



Matson, R. I., Perry, R., Hunt, L. P., Chong, A. H., Beynon, R., Hamilton-Shield, J., & Birch, L. (2020). Change in obesity-related metabolic abnormalities associated with body mass index improvement through life-style intervention: A meta-regression. *Pediatric Diabetes*, 21(2), 173-193. <https://doi.org/10.1111/pedi.12955>

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Figure 1. Flow diagram from the systematic review that identified the included studies

A total of 16383 references retrieved.
8318 duplicates removed, 8065 titles and
abstracts assessed

7815 articles excluded based on the title
and abstract. Reasons for exclusion were
as a result of the papers not being related
to obesity, did not look at children, not a
lifestyle intervention, no markers of
metabolic health reported and no change
in BMI/SD reported.

250 full text articles retrieved

17 papers from hand
searching of full text
articles (3 excluded)

N=14

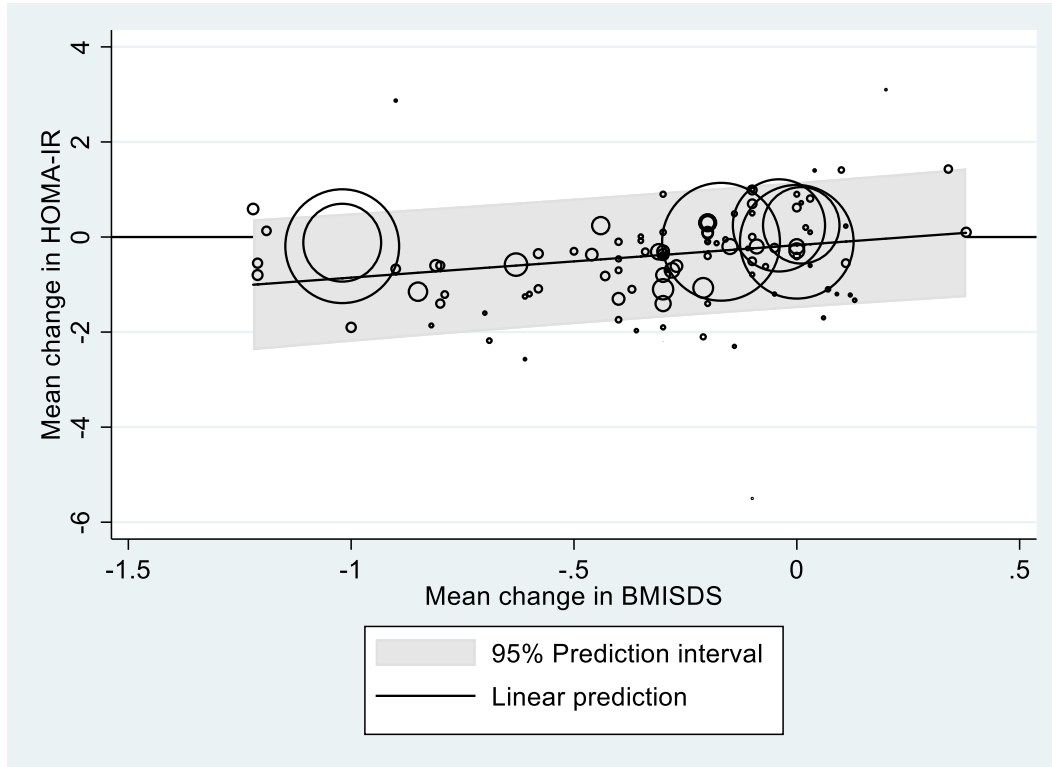
Total excluded: 166 articles

Not in age range = 16
Does not set BMI-SDS scores = 17
BMI (OW +/-or OB) or no diagnosis of obesity
=66
Cross-sectional study = 1
No results presented =1
Not a behaviour/lifestyle intervention =12
Data only measured at one time point = 9
Measure of psychological well-being only = 3
BMI-SDS only measured post-intervention = 1
Outcome: Difference in BMI-SDS based on age
of participants = 1
Only one relevant outcome =1
Systematic review = 1
No outcome of interest =16
Abstract or on-going study = 17
HOMA as predictor of BMI response (HOMA
measured as predictor of weight loss, not as
outcome) = 2
Primary obesity prevention = 2

