

**Ectopic fat deposition in populations of black African ancestry: A systematic review
and meta-analysis**

Acta Diabetologica

Online Supplementary Material

Reuben M Reed¹, Sarah J Nevitt², Graham J Kemp³, Daniel J Cuthbertson⁴, Martin B Whyte⁵

Louise M Goff¹

¹Department of Nutritional Sciences, Faculty of Life Sciences & Medicine, King's College London, London; ²Department of Health Data Science, Institute of Population Health, University of Liverpool, Liverpool, UK; ³Department of Musculoskeletal and Ageing Science. Institute of Life Course and Medical Sciences and Liverpool Magnetic Resonance Imaging Centre (LiMRIC), University of Liverpool, Liverpool, UK; ⁴Department of Cardiovascular and Metabolic Medicine, Institute of Life Course Sciences, University of Liverpool, Liverpool, UK; ⁵Faculty of Health & Medical Sciences, University of Surrey, Guildford, Surrey, UK.

Corresponding author: Louise M Goff, email louise.goff@kcl.ac.uk

Supplementary Table S1 An example of the full search strategy (Medline)

Search terms – Mesh and Key terms	Desired results
1 exp African Continental Ancestry Group/ or exp African American/ 2 (africa* or "african american*" or "african ancestry" or "afro-american*").mp. 3 ghan*.mp. 4 nigeria*.mp. 5 (caribbean* or "afro-caribbean*").mp. 6 (black* or "black british").mp. 7 ("black minority ethnic" or BME).mp. 8 1 or 2 or 3 or 4 or 5 or 6 or 7	BA populations
10 ("visceral fat" or "visceral adipos*" or "visceral obesity").mp. 11 ("intraabdominal fat" or "intraabdominal adipos*" or "intraabdominal obesity" or "intra-abdominal fat" or "intra- abdominal adipos*" or "intra-abdominal obesity").mp. 12 9 or 10 or 11	VAT
13 exp Fatty Liver/ 14 ("non-alcoholic fatty liver disease" or NAFLD or "non-alcoholic steatohepatitis" or NASH).mp. 15 (steatosis adj3 liver).mp. 16 ("visceral steatosis" or "hepatic steatosis").mp. 17 ("hepatic fat" or "liver fat" or "Fatty liver").mp. 18 ("intrahepatic fat" or "intrahepatic triglyceride*" or "intrahepatic lipid*" or "intra-hepatic fat" or "intra-hepatic triglyceride*" or "intra-hepatic lipid*" or IHTG).mp. 19 13 or 14 or 15 or 16 or 17 or 18	IHL
20 exp Pancreas/ 21 (lipid* or fat* or triglyceride* or triglycerol or triacylglyceride or steatosis or lipomatosis or TG or TAG).mp. 22 20 and 21 23 ((pancrea* or intrapancreatic or intra-pancreatic) adj3 (lipid* or fat* or triglyceride* or triglycerol or triacylglyceride or steatosis or lipomatosis or TG or TAG)).mp. 24 ("non-alcoholic fatty pancreas disease" or NAFPD).mp 25 22 or 23 or 24	IPL

26	exp Muscle, Skeletal/	
27	26 and 21	
28	((muscle or muscular or intramuscular or intramyocellular or intra-muscular or intra-myocellular or IM or myoc*) adj3 (lipid* or fat* or triglyceride* or triglycerol or triacylglyceride or steatosis or lipomatosis or TG or TAG)).mp.	IMCL
29	(IMTG* or IMCL* or IML*).mp.	
30	27 or 28 or 29	
31	continental population groups/ or american native continental ancestry group/ or asian continental ancestry group/ or european continental ancestry group/ or oceanic ancestry group/	
32	(asian* or caucasion* or hispanic* or indian* or latin* or white* or chin* or "south asian*" or pakistan*).mp.	Comparator ethnicities
33	(ancestry or ethnic* or race or national* or "ethnic group*" or "ethnic population*").mp.	
34	31 or 32 or 33	
35	12 or 19 or 25 or 30	
36	8 and 34 and 35	Combining search
37	36 not (exp animals/ not humans.sh.)	
38	37 not ((exp infant/ or exp child/ or adolescent/) not exp adult/)	Limits
39	limit 38 to yr="1980 -Current"	

