**Supplementary Figure 1 -- NAC treatment slightly improved the lipidome in C dams.** *A*: NAC reduced hepatic TG, but not hepatic DG in C dams. *B*: NAC reduced serum C14:0, C16:0, C17:0, C18:0, C20:4 and C22:6 fatty acids in C dams. *C* and *D*: NAC had no effect on serum or hepatic ceramides in C dams, respectively. \*P<0.05, \*\*P<0.01, \*\*\*P<0.001, \*\*\*\*P<0.0001 by Student’s t-test (n=6/group).

**Supplementary Figure 2 -- NAC treatment improved metabolic function in female HFD offspring.**

*A-B*: NAC prevented the early life CUG (A) and increased weight gain seen in HFD+vehicle offspring (B) (n=25-40/grp). *C:* NAC increased food intake in HFD+vehicle offspring. *D*: NAC normalized the increase in terminal body weight observed at 36 weeks in HFD+vehicle offspring (n=25-40/grp). *E*: NAC improved glucose tolerance compared to HFD+vehicle (black squares) at 7 weeks of age (n=6/grp). Inset represents area under the curve (AUC). *F*: HFD+NAC resulted in improved insulin sensitivity in offspring at 8 weeks of age compared to HFD+vehicle offspring (n=6/grp). Inset represents AUC. *G*: Fed insulin (n=5/grp). *H*: HOMA-IR (n=5/grp) Black circle, C+vehicle; white circle, C+NAC; black square, HFD+vehicle; white square, HFD+NAC. \*P<0.05, \*\*P<0.01, \*\*\*P<0.001, \*\*\*\*P<0.0001 by ANOVA.

**Supplementary Figure 3 -- NAC exposure does not alter fecal lipid content.** No significant difference in fecal triglyceride content. n=4/grp

**Supplementary Figure 4 -- NAC treatment normalized adiposity in female HFD offspring.**

*A-B*: NAC normalized gonadal fat pad weight and overall adipose mass in HFD+vehicle. *C*: NAC normalized adipocyte hypertrophy seen with H&E staining in HFD+vehicle and produced browning of WAT (original magnification 600X). *D:* NAC normalized serum leptin in HFD+vehicle offspring. *E:* NAC did not significantly alter serum adiponectin in HFD+vehicle offspring. (n=5-6/grp except n=3/grp in *C*). \*\*P<0.01, \*\*\*\*P<0.0001 by ANOVA.

**Supplementary Figure 5 -- NAC treatment prevented BAT hypertrophy in female HFD offspring.**

*A*: NAC prevented the increase in BAT weight compared to HFD+vehicle. *B*: NAC decreased the lipid droplet size seen with H&E staining in HFD+vehicle (original magnification 200X). *C*: core body temperature of C and HFD exposed offspring. (n=5-6/grp except n=3/grp in *B*). \*\*P<0.01, \*\*\*\*P<0.0001 by ANOVA.

**Supplementary Figure 6 -- NAC treatment prevented hepatic steatosis and preserved antioxidant capacity in female HFD offspring.**

*A*: NAC normalized liver weight, *B*: the rise in hepatic triglycerides, and *C*: the increase in hepatic lipid vacuolization (original magnification 200X) observed by H&E staining in HFD+vehicle exposed offspring. *D:* NAC exposure increased hepatic GSH in HFD+vehicle exposed offspring. *E-F:* Effect of NAC exposure had on hepatic GR and GPx activity. *G-H:* Effect of NAC exposure had on serum GR and GPx activity*.* (n=5-6/grp except n=3/grp in *C*). \*P<0.05, \*\*\*P<0.001, \*\*\*\*P<0.0001 by ANOVA.