Total number of articles included =

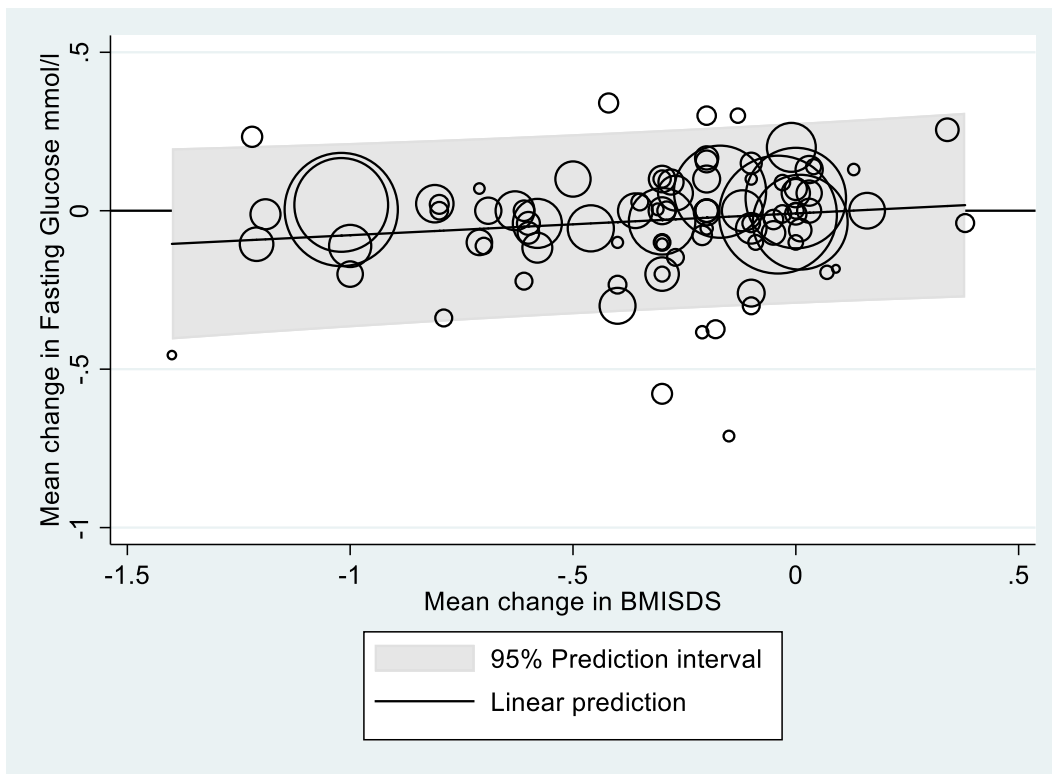
98 (90 studies)

Figure 2: Meta-regression of relationship between mean change in HOMA-IR and the mean change in BMI-SDS (n=105 subsets).



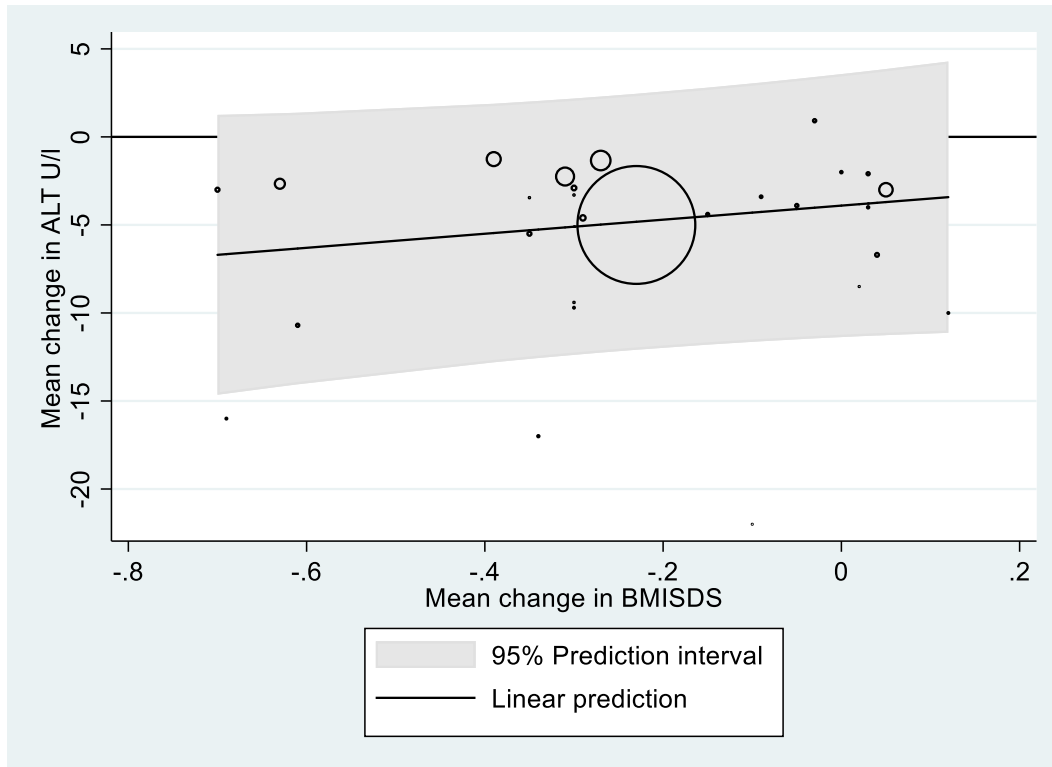
The values of the adjusted R^2 (the proportion of the between-study variance in mean change HOMA-IR explained by mean change in BMI-SDS) and I^2 (the percentage residual variation due to heterogeneity) and were 13% and 93% respectively.

