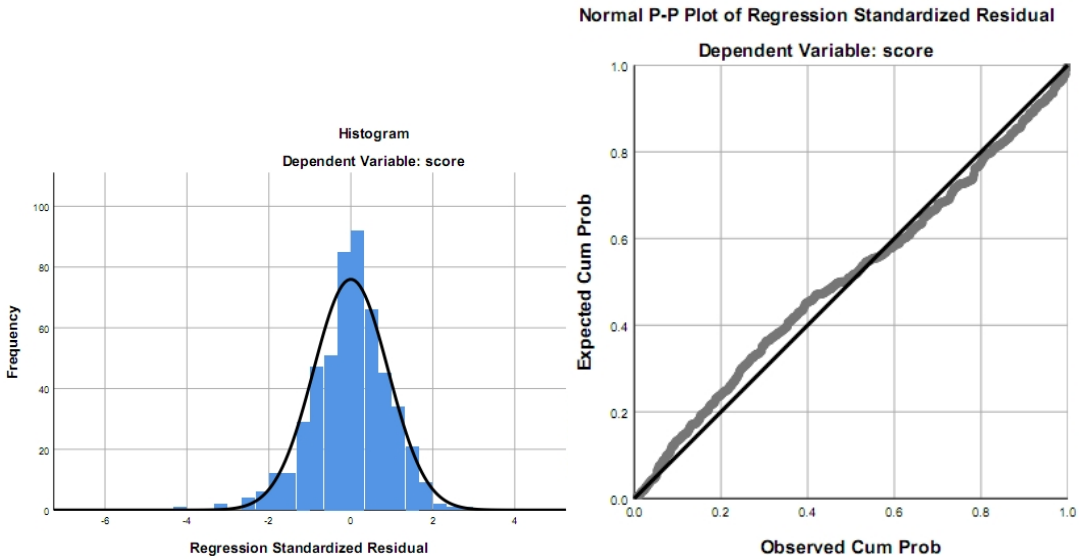


Figure 10: Residual normality check

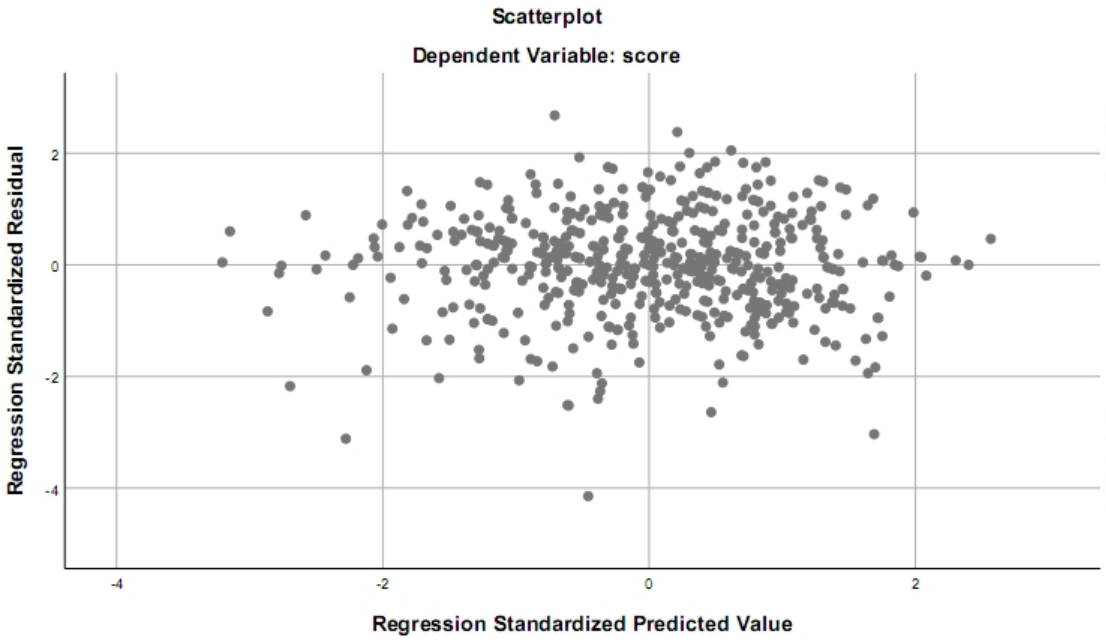


Figure 11: Homoscedastic variance check

The full details of the output of the initial path model are presented in figure 12, only these seven variables explain 31.1% variability of the mental health, which is about 10% less than the model with all variables. All the causal arrows are drawn based on the findings in academic papers, expert opinions and our hypothesis. Integrating the path and principal component analysis, the path model provides a series of statistical indices to illustrate the direct and indirect causal relationship between cultural participation and mental wellbeing. Different colors indicate the different levels of absolute value of path coefficients. Dark red represents the highest path coefficient, which shows the highest causal relationship. Orange represents a very high causality, yellow shows a relatively high causality, and black means weak causal relationship.

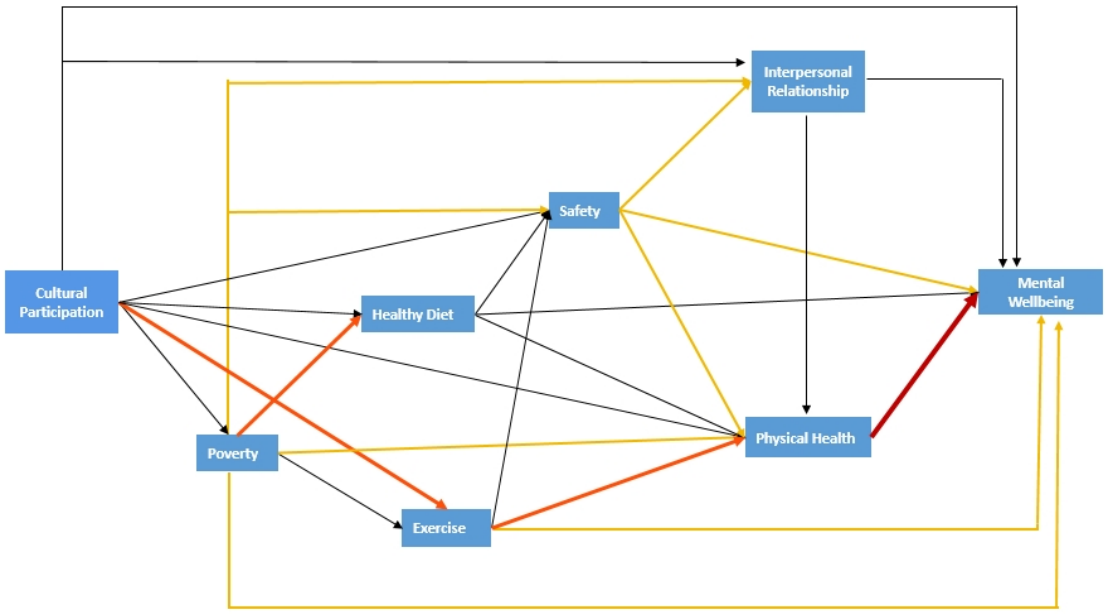


Figure 12: Initial path model

The details of the result are summarized as table 2. The difference between sign of path coefficient and relationship is due to the different settings of question options in the survey. For example, the highest path coefficient occurs between physical health and mental wellbeing, which is -0.305. Since the smaller the physical health variable, the healthier the household, then the negative sign actually present a positive relationship between physical health and mental wellbeing. In addition, the second highest absolute value appears between cultural participation and exercise, and between exercise and physical health, which are 0.264 and 0.27 respectively. The absolute values of path coefficient between poverty and physical health, poverty and safety, poverty and interpersonal relationship, poverty and mental health, exercise with mental health, safety and interpersonal relationship, safety and physical health, and safety and mental wellbeing are also greater than 0.1. The results make it clear that the cultural participation contributes to more exercise, then leads to better physical health, and finally improves the mental wellbeing. The first hypothesis we made above is rejected according to this model.