Database searched from 1980 – 1 December 2020. Other database (Embase, Scopus, Cochrane CENTRAL and OpenGrey) searches used the same search strategy design where MeSH terms were changed where necessary. BA: black African ancestry; IHL: intrahepatic lipid; IMCL: intramyocellular lipid ; IPL: intrapancreatic lipid.

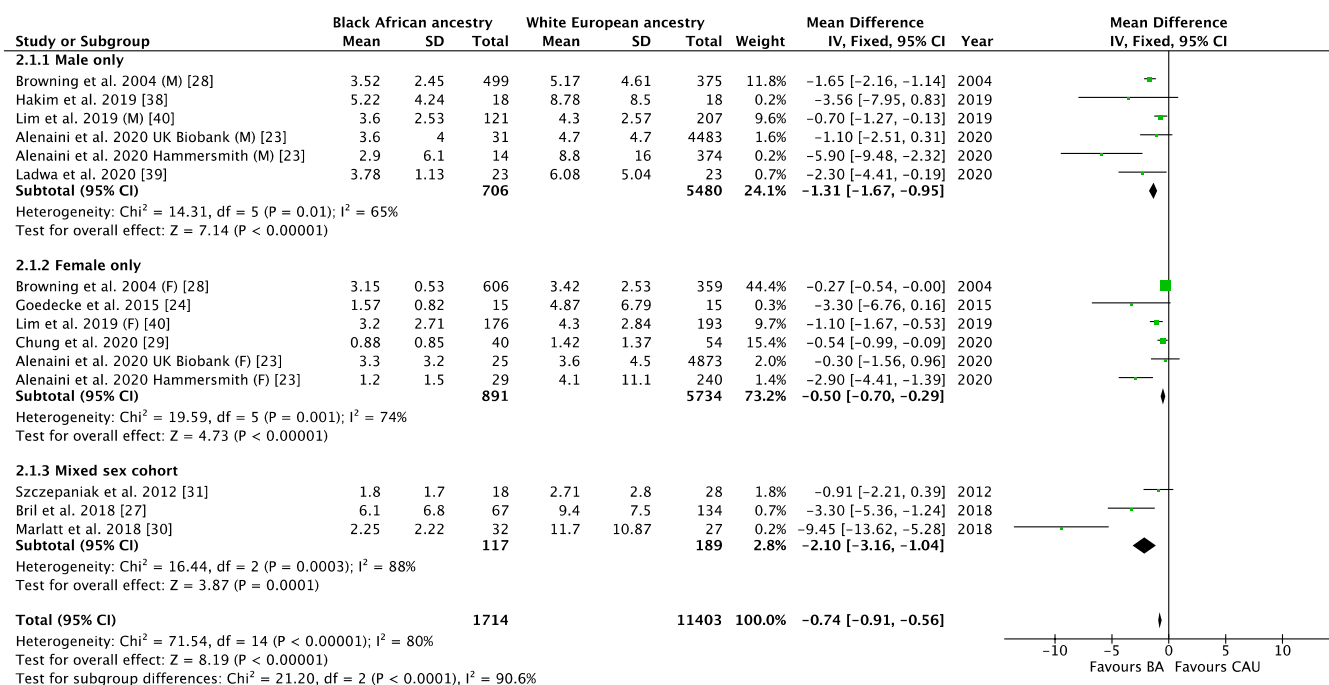
Supplementary Table S2 Quality assessment of included studies by a modified Newcastle-Ottawa Scale (NOS) for cohort studies adapted to assess cross-sectional studies.