Figure 3: Meta-regression of relationship between mean change in fasting glucose and the mean change in BMI-SDS (n=92 subsets)



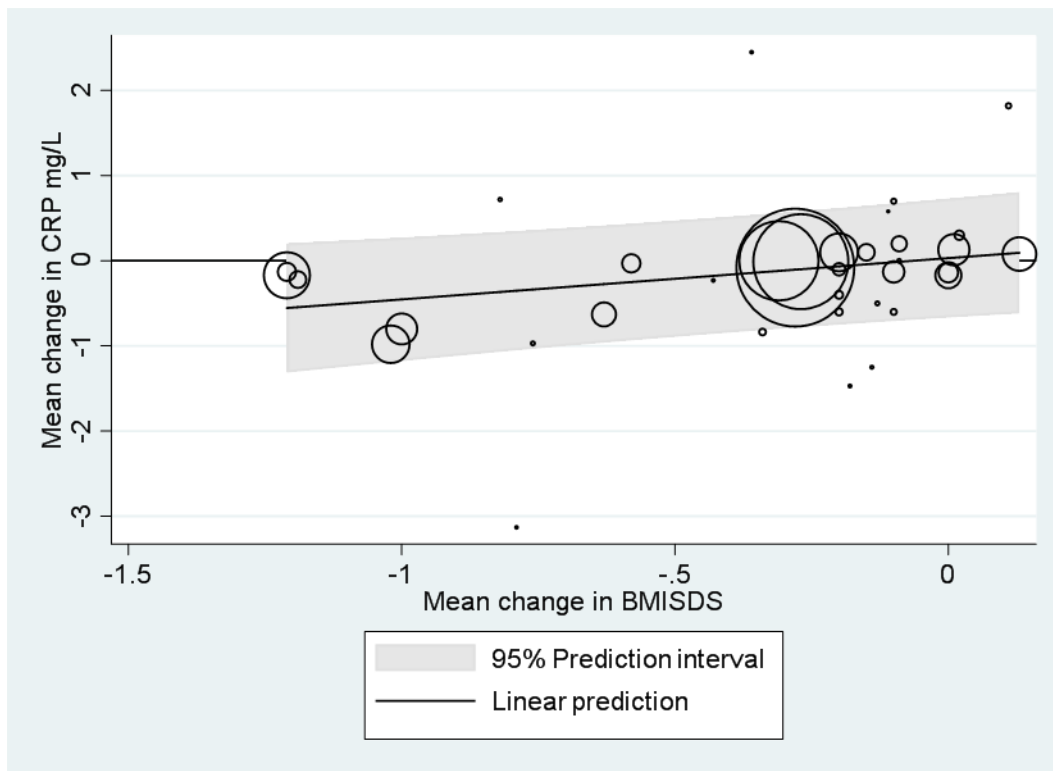
The I^2 and adjusted R^2 were 86% and 1% respectively.

Figure 4: Meta-regression of relationship between mean change in ALT and the mean change in BMI-SDS (n=28 subsets)



The I^2 and adjusted R^2 were 96% and 0.3% respectively.

Figure 5: Meta-regression of relationship between mean change in CRP and the mean change in BMI-SDS (n=36 subsets)



The I^2 and adjusted R^2 were 89% and 37% respectively.

Fig A(i) Half normal plot for the predicted random effects from the meta-regression of the mean change in HOMA-IR and the mean change in BMI SDS (n=105, see main text).

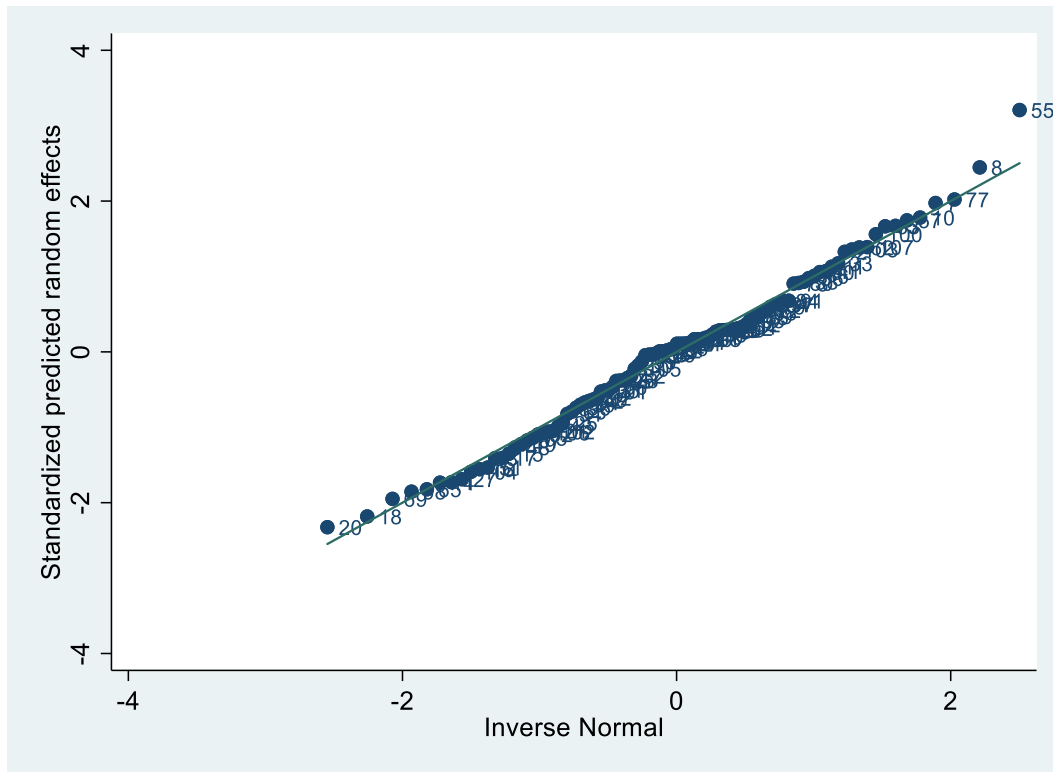


Figure A(ii) Meta-regression of relationship between mean change in HOMA-IR and the mean change in BMI-SDS.

Figure A(ii) shows the meta-regression of Figure 2 in the main paper but highlights (in red) the 4 study subsets where geometric means were used interchangeably with medians. The results seemed consistent with the remainder and their exclusion did not change our overall findings (not shown).

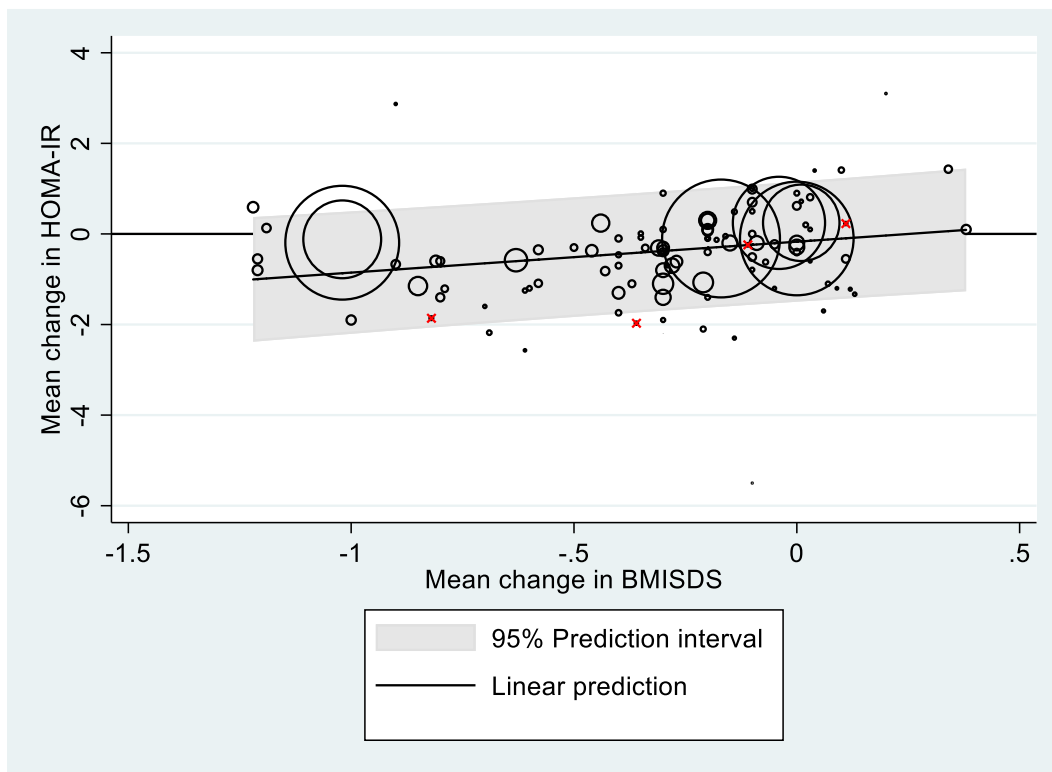


Figure A(iii) *Meta-regression of relationship between mean change in HOMA-IR and the mean change in BMI-SDS using only the 22 data subsets where the mean and SD of the changes are given in the paper.*

The fitted regression line was **Mean fall in HDL = 1.498 x Mean change in BMI-SDS + 0.022**. From these limited data, we could not determine a mean change in BMI-SDS that would ensure a mean reduction of HOMA-IR; there was a weak relationship between these values that failed to reach statistical significance (P=0.058). The Adjusted R-squared was 21% and the I² was 87%.

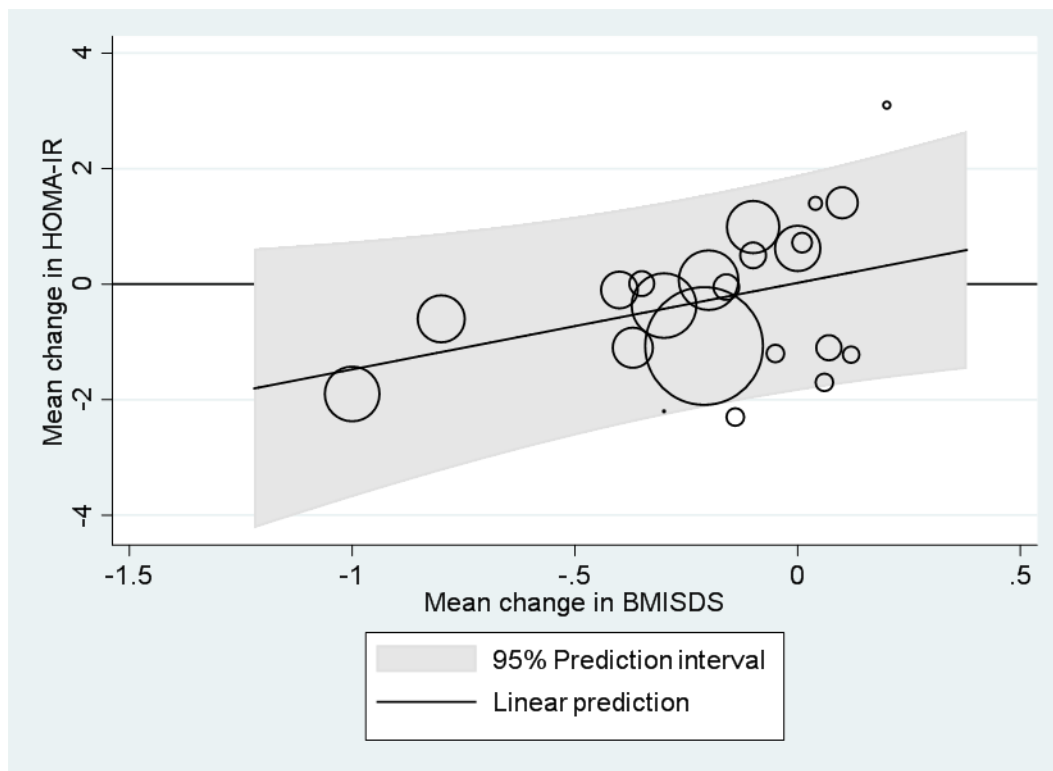


Fig B(i) Half normal plot for the predicted random effects from the meta-regression of the mean change in fasting glucose and the mean change in BMI SDS (n=92, see main text).

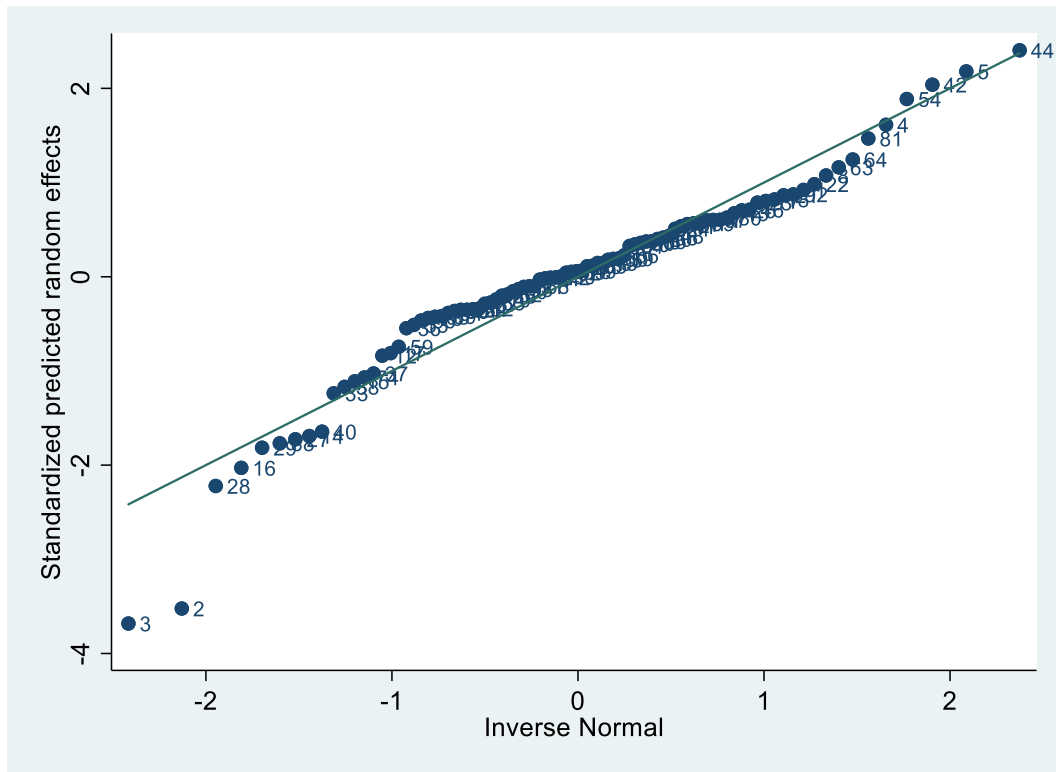


Figure B(ii) *Meta-regression of relationship between mean change in fasting glucose and the mean change in BMI-SDS after excluding two outliers (n=90, see main text).*

The meta-regression line fitted was: **Mean fall in Glucose = 0.075 x Mean change in BMISDS -0.006**. The small positive slope was not statistically significant (P=0.068). From the prediction intervals, it was not possible to determine a mean reduction in BMI Z-score that would ensure a fall in Glucose. The I^2 and adjusted R^2 were 83% and 3% respectively.

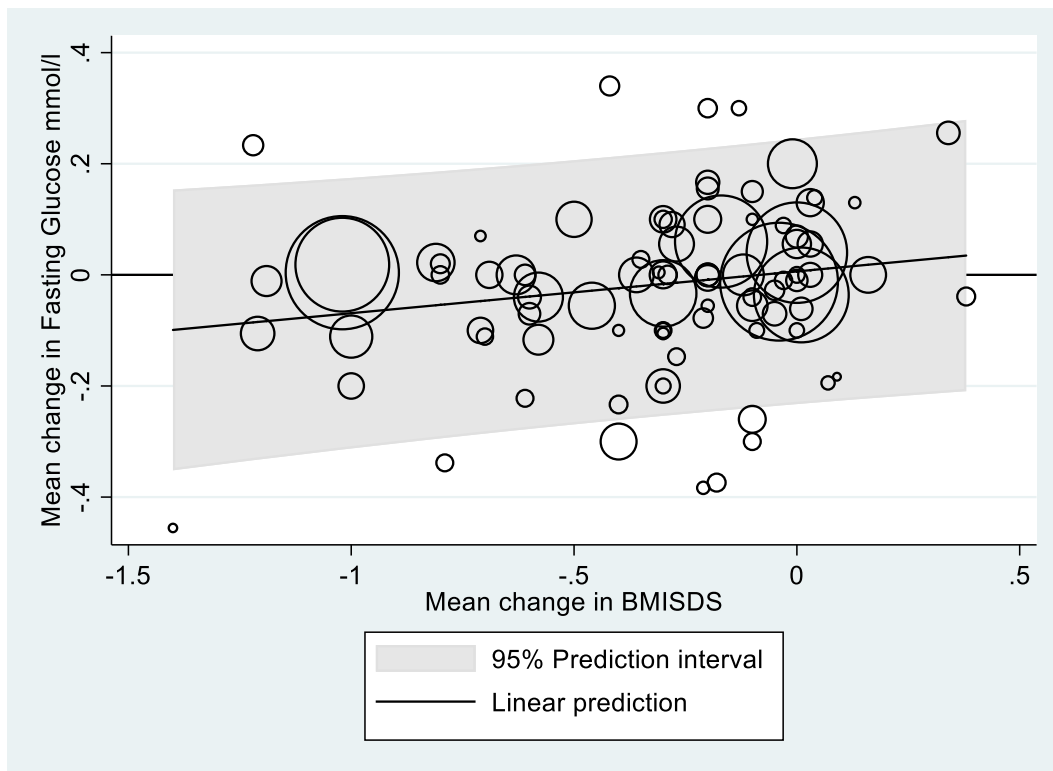


Fig C(i) Half normal plot for the predicted random effects from the meta-regression of the mean change in ALT and the mean change in BMI SDS (n=28, see main text).

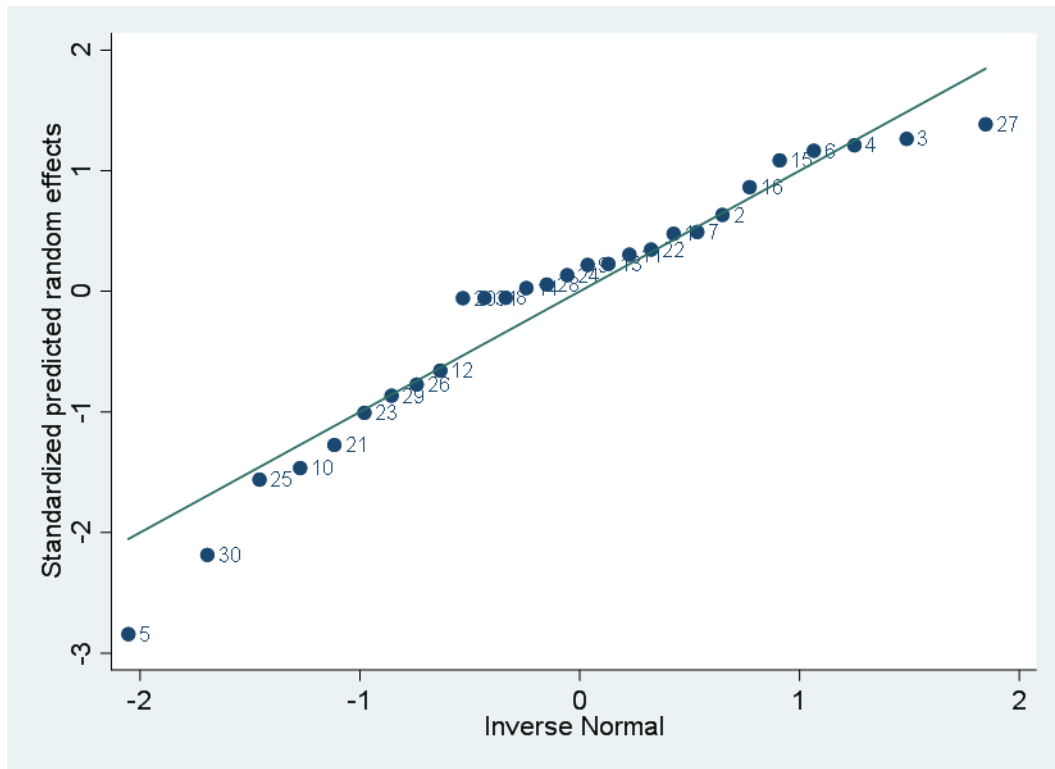
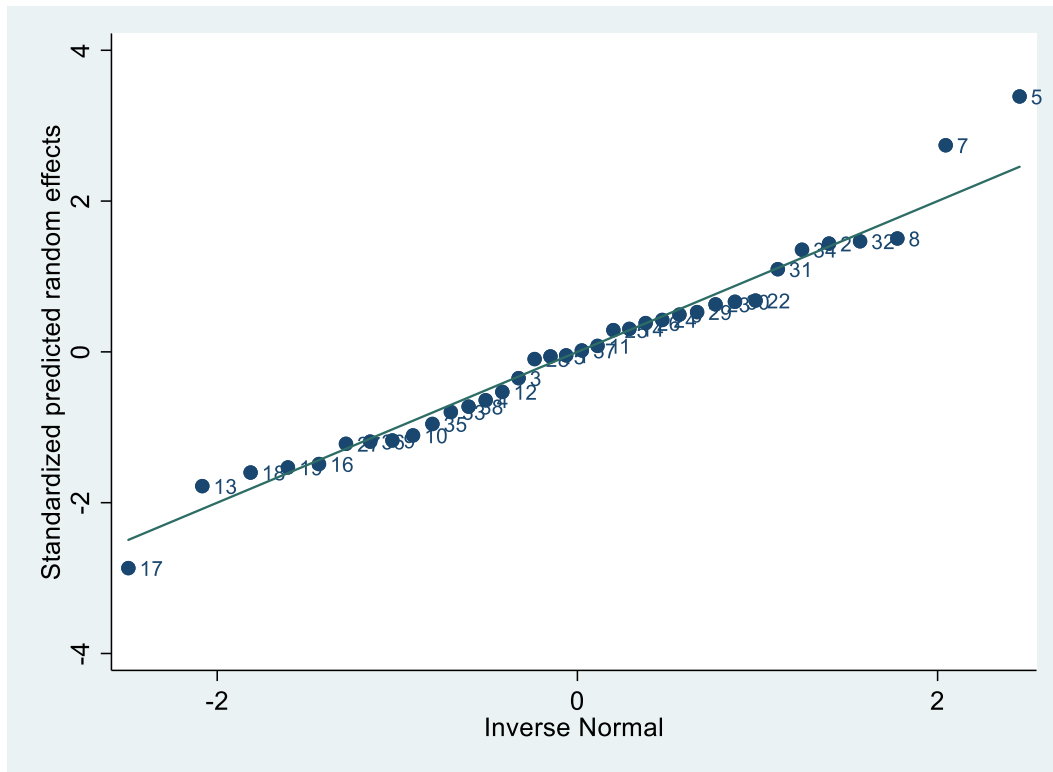
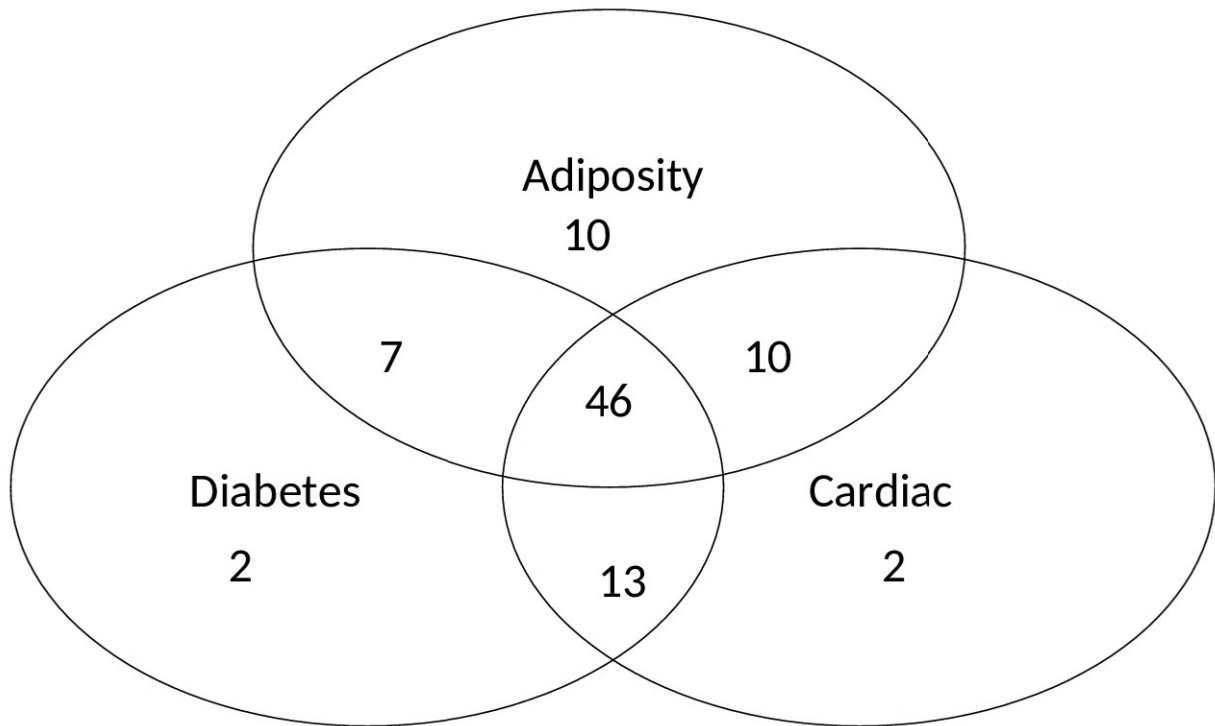


Fig D(i) Half normal plot for the predicted random effects from the meta-regression of the mean change in CRP and the mean change in BMI SDS (n=36, see main text).



S2: Figure 6. Venn diagram illustrating markers of metabolic health measured

The Venn diagram illustrates which of the 90 studies in the systematic review report fasting glucose, HOMA-IR, IL-6, CRP or ALT and thus are included in this paper.



Total number of studies = 90