Table 2: Results of path model

Path	Path coefficient	e value
cultural participation - poverty	0.018	
cultural participation - healthy diet	0.060	
cultural participation - exercise	-0.264	
cultural participation - safety	0.000	
cultural participation - physical health	0.073	
cultural participation - interpersonal relationship	0.051	
cultural participation - mental wellbeing	-0.073	
poverty - healthy diet	0.208	
poverty - exercise	-0.074	
poverty - safety	0.144	0.990
poverty - physical health	0.142	
poverty - interpersonal relationship	0.102	
poverty - mental wellbeing	-0.197	
healthy diet - safety	0.024	
healthy diet - physical health	-0.014	0.976
healthy diet - mental wellbeing	-0.094	
exercise - safety	0.008	
exercise - physical health	-0.270	0.960
exercise - mental wellbeing	0.168	
safety - interpersonal relationship	0.101	
safety - physical health	0.179	0.989
safety - mental wellbeing	-0.148	
interpersonal relationship - physical health	-0.068	0.987
interpersonal relationship - mental wellbeing	-0.005	
Physical health - mental wellbeing	-0.305	0.830

In order to further improve the causal model, we added three more variables into the model, which are diverse friendship group, civic engagement and living satisfaction. And since most of papers conclude that better mental wellbeing contributes to a higher living satisfaction, which is contrary to our second hypothesis, then we try both directions. When mental wellbeing contributes to living satisfaction. The R Square value for the new mental wellbeing model is 0.278, which is even less than the original model. The corresponding direct effect between mental wellbeing and living satisfaction is -0.127, which means the better mental health, the higher living satisfaction. The path from cultural participation to mental wellbeing does not change, and the direct causal relationship between safety and mental health is very strong, which is above 0.4. When put living satisfaction on the left of mental wellbeing, the result still not change too much. The path coefficient between living satisfaction and mental wellbeing is -0.125, which is just slightly smaller than the previous one. However, the R Square value for this mental health model is 0.317, which is larger than the original one. Therefore, we can conclude that here for the path between cultural participation and mental wellbeing, the cultural participation will first contribute to more exercise, then leads to better physical health, and finally improve the mental wellbeing, and reject the first hypothesis. For the path between mental wellbeing and living satisfaction, due to the similar path coefficient and the change in R Square value, the causal relationship can go both directions, which do not reject our second hypothesis.

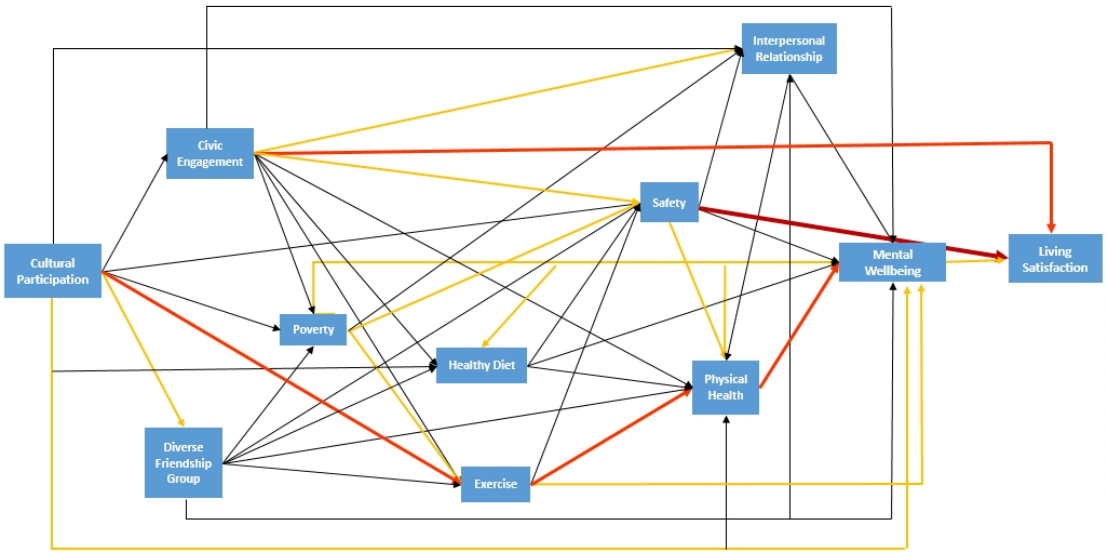


Figure 13: Improved path model (1)

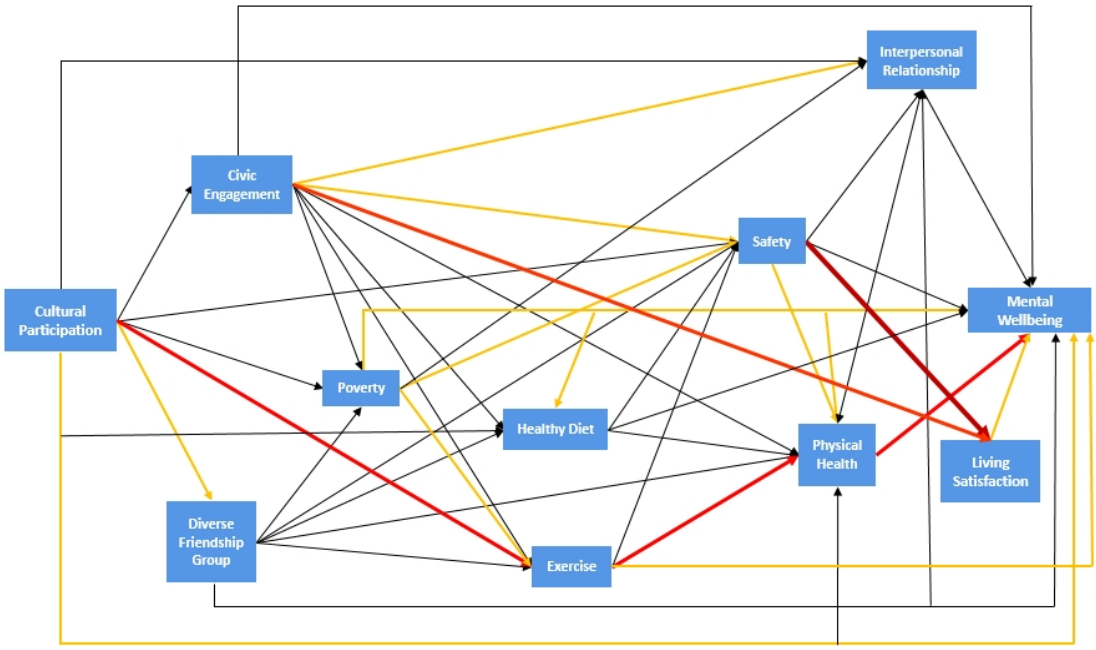


Figure 14: Improved path model (2)