Study (Author and year)	<i>Selection</i>		<i>Comparability</i>		<i>Outcome</i>		Total
	Representativeness of the sample*	Sample size*	Ascertainment of the exposure*	Participants in different groups are comparable**	Assessment of the outcome**	Statistical test*	
Le et al. (2011)	-	-	*	**	*	-	4
Szczepaniak et al. (2012) [31]	-	-	*	**	**	*	6
Goedecke et al. (2015) [24]	-	-	-	**	*	*	4
Marlatt et al. (2018) [30]	*	*	-	**	*	-	5
Chung et al. (2020) [29]	*	-	*	**	*	*	6
Browning et al. (2004) [28]	*	*	*	*	**	*	7
Larson-Meyer et al. (2008) [42]	-	-	*	**	*	*	5
Brown et al. (2009) [32]	-	-	-	**	*	-	3
Wagenknecht et al. (2020) [36]	*	*	*	*	*	*	6
Nazare et al. (2012) [34]	-	-	*	*	*	*	4
North et al. (2013) [35]	*	-	-	-	*	-	2

Walker et al. (2012) [41]	-	-	*	**	*	*	5
Garg et al. (2016) [25]	*	*	*	-	**	*	6
Whitaker et al. (2017) [37]	*	-	-	**	*	*	5
Bril et al. (2018) [27]	*	-	-	**	*	*	5
Naran et al. (2018) [33]	-	*	-	*	*	*	4
Allister-Price et al. (2019) [26]	-	*	-	**	*	*	5
Hakim et al. (2019) [38]	*	*	*	**	*	*	7
Lim et al. (2019) [40]	*	-	*	*	*	*	5
Alenaini et al. (2020) [23]	*	-	*	**	*	*	6
Hammersmith cohort							
Alenaini et al. (2020) [23]	*	*	*	**	**	*	8
UK Biobank Cohort							
Ladwa et al. (2020) [39]	*	-	*	**	**	*	7
Smith et al. (2010) [47]	*	-	-	**	*	*	5
Ingram et al. (2011) [45]	*	-	*	*	*	*	5

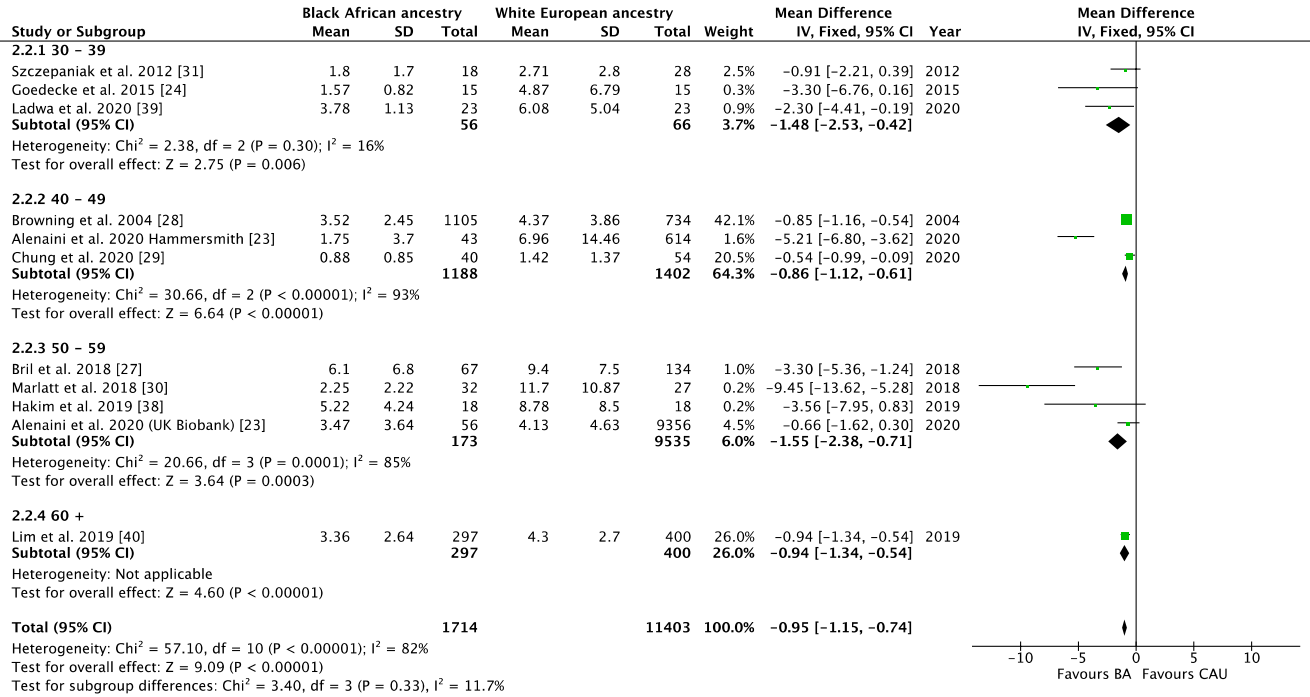
Delaney et al. (2014) [46]	-	-	-	**	*	*	4
Hakim et al. (2017) [44]	-	-	-	**	*	*	4
Bello et al. (2020) [43]	*	*	*	**	*	*	7
Le et al. (2011) [49]	-	-	*	**	*	-	4
Hakim et al. (2019) [17]	*	*	*	**	*	*	7
Hakim et al. (2019) [48]	*	*	*	**	*	*	7

Newcastle-Ottawa Scale for cohort studies adapted to assess cross-sectional studies was modified to assess the quality of included studies. Where domains were not appropriate, they were removed or amended. Stars were awarded for: Representativeness of the sample: somewhat or truly representative of the sample*; sample size: justified and satisfactory*; ascertainment of the exposure: non-validated measurement but the tool is described*; participants in different groups are comparable (based on study design or analysis): study controls for BMI*, study controls for any additional factor including age, gender, diabetes status or alcohol consumption*; assessment of the outcome: validated blind assessment**, validated assessment*; statistical test: clearly described and appropriate and the measurement of association is presented with mean, standard deviation and P value*.



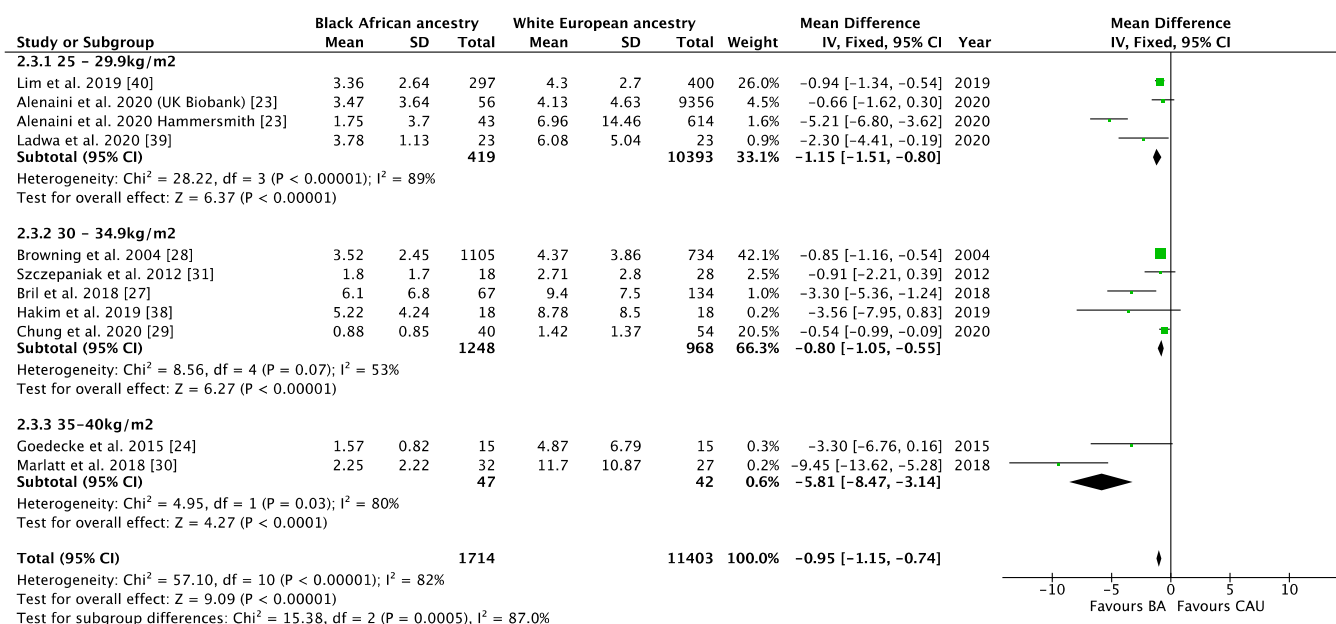
Supplementary Fig. S3 Forest plot for the effect of black African ancestry (BA) on intrahepatic lipid (IHL), grouped by sex.

