

Common mental disorder and obesity: insight from four repeat measures over 19 years: prospective Whitehall II cohort study.

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ANNEX 1: Dealing with missing data

To explore whether selection bias might have occurred due to missing data, we undertook sensitivity analysis in which we used multiple multivariate imputation based on all covariates, BMI and GHQ (both modelled as continuous variables) for any missing values amongst participants who remained alive during the whole study period (N=9775). This was achieved using 'switching' regression in Stata, as described by Royston (Royston P. Multiple imputation of missing values. *Stata Journal*. 2004;4:227-241). We ran 20 cycles of regression switching which generated 20 imputation datasets. The multiple multivariate imputation approach creates a number of copies of the data (in this case, 20) each of which has values that are missing imputed with an appropriate level of randomness using chained equations. The results from the analysis are obtained by averaging across those from each of these 20 datasets using Rubin's rules. This procedure takes account the uncertainty in the imputation as well as uncertainty due to random variation (as undertaken in all multivariable analyses). In these analyses we modelled the data so that missing values of BMI and GHQ could not be imputed with values that extended beyond the range of values in our complete dataset.

Analyses of Model A in table 2 are repeated in the annex table with the exception that the calculations are now based on all participants except those who had died by phase 7, a total of 9,775 persons. The results are largely similar to those presented in table 2 for participants with no missing data.

Annex table. Multiple multivariate imputation models* of the associations between common mental disorder and subsequent BMI category.

| Number of times GHQ-case at phases 1, 3 and 5 | Mean number of participants | Odds ratio (95% CI) for BMI category at phase 7‡ | |
|--|--------------------------------|--|------------------------|
| | | Overweight vs normal weight | Obese vs normal weight |
| 0 | 5209 | 1.00 (reference) | 1.00 (reference) |
| 1 | 2591 | 1.16 (0.99 to 1.35) | 1.29 (1.01 to 1.65) |
| 2 | 1386 | 1.18 (0.99 to 1.42) | 1.49 (1.11 to 1.99) |
| 3 | 589 | 1.19 (0.93 to 1.53) | 1.96 (1.25 to 3.07) |
| Test for trend | | $P = 0.02$ | $P < 0.0001$ |

*Mean values from 20 independent copies of the dataset based on multiple multivariate imputations for the total baseline population alive at Phase 7, adjusted for age, sex and BMI category at baseline.