6.3. Text Analysis for open-ended questions

Four open-ended questions in the survey are analyzed by using word cloud. The first word cloud measures the attitudes for the area they live in. 24.7% of households think the area is worse to live in, while 9.2% think it becomes better to live in. Based on their comments in the survey, we analyzed the reasons behind their attitudes. According to figure 15, the blue color represents the comments with negative attitude, and the red color shows the positive comments. The three most unsatisfactory problems for residents are parking, crime, and antisocial behavior, followed by street and rent. Most of the household mentioned that there are limited space for parking, more street crimes and

antisocial behaviors, and increasing number of strangers in the street since lots of houses are rented. Therefore, the biggest problems that households concern is safety. According to the causal model above, the weak sense of safety tends to directly reduce their living satisfaction, and thus it is an important issue in Coventry that needs to be improved. According to the red words, which stands for positive comments, quieter is the biggest advantage for the area to live in. Some households hold the opinions that the area is safe, but the proportion is much smaller than those who do not.

Figure 15: Why do you feel your area has got better or worse to live in?

Since safety is important for the future development of Coventry, we then analyzed the main areas that household feel unsafe for Coventry as reference, which is showed in the following figure 16. The most obvious area is city centre, about 43% of the households mentioned that they worry more about the centre of city. Other areas like Woodend and Hillfields also needs more attentions. Moreover, most of people feel unsafe after dark.

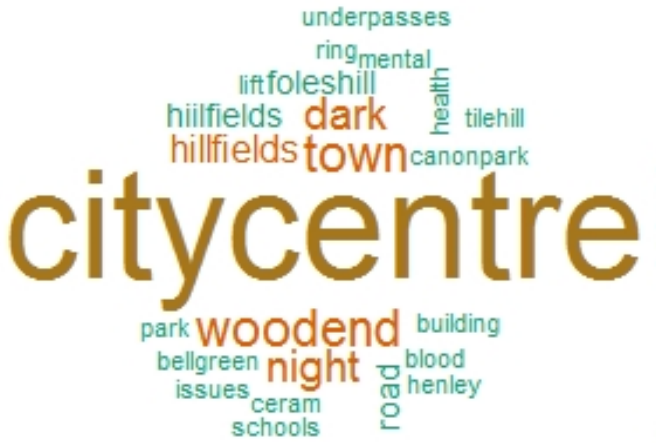


Figure 16: How do household get information about Coventry City Council?

The third word cloud described the ways that households get information about Coventry City Council. The most popular way is through television, then followed by friends and family members,

or through phone, google or local meetings.

Figure 17: Where do household feel unsafe?

Finally, here are the ethnicities that are not included in the options. Households from Poland, Romania and Latvia account for 39.7%, 19.8% and 7.2%. Therefore households of these ethnicities could also be taken into account in future analyses.

Figure 18: Other ethnicity

7. Conclusions

In this dissertation, we examined the correlations between cultural participation, mental wellbeing and other factors. Results from different testing methods show that cultural participation is significantly associated with duration of residence, living satisfaction, civic engagement, neighborhood communication, diversified friendship group, sense of belonging to neighborhood, their children cultural events participation, influence of big events, health, fruit eating, soft drinks, takeaway eating frequency, alcohol drinking, exercise, mental wellbeing, economic status, educational level, gender, age, marital status, religion and ethnicity. Similarly, apart from the above

variables, mental wellbeing is also correlated with diverse neighborhood background, image of Coventry as a city centre, cultural participation, safety, smoking, healthy eating habits, poverty. Based on the results, we investigated the causal relationship of cultural participation and mental wellbeing by applying principle component analysis and path analysis. Result suggests that the direct causal relationship between cultural participation and mental wellbeing is much weaker than their indirect causal relationship. Although we added civic engagement, diverse friendship group and living satisfaction later in the model, and the strength of direct relationship increase, it is still smaller than the indirect relationship. The strongest causal path occurs when the cultural participation first contribute to more exercise, then leads to better physical health, and finally improve the mental wellbeing. Even if we added more variables into the model, this result still holds. The result from causal path also suggests a strong direct causal relationship between safety and living satisfaction, and a relatively strong direct relationship between civic engagement and living satisfaction. Finally, according to the word cloud about the feeling of their living area, parking and safety are the biggest problems that affect their living satisfaction, since the words like parking, crime and antisocial behavior appear repeatedly. And the areas like City Centre, Hillfield, and Woodend should pay more attention to safety problem. The most popular ways that households get information about Coventry City Council is television, family, friends, phone and google. So making full use of these ways may be more effective in achieving the expected effect of the City Council. The last word cloud shows the large proportion of households from Poland and Romania. And since these ethnicities are not included in the options, this word cloud also suggests that City Council may also take this ethnicities into account in the following surveys.

Acknowledgements

Many thanks to my supervisor Bo Chen for the valuable comments and suggestions. And thanks to Tim Healy in Coventry City Council for discussing and sharing useful articles, experiences and methods with me during this period.

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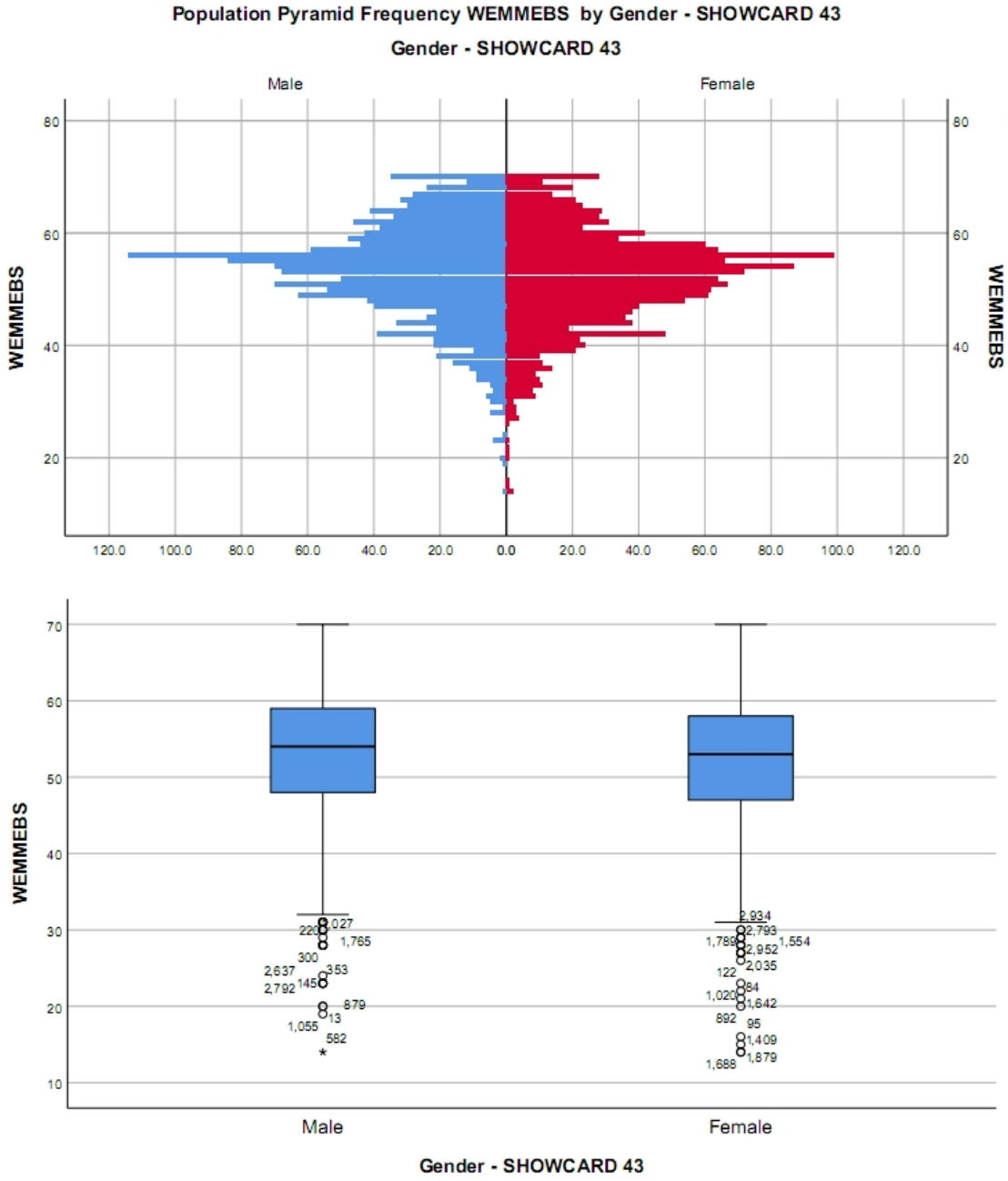
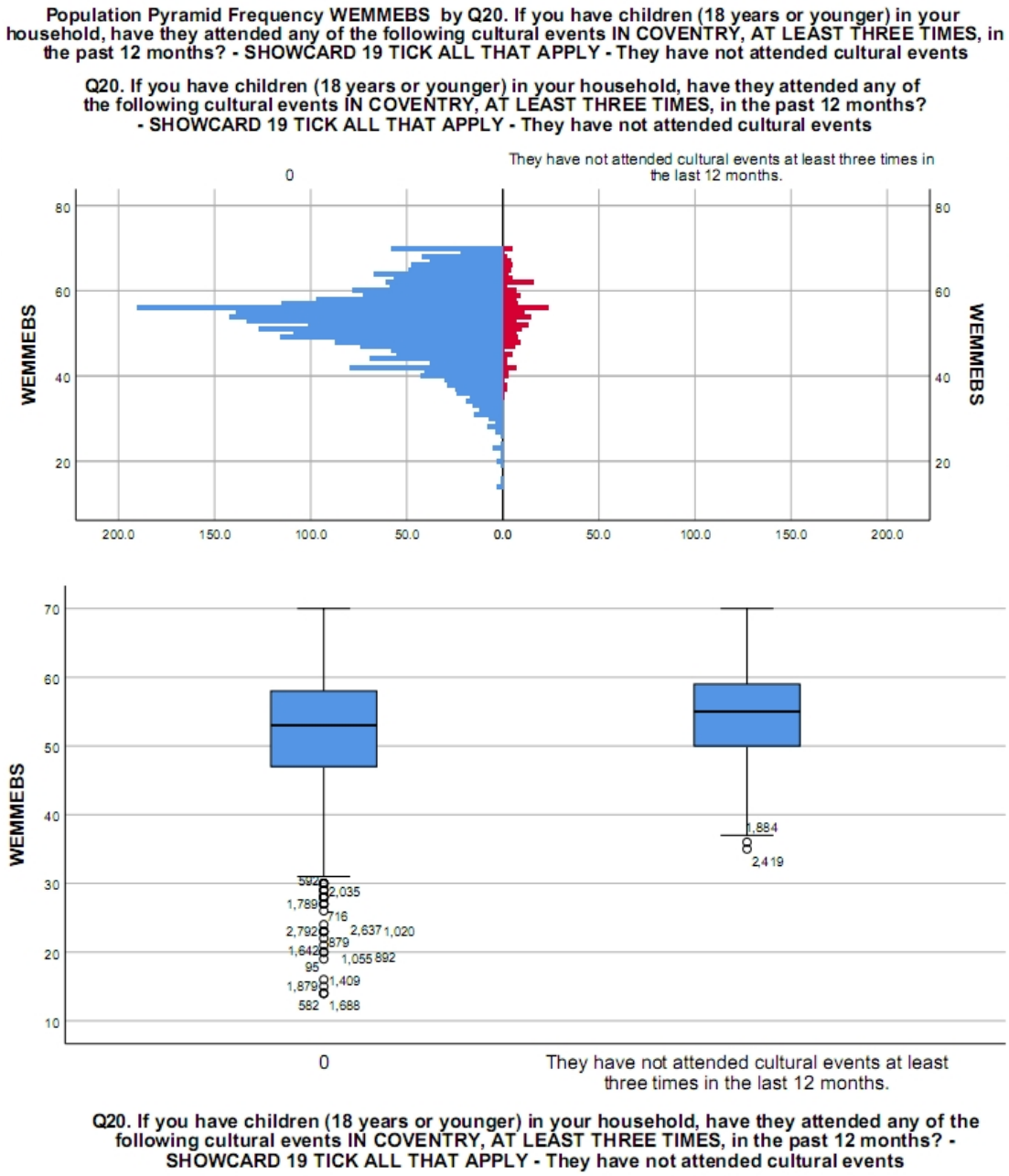
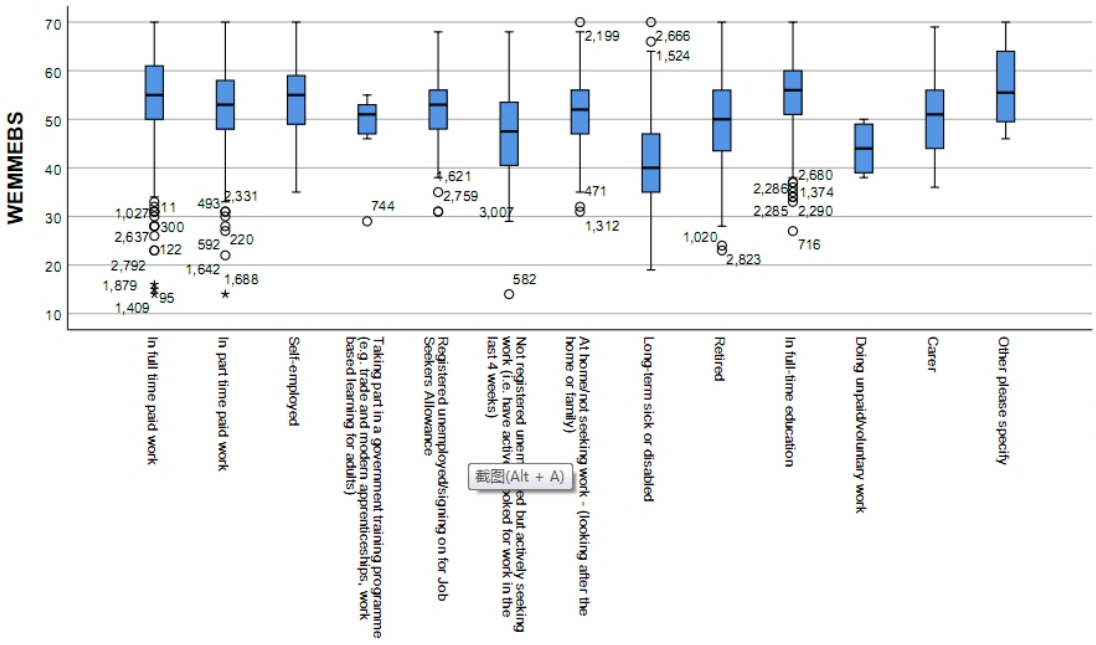
Appendix A: Gender distribution (Mann Whitney U Test)



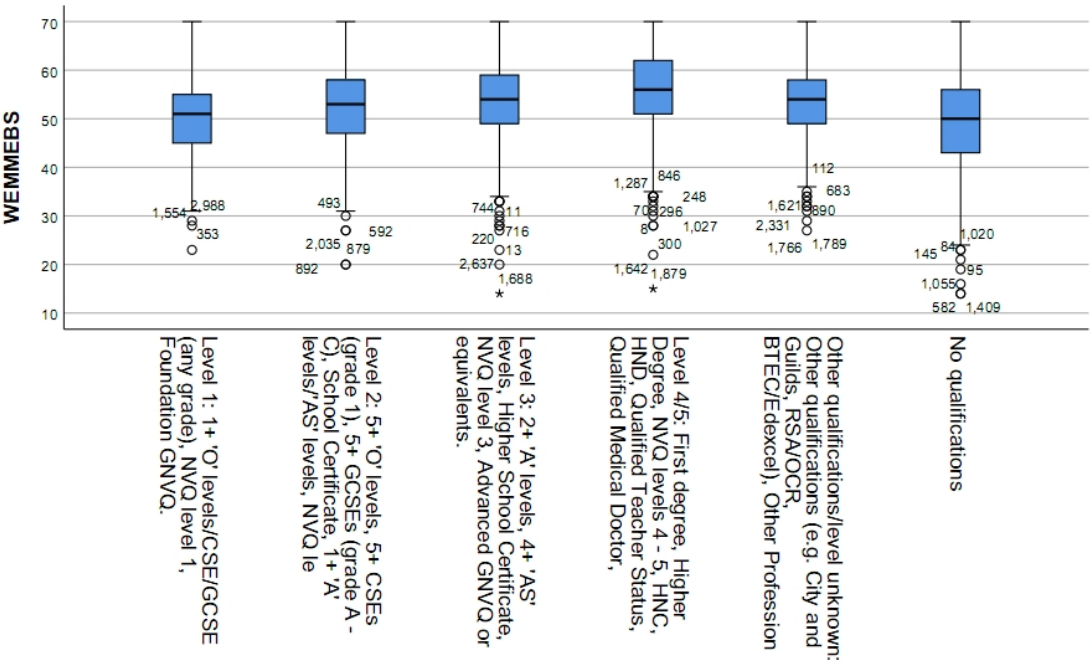
Appendix B: Children participation distribution (Mann Whitney U Test)



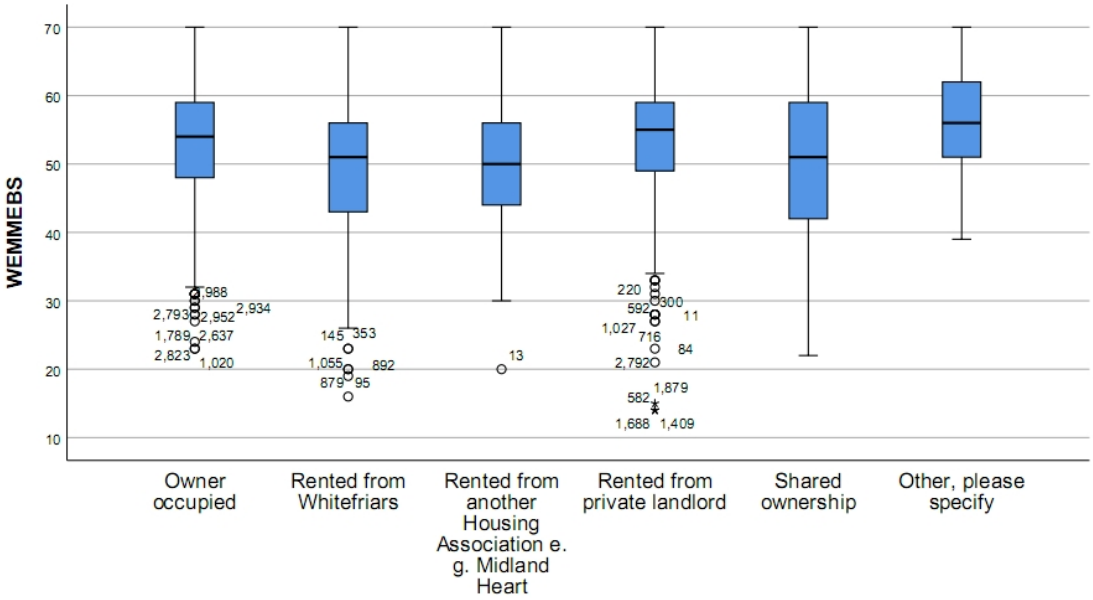
Appendix C: Economic Status distribution (Kruskal Wallis Test)



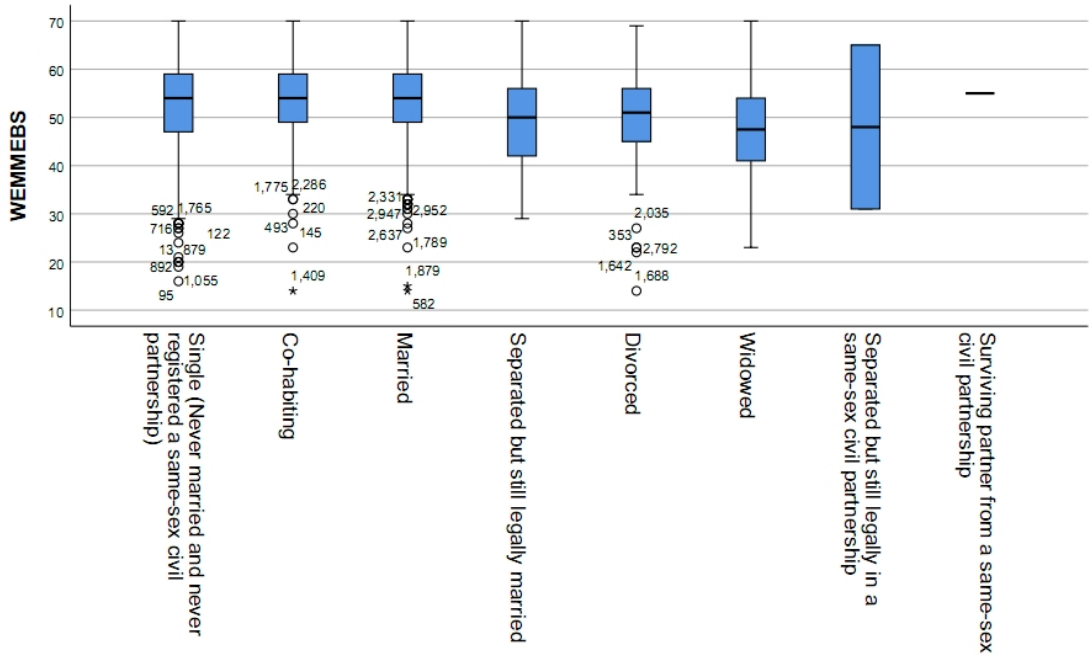
Appendix D: Educational level distribution (Kruskal Wallis Test)



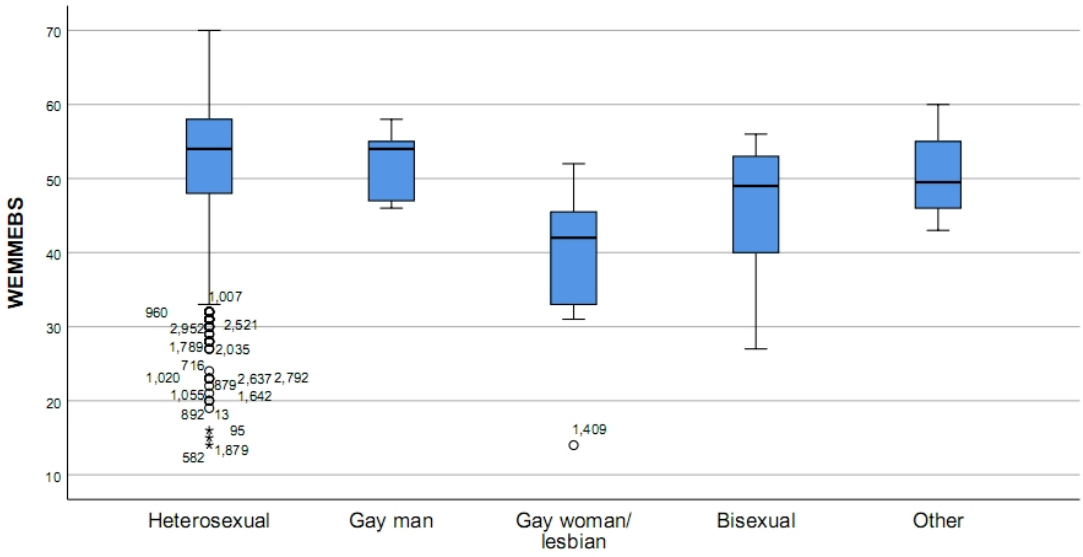
Appendix E: Property distribution (Kruskal Wallis Test)



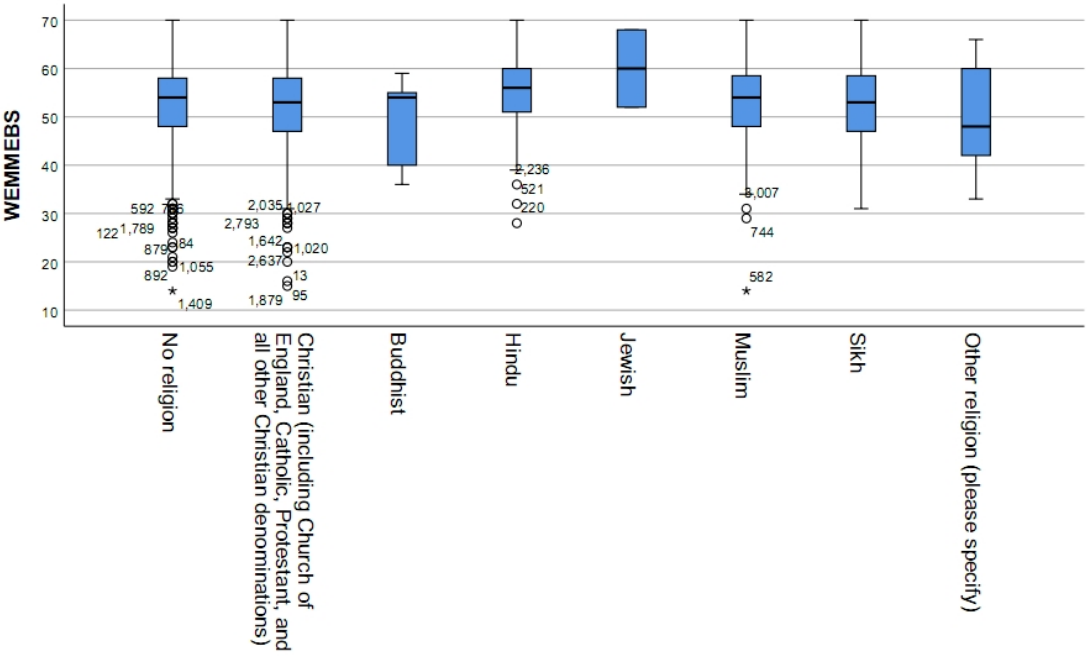
Appendix F: Marital status distribution (Kruskal Wallis Test)



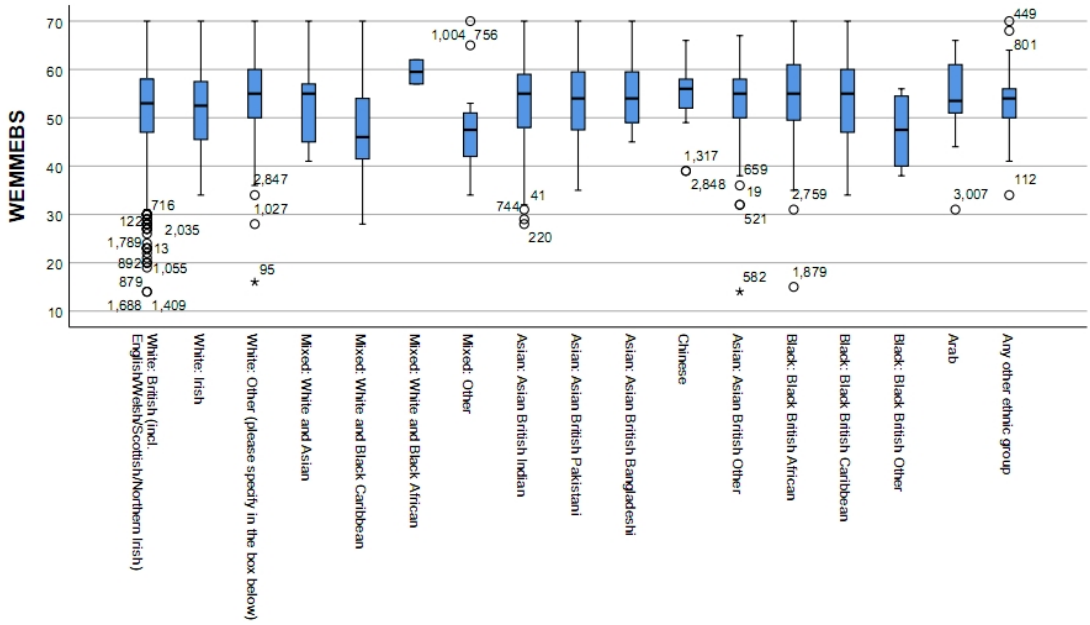
Appendix G: Sexual orientation distribution (Kruskal Wallis Test)



Appendix H: Religion distribution (Kruskal Wallis Test)



Appendix I: Ethnicity distribution (Kruskal Wallis Test)



Appendix J: Descriptive statistics

Descriptive

	N	Minimum	Maximum	Mean	Std. Deviation
Q1. So firstly, how long have you lived in this neighbourhood? - SHOWCARD 1	3007	1	6	3.91	1.730
Q2. And generally, how satisfied are you with your local area as a place to live? SHOWCARD 2	3001	1	5	2.04	.879
Q3. Do you think that over the past two years your area has …? SHOWCARD 3	2972	1	4	2.73	.843
Q4. Do you agree or disagree that you can influence decisions affecting your local area? SHOWCARD 4	2694	1	4	2.76	.775
Q5. To what extent do you agree or disagree that there are opportunities for you to be actively involved in improving your local area? SHOWCARD 4	2453	1	4	2.54	.759
Q7. In the future, there will be more opportunities for residents to take a more active role in their communities. Over the next 12 months, how likely, if at all, might you be to get involved with others in your local area to make improvements? - SHOWCARD	2727	1	4	2.64	.801
Q8. How often do you chat to your neighbours, more than to just say hello? - SHOWCARD 7	3005	1	5	2.07	1.156
Q10. How strongly do you agree or disagree with the following statement...? - SHOWCARD 9 Generally, I borrow things and exchange favours with my neighbours.	3007	1	4	2.67	.988

Q12. What proportion of your friends are of the same ethnic group as you? - SHOWCARD 11	3007	1	5	2.25	.873
Q13. What proportion of your friends are of the same religious group as you? - SHOWCARD 12	3007	1	5	2.82	1.370
Q14a. Your immediate neighbourhood	2959	1	4	1.99	.822
Q14b. Coventry	2966	1	4	1.84	.780
Q15. To what extent do you agree or disagree that this neighbourhood is a place where people from different backgrounds (i.e. different ethnic groups, faith groups, social backgrounds or countries of origin) get on well together? - SHOWCARD 14	2859	1	5	1.91	.776
Q16. How well informed do you feel about what the Council is doing? - SHOWCARD 15	3007	1	5	3.02	1.081
Q19. Have you attended any of the following cultural events IN COVENTRY, AT LEAST THREE TIMES, in the past 12 months? TICK ALL THAT APPLY - SHOWCARD 18 - I have not attended cultural events at least three times in the last 12 months.	3007	0	1	.22	.417
Q20. If you have children (18 years or younger) in your household, have they attended any of the following cultural events IN COVENTRY, AT LEAST THREE TIMES, in the past 12 months? - SHOWCARD 19 TICK ALL THAT APPLY - They have not attended cultural events	3007	0	1	.07	.263

Q21. How would you rate Coventry as a city centre on a scale of 1 (terrible) to 5 (fantastic)? - SHOWCARD 20	2999	1	5	2.97	.959
During the day	3004	1	4	1.55	.643
At night	2994	1	4	2.08	.862
Q26. Does the bid to become City of Culture in 2021 make you m...	3007	1	5	2.45	1.421
Q27. Would you say in general your health is…? - SHOWCARD 26	3001	1	5	2.05	.834
Q28. Do you, or have you ever, smoked? - SHOWCARD 27	2986	1	3	2.48	.776
Q29. Do you use, or have you ever used, e-cigarettes?	2985	1	3	2.84	.484
Q30. Looking at the information below, how many portions of fr...	2980	1	5	2.22	.993
Q31a. I eat breakfast every day	3002	1	4	1.76	.877
Price is the most important factor to me when I decide what food to buy	2986	1	4	2.16	.840
It is important to me to eat healthy foods	2993	1	4	1.65	.648
I have enough time to make dinner from scratch every night	2975	1	4	2.03	.872
I always plan my meals before I go food shopping	2977	1	4	2.23	.820
It is important for families to eat together every night	2976	1	4	1.69	.681
I have everything I need in my kitchen to cook meals from scratch	2983	1	4	1.69	.664
I frequently eat snacks between meals	2996	1	4	2.30	.814
Q32. How often, if at all, do you drink soft or fizzy drinks? ...	3007	1	6	3.41	1.400
Q33. How frequently, if at all, do you eat takeaways? - SHOWCA...	3007	1	6	3.97	.948

Q34. Which of the following statements best describes the food...	3007	1	4	1.23	.474
Q35. How many days in a typical week do you usually drink alco...	2986	1	6	4.80	1.302
Q36. Looking at the information on this card, how many days in an average week do you drink more than 2 units of alcohol? - (WHERE IS THE CARD???)	1673	1	8	2.03	1.449
Q37a. Cultural activities and social activities/ visit museum; visiting a friend etc.	3007	1	4	2.53	1.184
Everyday activity For example: Active travel (walking or cycling as a form of transport), heavy housework, gardening / DIY, occupational activity	3007	1	4	2.71	1.095
Active recreation For example: Recreational walking / cycling, active play (with children), dance	3007	1	4	2.20	1.186
Sport For example: Swimming, exercise and fitness training, structured competitive activity, individual pursuits or informal sport	3007	1	4	1.85	1.176
Q40. Are your day-to-day activities limited because of a healt...	3007	1	3	2.73	.606
Q41. Which of the following best describes your current economic status?	3007	1	13	4.72	3.774
Q42. Which of these is your highest qualification? This refers to the individual respondent,	2889	1	6	3.81	1.575
Q43. How often would you say you have been worried about money...	2940	1	4	3.24	.836
Gender - SHOWCARD 43	3006	1	2	1.50	.500

How old are you? - SHOWCARD 44	3001	1	7	3.29	1.842
Is your property…? - SHOWCARD 45	2974	1	6	2.15	1.367
What is your marital status? - Just read out a number fro...	2977	1	10	2.46	1.399
Pre-school age (0-4 years)	2714	0	9	.20	.515
Primary school age (5-11 years)	2714	0	9	.31	.704
Secondary school age (12-16 years)	2714	0	4	.16	.466
Post school education (16/17 years)	2714	0	5	.06	.276
Adult (18-59-female or 18-64-male)	2714	0	8	1.84	1.262
Retired (60+-female or 65+-male)	2714	0	9	.29	.657
Working (60+-female or 65+-male)	2404	0	9	.03	.308
Q49. Please can you tell me which of the following best describes you? SHOWCARD 48 Please just read out the number on the showcard which best describes you. If you prefer not to say, I can record that i...	2956	1	5	1.02	.264
Which of the following best describes your religion? - SHOWCARD 49	2927	1	8	2.31	1.704
How would you describe your ethnicity? - SHOWCARD 50	2981	1	18	3.94	4.701
WEMMEBS	2912	14	70	52.68	9.084

Appendix K: Relationships

Table 3: Relationships between cultural participation and other factors

Variable	Pearson Chi-Square value	Significance	strength of association
Children cultural participation	77.303	0.000	0.160
Economic status	126.787	0.000	0.205
Educational level	126.333	0.000	0.209
Gender	16.664	0.000	0.074
Property	11.671	0.040	0.063
Marital status	54.242	0.000	0.135
Sexual orientatio	0.959	0.916	0.018
Religion	41.852	0.000	0.120
Ethnicity	49.938	0.000	0.129

Variable	Exp(B)	Wald	Significance
Mental	0.956	84.849	0.000
More pre-school age family members	0.949	0.333	0.564
More primary school age family members	0.932	1.079	0.299
More secondary school age family members	1.020	0.042	0.839
More post school educational family members	1.190	1.260	0.262
More adults	0.766	46.426	0.000
More retired family members	1.597	53.227	0.000
More working(60+-female or 65+-male)	1.067	0.204	0.651

Variable	Pearson Chi-Square value	Significance	Linear relation
Living year	29.197	0.000	Yes
Living satisfaction	5.551	0.235	
area over past two years	9.110	0.011	Yes
Influence on local decisions	18.089	0.000	Yes
There are opportunities to be atively involved in local area improvement	16.437	0.001	Yes
There will be more opportunities to take active role in community	43.619	0.000	Yes
How often household talk to their neighbors	8.640	0.071	
Borrow things and exchange favors with neighbor	13.227	0.004	Yes
Diverse ethnic friendship group	87.144	0.000	Yes
Diverse religious friendship group	61.515	0.000	Yes
Sence of belonging to neighborhood	13.629	0.003	Yes
Sense of belonging to Coventry	3.780	0.286	
Diverse neighborhood background	3.394	0.335	
How well informed about what the Coventry is doing	9.883	0.042	No
Rate Coventry as city centre	2.048	0.727	
Safety during the day	0.668	0.881	
Safety at night	2.806	0.423	
Influence of City of Culture 2021	56.868	0.000	Yes
Health	74.757	0.000	Yes

Variable	Pearson Chi-Square value	Significance	Linear relation
Smoke	1.629	0.443	
E-cigarettes	4.777	0.092	
Fruit or vegetable eating	28.189	0.000	Yes
Eat breakfast every day	4.692	0.196	
Price is the most important factor when households decide what food to buy	4.371	0.224	
Eat healthy foods	0.753	0.861	
Have enough time to make dinner from scratch	10.401	0.015	Yes
I always plan my meals before I go food shopping	2.190	0.534	
It is important for families to eat together every night	3.062	0.382	
I have everything I need in my kitchen to cook meals from scratch	2.389	0.496	
I frequently eat snacks between meals	2.124	0.547	
Frequency of drinking soft or fizzy drinks	42.528	0.000	Yes
Frequency of eating takeaways	80.117	0.000	Yes
Whether have enough to eat	6.943	0.074	
Worry about monty	1.414	0.702	
Frequency of drinking alcohol	132.647	0.000	Yes
Alcohol drinking quantity	51.201	0.000	No
Activity limit due to health problem and diability	47.550	0.000	Yes
Age	115.952	0.000	Yes

Table 4: Relationships between mental wellbeing and other factors

Variable	Spearman's rho correlation coefficient	Sig. (2-tailed)	Variable	Spearman's rho correlation coefficient	Sig. (2-tailed)
Living year	-0.145	0.000	Smoke	0.111	0.000
Living satisfaction	-0.166	0.000	E-cigarettes	0.067	0.000
Feel about area over past two years	-0.164	0.000	Fruit or vegetable eating	-0.206	0.000
Influence on local decisions	-0.061	0.002	Eat breakfast every day	-0.143	0.000
There are opportunities to be atively involved in local area improvement	-0.067	0.001	Price is the most important factor when households decide what food to buy	0.110	0.000
There will be more opportunities to take active role in community	-0.084	0.000	Eat healthy foods	-0.101	0.000
How often household talk to their neighbors	-0.043	0.020	Have enough time to make dinner from scratch	-0.080	0.000
Borrow things and exchange favors with neighbor	-0.045	0.015	I always plan my meals before I go food shopping	-0.054	0.004
Diverse ethnic friendship group	0.046	0.014	It is important for families to eat together every night	-0.078	0.000
Diverse religious friendship group	0.005	0.826	I have everything I need in my kitchen to cook meals from scratch	-0.173	0.000
Sence of belonging to neighborhood	-0.044	0.019	I frequently eat snacks between meals	-0.058	0.002
Sense of belonging to Coventry	-0.021	0.269	Frequency of drinking soft or fizzy drinks	-0.023	0.224
Diverse neighborhood background	-0.163	0.000	Frequency of eating takeaways	-0.061	0.001
How well informed about what the Coventry is doing	-0.023	0.206	Whether have enough to eat	-0.242	0.000
Rate Coventry as city centre	0.132	0.000	Worry about monty	0.240	0.000
Safety during the day	-0.160	0.000	Frequency of drinking alcohol	-0.028	0.127
Safety at night	-0.210	0.000	Alcohol drinking quantity	-0.056	0.025
Influence of City of Culture 2021	-0.153	0.000	Activity limit due to health problem and diability	0.306	0.000
Health	-0.341	0.000	Age	-0.211	0.000