Studies utilised magnetic resonance techniques and compared to white European ancestry (WE), grouped according to sex. Data are presented as mean difference (% IHL) with 95% confidence intervals (CI) for individual studies and pooled estimates. SD: standard deviation



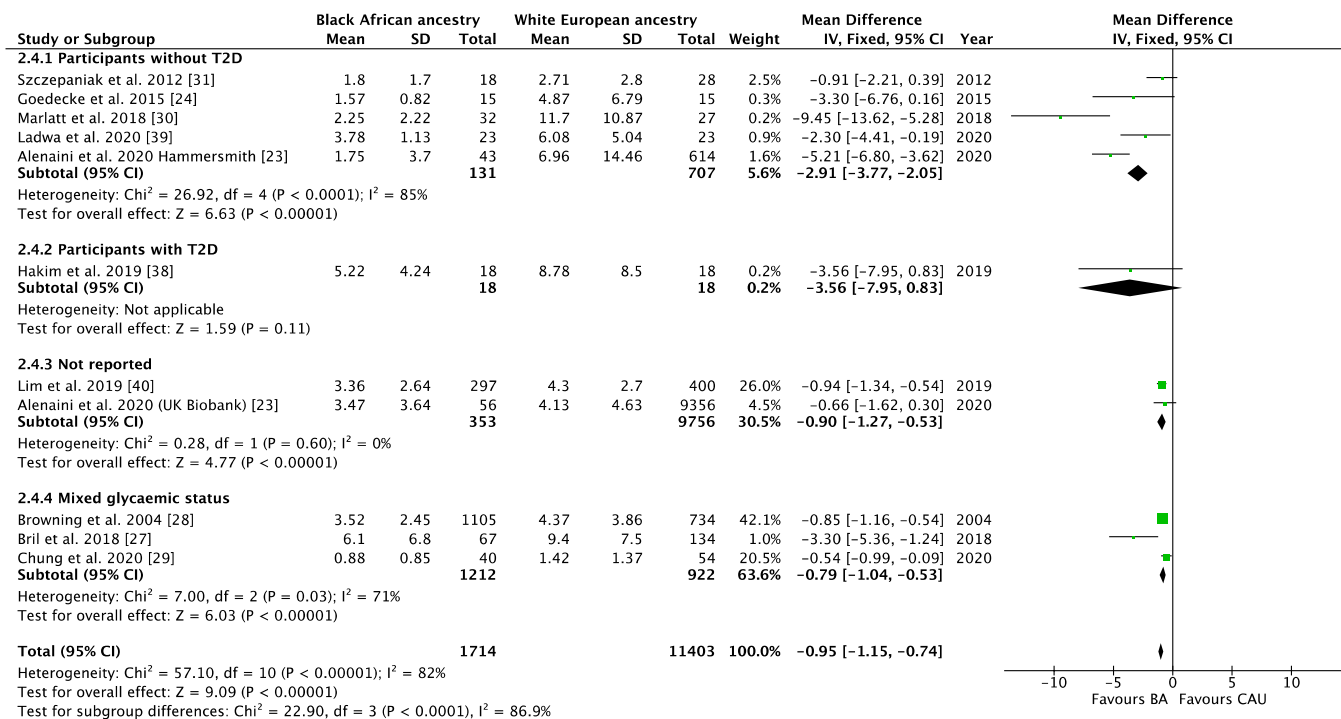
Supplementary Fig. S4 Forest plot for the effect of black African ancestry (BA) on intrahepatic lipid (IHL), grouped by age (years).

Studies utilised magnetic resonance techniques and compared to white European ancestry (WE), grouped according to age. Data are presented as mean difference (% IHL) with 95% confidence intervals (CI) for individual studies and pooled estimates. SD: standard deviation



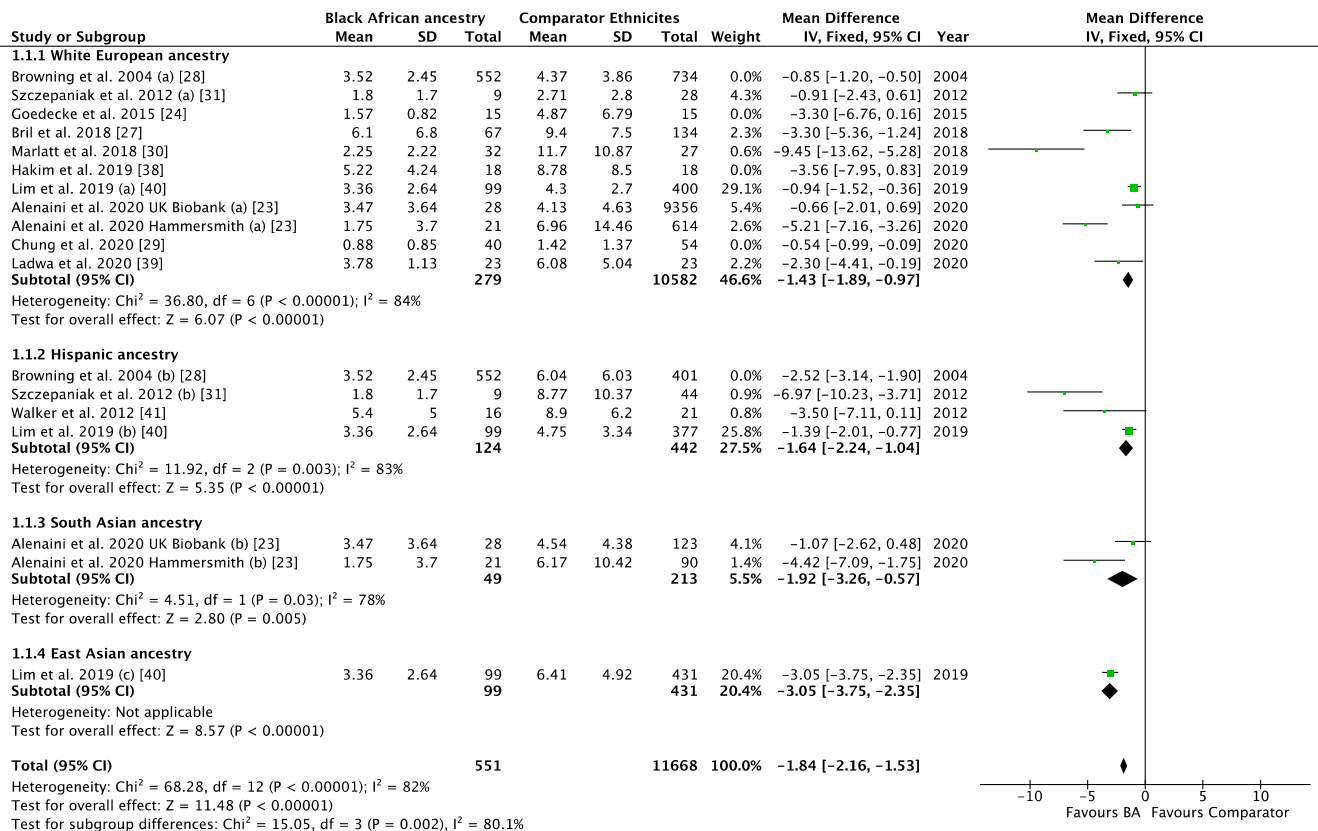
Supplementary Fig. S5 Forest plot for the effect of black African ancestry (BA) on intrahepatic lipid (IHL), grouped by BMI.

Studies utilised magnetic resonance techniques and compared to white European ancestry (WE), grouped according to BMI. Data are presented as mean difference (% IHL) with 95% confidence intervals (CI) for individual studies and pooled estimates. SD: standard deviation

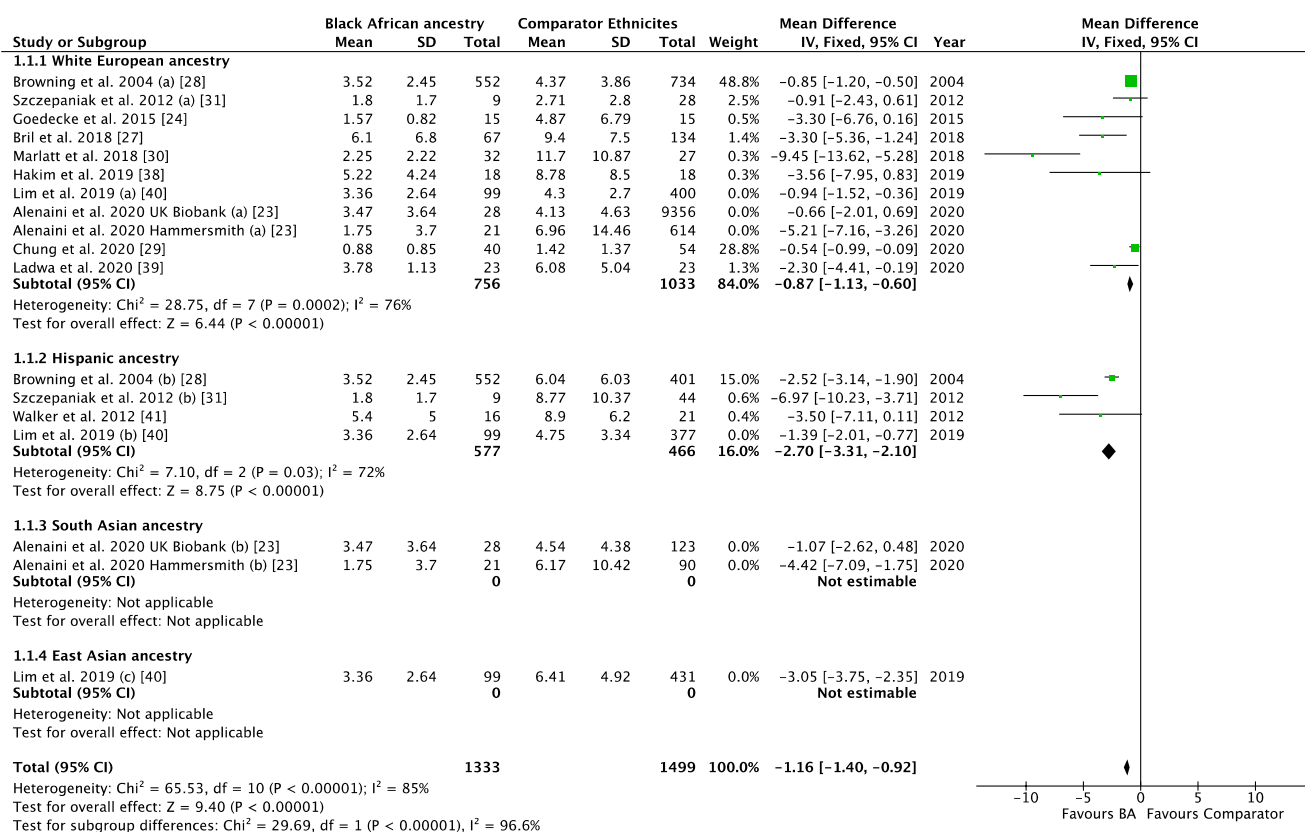


Supplementary Fig. S6 Forest plot for the effect of black African ancestry (BA) on intrahepatic lipid (IHL), grouped by glycaemic status.

Studies utilised magnetic resonance techniques and compared to white European ancestry (WE), grouped according to glycaemic status. Data are presented as mean difference (% IHL) with 95% confidence intervals (CI) for individual studies and pooled estimates. T2D: type 2 diabetes; SD: standard deviation

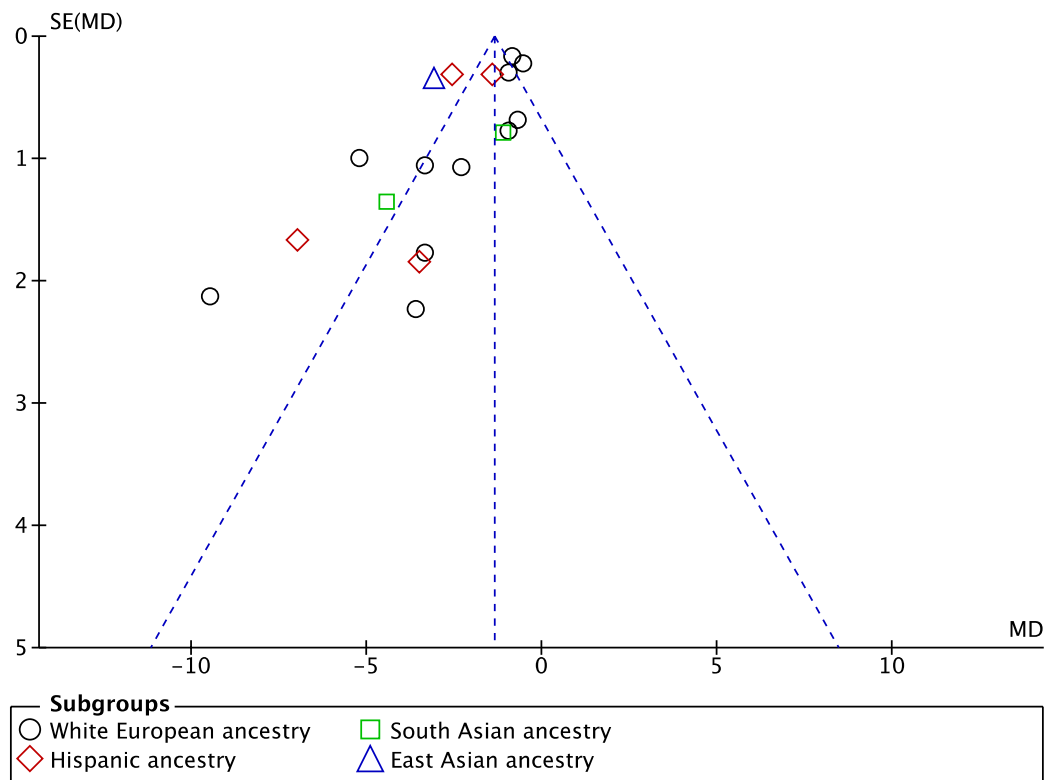


Supplementary Fig. S7 Sensitivity analysis removing studies estimating means and standard deviation (SD) from median and interquartile range (IQR) in the comparison of intrahepatic lipid (IHL) between participants of black African ancestry (BA) and comparator ethnicities. Studies utilised magnetic resonance techniques. Data are presented as mean difference (% IHL) with 95% confidence intervals (CI) for individual studies and pooled estimates



Supplementary Fig. S8 Sensitivity analysis removing studies which only reported covariate adjusted means and standard deviation (SD) in the comparison of intrahepatic lipid (IHL) between participants of black African ancestry (BA) and comparator ethnicities.

Studies utilised magnetic resonance techniques. