Scotland's mental health: Children and young people 2013

Technical supplement

Contents

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Abbreviations

APS	Annual Population Survey
C&YP	Children and young people
CR	Crude rate
SR	Standardised rate
FRS	Family Resources Survey
HBSC	Health Behaviour in School-aged Children Survey
GHQ-12	12-item General Health Questionnaire
IRR	Incident rate ratio
ISD	Information Services Division
NRS	National Records of Scotland (previously General Register Office for Scotland)
OR	Odds ratio
SALSUS	Scottish Schools Adolescent Lifestyle and Substance Use Survey
SCQF	Scottish Credit and Qualifications Framework
SDQ	Strengths and Difficulties Questionnaire
SHCS	Scottish House Condition Survey
SHeS	Scottish Health Survey
SHoS	Scottish Household Survey
SIMD	Scottish Index of Multiple Deprivation
SMR	Scottish Morbidity Record
SPS	Scottish Prison Survey
SPSS	Statistical Package for the Social Sciences
SSA	Scottish Survey of Achievement
SSAS	Scottish Social Attitudes Survey
SSLN	Scottish Survey of Literacy and Numeracy
WEMWBS	Warwick-Edinburgh Mental Well-being Scale

1.   Introduction

This report provides details of the analytical approach used in the first national children and young people's (C&YP) mental health report, *Scotland's mental health: Children and young people* 2013,[1] and gives technical details important in the interpretation of individual measures.

2.   Data sources

The C&YP indicator set draws upon data from eighteen different sources including both surveys and administrative data (number of indicators in brackets after the abbreviation):

1. Annual Population Survey (APS, 2)
2. Department for Work and Pensions – Family Resources Survey (FRS, 1)
3. Health Behaviour in School-aged Children Survey (HBSC, 35)
4. ISD Scotland, Scottish Morbidity Record 01/04 (SMR01/04, 1)
5. ISD Scotland, Scottish Morbidity Record 02 (SMR02, 1)
6. ISD Scotland, Teenage pregnancy analysis team (1)
7. National Records of Scotland (NRS, 2)
8. School Leavers Destination Survey, Follow-up survey (1)
9. Scottish Government - child care statistics (1)
10. Scottish Government - education statistics (4)
11. Scottish Government - housing and regeneration statistics (2)
12. Scottish Government - income and poverty statistics (3)
13. Scottish Health Survey (SHeS, 24)
14. Scottish House Condition Survey (SHCS, 2)
15. Scottish Household Survey (SHoS, 7)
16. Scottish Prison Survey (SPS, 2)
17. Scottish Schools Adolescent Lifestyle and Substance Use Survey (SALSUS, 13)
18. Scottish Survey of Achievement/Scottish Survey of Literacy and Numeracy (SSA/SSLN, 2).

3.   Target population

The term 'children and young people' is taken throughout the report to denote all those aged 17 years and under. However, in some cases data availability or indicator definitions have made it necessary to analyse the indicators for a narrower age range or to extend the age range to 19 years. See the full data report for further details:
www.scotpho.org.uk/publications/reports-and-papers/1159-scotlands-mental-health-children-and-young-people-2013[1]

4.   Data description and analysis

Some data were requested from data managers, while others were accessed from published reports or obtained from the data archives by the authors of the report. Where analysis was undertaken by the authors, the Statistical Package for the Social Sciences (SPSS) version 19 was used.

4.1 Measures in the children and young people's mental health indicator set

Each reported indicator has a minimum of one measure associated with it. Multiple measures were reported for some indicators in cases where a single measure did not adequately cover the scope of the indicator. There were 152 possible measures and data were available for 104 of them.

Table 1. Summary of all 104 reportable measures by type of measure

Number of measures	Measure
9	Crude rate per 1,000 population in the past year
2	Age–sex standardised rates, per 100,000 per year
6	Mean
86	Percentage
1	Gini coefficient

The measures included in the C&YP mental health indicator set can be defined as shown below. The definitions are adapted from the former Association of Public Observatories (APHO) Technical Briefing Paper 3.[2]

Proportions are statistics where the denominator is the count of a 'closed' population, and the numerator is the count of members of this population that have a specified characteristic. For example, if the characteristic of interest is defined as 'O' and the total number of individuals in the sample is defined as 'n', then the estimated proportion 'p' is defined as p = O/n. In the C&YP mental health indicator set, proportions have been multiplied by 100 to obtain percentages.

Mean scores were calculated for mental wellbeing as measured by the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) on a scale from 14 (the lowest level of mental wellbeing) to 70 (the highest).

Life satisfaction was measured by the ten-point Cantril ladder for P7, S2 and S4 pupils (rating of whether an individual perceives they have the best or worst possible life for them

at present) where zero is the 'worst possible life' and ten is the 'best possible life'. Life satisfaction in 16- and 17-year-olds was measured as the mean score of 'how satisfied 16- and 17-year-olds are in their life nowadays' on a scale from zero to ten where zero was 'extremely dissatisfied' and ten 'extremely satisfied'.

Gini coefficient is a measure of income inequality. It ranges between zero and one where zero is complete equality and one is where a single individual has all the income.

Crude rates were calculated in the C&YP data report as follows: if 'O' is the number of people experiencing an event (such as hospital admission) in a population of size 'n' during a period 't', then the estimated crude rate is given by r=O/n x t. The crude rates are expressed per 100,000 population per year or per 1,000 population per year.

Directly age–sex standardised rates have been calculated for suicide and drug-related disorders indicators because the overall rate may vary with the age–sex structure of the population. The direct standardisation method was used, with the age–sex specific rates of the local population (i.e. Scotland) applied to the age–sex structure of a standard population (in this case the 1976 European Standard Population). This gives the overall rate that would have occurred in Scotland if it had the same age–sex profile as the standard population. It allows valid comparisons to be made between areas with differing population age–sex structures. In the report, age–sex standardised rates were expressed per 100,000 population per year.

Table 2. 1976 European Standard Population (age 0 to 24 years)

Age band (years)	Population (no. of persons)
0–4	8,000
5–9	7,000
10–14	7,000
15–19	7,000
20–24	7,000

4.2 Confidence intervals

A confidence interval is a range of values that is normally used to describe the uncertainty around a point estimate of a measure, for example, a mortality rate. In the case of indicators based on a sample of the population, uncertainty arises because of the random error introduced due to the chance differences between the sampled individuals and the population overall. The stated value should therefore be considered as only an estimate of the true or 'underlying' value of the entire population. Confidence intervals quantify the uncertainty in this estimate and, generally speaking, describe how different the point estimate could have been if the underlying conditions stayed the same, but chance had led to a different set of data; the wider the confidence interval, the greater the uncertainty in the precision of the estimate.

Confidence intervals are given with a stated probability level. In *Scotland's mental health: Children and young people 2013*, this is 95% and so there is a 95% probability (i.e. a 19 in 20 chance) that the confidence interval includes the 'true' value of the indicator (i.e. the actual value of Scotland). The use of 95% is arbitrary, but is the method used to calculate confidence intervals for the different C&YP mental health measures.

Example: Mortality rate
> Point estimate: a rate of 10 deaths per 100,000 population
> 95% confidence interval lower bound: 8
> 95% confidence interval upper bound: 14

In the above example, the confidence interval is telling us that although the mortality rate in this sample is 10, there is a 95% chance that the 'true' value for the population actually lies between 8 and 14 deaths per 100,000 people.

4.3 Analysis of the mental health outcomes

4.3.1 Point prevalence estimates and equalities analysis
Data were available for 13 of the 15 C&YP mental health indicators. For all indicators, C&YP point prevalence estimates were presented for the whole population in the most recent year(s) available.

Equalities analysis was undertaken for mental health outcome indicators as follows:
- gender – 13 indicators (32 measures)
- age – 11 indicators (18 measures)
- SIMD – 11 indicators (23 measures)
- 6-fold urban-rural classification – seven indicators (12 measures).

Gender and age
A gender breakdown was provided for all mental health outcome measures where possible. It was not possible to use a consistent age breakdown across all indicators as the age range for each measure varied depending on the data available. See *Scotland's mental health: Children and young people 2013*, Appendix 3 for further information on the age range available for each measure: www.scotpho.org.uk/publications/reports-and-papers/1159-scotlands-mental-health-children-and-young-people-2013[1]

Scottish Index of Multiple Deprivation
Area deprivation was measured using the Scottish Index of Multiple Deprivation (SIMD). This index is composed of seven domains: current income, employment, health, education, skills and training, geographic access to services, housing, and crime. These are combined to produce an overall deprivation score. See the Scottish Government website for further information: www.scotland.gov.uk/Topics/Statistics/SIMD/simd2009technical

For the purposes of the report, geographical areas were categorised into quintiles based on deprivation score – with one being the 'most deprived quintile' and five being the 'least deprived quintile'.

Scottish Government 6-fold Urban/Rural Classification
The Scottish Government 6-fold urban/rural criteria measures two features: size of the population in each settlement and how accessible areas are to larger settlements. For this reason, the urban/rural variable has been treated as a categorical variable in the equalities analysis undertaken in the report.

Table 3. Details on each of the six classifications[4]

	Scottish Government 6-fold Urban/Rural Classification
1 Large Urban Areas	Settlements of over 125,000 people.
2 Other Urban Areas	Settlements of 10,000 to 125,000 people.
3 Accessible Small Towns	Settlements of between 3,000 and 10,000 people and within 30 minutes' drive of a settlement of 10,000 or more.
4 Remote Small Towns	Settlements of between 3,000 and 10,000 people and with a drive time of over 30 minutes to a settlement of 10,000 or more.
5 Accessible Rural	Areas with a population of less than 3,000 people, and within a 30-minute drive time of a settlement of 10,000 or more.
6 Remote Rural	Areas with a population of less than 3,000 people, and with a drive time of over 30 minutes to a settlement of 10,000 or more.

Source: www.scotland.gov.uk/Topics/Statistics/About/Methodology/UrbanRuralClassification

4.3.2 Statistical analysis by equality groupings (categorical dependent variables)

All categorical measures (percentages) used in the report were treated as binomial responses (i.e. the proportion of the population with the condition of interest compared with the proportion without).

Statistical significance by gender, age, SIMD or urban/rural classification was determined using binomial logistic regression, where each of these factors was simultaneously adjusted for in the model (with significance assigned arbitrarily to values with a p-value of less than 0.05). This gives an estimate of the independent effect of each predictor variable on the outcome when all of the other independent variables were included in the model.

The results of the binary logistic regression analysis were presented as odds ratios together with the accompanying p-value to assess the probability of the association being statistically significant. Odds ratios are expressed relative to a reference category which is given the value of 'one'. If the confidence interval for the odds ratio contained one then there was deemed to be no association between the predictor variable and the outcome variable. An odds ratio which was greater than one indicated that exposure to the factor being measured may increase the risk of a particular outcome in that group compared to the unexposed group. Conversely, an odds ratio of less than one indicated that exposure may decrease the risk of a particular outcome in that group compared to the unexposed group.

Example: Happiness in P7 pupils
        Odds ratio is 1.025 with a 95% CI of 1.020, 1.030.

In the above example, the confidence interval for the odds ratio does not contain one and so indicates a statistically significant difference between those P7 pupils who reported being happy and those who didn't.

The measure is 'the percentage of P7 pupils who feel 'very happy with their life at present'. As the odds ratio is 1.025, P7 pupils are 1.025 times as likely to report being happy than to report not being happy.

4.3.3 Statistical analysis by equality groupings (continuous dependent variables)

In the case of continuous measures such as the mean score for WEMWBS or life satisfaction, differences by population subgroup were reported as the regression coefficient (B) where there was a linear trend. This was presented along with the 95% confidence interval to show the precision of the estimate. Where there was no linear trend in a continuous variable, the pattern of change was described narratively.

Where the measure was a rate, in the case of suicide and drug-related disorders, Poisson regression was used to determine any statistically significant difference by equality grouping or trend over time. Differences in rates by equality characteristics for drug-related disorders and suicide were described as the incident rate ratio (IRR).

Example: Gender differences in WEMWBS S4 pupils
        B coefficient is 2.31 with a 95% confidence interval of 2.04 to 2.58.
        $P<0.01$

In the above example, we can see the relative difference in mental wellbeing (WEMWBS) between boys and girls. Boys scored better than girls where the slope coefficient was greater than zero and where the p-value was <0.05. Therefore, in this example, S4 boys scored on average 2.31 points on the WEMWBS scale higher than girls did.

4.3.4 Time-trend analysis (categorical and continuous dependent variables)

Time-trend analysis was undertaken for the C&YP's population as a whole. When analysing data, the more comparisons that are made, the greater the chance of obtaining a statistically significant result when in fact there are no real differences in the population (type 1 errors). In order to minimise the number of comparisons and the risk of these errors, time-trend analysis was not undertaken separately by gender, age, SIMD or urban/rural classification.

Time-trend data were available for 11 out of 15 indicators (26 measures), reflecting the limited availability of comparable data over time. This is attributable in part to changes to survey questions or methods of recording data precluding valid comparison across time.

The same methods as described above for the equalities analysis of both categorical and continuous variables were followed for the time-trend analysis with the addition of a time period variable (year) to determine any significant trends over time.

A minimum of three data points were deemed necessary for time-trend analysis to be undertaken due to the difficulties in determining a representative and robust pattern over time with fewer data points. The length of time series available varies by measure and details of these are discussed for each measure respectively in the full data report.

4.3.5 Data presentation for mental health outcomes

The mental health outcome data are described in a series of tables for most recent point estimates, trends over time, gender, age, SIMD and 6-fold urban/rural classification. All tables (with the exception of table one) report the associated p-values.

In addition to the tables, the odds ratios and regression slope coefficients are presented in a series of tables and charts. Examples from the report are given below.

Odds ratios

Forest plots have been reported to illustrate the odds ratios (effect size) for each categorical measure over time, by gender and by SIMD. In the example below, the green circle represents a statistically significant improvement over the time period for both happiness and pro-social behaviour at all age groups looked at. The line crossing through the centre of the circle illustrates the width of the confidence interval, and therefore the precision of the estimate. A shorter line indicates a more precise estimate, and a longer line a less precise estimate.

Example:

Table 3.2a. Trends over time in mental health outcomes, annual change[xiii]

Construct	Indicator	Units for Relative change measure	Relative change (OR)	95% CI Lower	95% CI Upper	Annual % change in OR	Time period	P-value
Mental wellbeing	Happiness (P7 pupils)	OR	1.025	1.020	1.030	2	1998-2010	<0.01
	Happiness (S2 pupils)	OR	1.030	1.020	1.040	3	1998-2010	<0.01
	Happiness (S4 pupils)	OR	1.018	1.010	1.027	2	1998-2010	<0.01
	Pro-social (4 to 12 years)	OR	1.030	1.000	1.060	3	2003-2011	<0.05
	Pro-social (S2 pupils)	OR	1.043	1.026	1.060	4	2006-2010	<0.01
	Pro-social (S4 pupils)	OR	1.022	1.007	1.037	3	2006-2010	<0.01
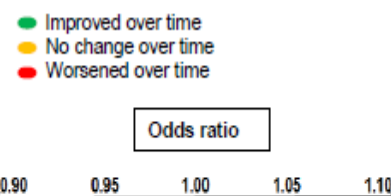
Regression slope coefficient

Where appropriate to do so, the regression slope coefficient (B) was used to illustrate linear trends in continuous outcome measures.

Example:

Table 3.5a. Inequalities in mental health outcomes by SIMD, continuous variables

Continuous outcome variables	slope coefficient (B)	95%CI	P-value
Mental wellbeing (S2 pupils)	1.08	0.63 to 1.54	<0.01
Mental wellbeing (S4 pupils)	0.46	0.36 to 0.57	<0.01
Mental wellbeing (16 to 17 years)	0.32	0.22 to 0.42	<0.01
Life satisfaction (16 to 17 years)	0.12	0.04 to 0.21	<0.01

4.4 Analysis of the contextual factors associated with mental health

Scotland's mental health: Children and young people 2013 gives a descriptive picture of the contextual factors associated with the mental health of children and young people. Point estimates are presented along with 95% confidence intervals where available or appropriate.

As the aim of the report was to provide a descriptive account of the contextual factors, statistical testing was not undertaken.

Where possible, the following breakdowns were reported for the contextual measures:
- Most recent point estimate for the whole C&YP population detailed for each measure.
- Time trend for the whole C&YP population detailed for each measure.
- Breakdowns by sex and age.

Breakdowns by SIMD and 6-fold urban/rural classification were not undertaken.

Data presentation for contextual factors
Each contextual domain has been reported in a separate chapter to reflect the structure of the C&YP mental health indicator set and to assist with navigating the document. For each contextual domain, data for the most recent available year(s) and breakdowns by age and gender have been presented together in the first table and time-trend data presented in the subsequent table in each chapter.

5.   Data caveats and limitations

Full details of the caveats and limitations around the data reported in *Scotland's mental health: children and young people 2013* can be found in Appendix 2 of the full data report which can be accessed at the link below:
www.scotpho.org.uk/publications/reports-and-papers/1159-scotlands-mental-health-children-and-young-people-2013[1]

6.   Data accuracy and completeness

The point prevalence estimates for the whole population and the equalities analyses presented in the report are based upon the most recent data available at the time of analysis. Analyses are based on sources identified in the national mental health indicator set.

The most recently available data were used for all indicator measures where possible. When the sample size or the number of cases in a single year was small, two or more years of data were combined to ensure robust analysis.

No data are currently available for 35 indicators as there is a need to clarify these concepts and/or develop questions that adequately capture their contribution to mental health. Full details of all mental health indicators in the C&YP set can be found in the *Children and Young People's Mental Health Indicators for Scotland: Final Briefing, November 2011* (www.healthscotland.com/documents/5589.aspx).[3]

7.   Data disclosure

The data contained in *Scotland's Mental Health: Children and Young People 2013* conform to our policy on statistical disclosure control. No information is given which could be potentially disclosive (i.e. count information which might enable an individual to be identified, perhaps with the aid of further knowledge of the topic).

Appendix A: Codes for suicide and drug-related disorders

Indicator	Notes	Codes
Drug-related disorders	Based on hospital discharge data for C&YP aged 19 years and under, for mental and behavioural disorders due to psychoactive substance use (general acute and psychiatric hospitals). Patients are counted only once per year regardless of how many times they were discharged within that year.	ICD10 codes recorded in any of 6 diagnosis positions; F11, F12, F13, F14, F15, F16, F18 & F19
Suicide	Deaths from mental and behavioural disorders due to psychoactive substance use were subsumed within the number of recorded suicides from 2011 onwards. The data presented are based on the coding prior to this change and will not be directly comparable with data published after this time. More information is available from the National Records of Scotland website.	Intentional self-harm (ICD9 codes E950-E959; ICD10 codes X60-X84, Y87.0) Event of undetermined intent (ICD9 codes E980-E989; ICD10 codes Y10-Y34, Y87.2)

References

1. Tod E, Parkinson J, McCartney G. *Scotland's mental health: Children and young people 2013*. Edinburgh. NHS Health Scotland; 2013. Available from: www.scotpho.org.uk/reports-and-papers/1159-Scotlands-mental-healthchildren-and-young-people-2013

2. Eayres D. *Technical briefing 3. Commonly used public health statistics and their confidence intervals*. York: APHO, 2008. Available from: www.apho.org.uk/resource/item.aspx?RID=48457

3. Parkinson J. *Children and Young People's Mental Health Indicators for Scotland: Final Briefing November 2011*. Glasgow: NHS Health Scotland; 2012. Available from: www.healthscotland.com/documents/5589.aspx

4. Scottish Government. Scottish Government Urban Rural/Classification. 16 August 2013; Available from: www.scotland.gov.uk/Topics/Statistics/About/Methodology/UrbanRuralClassification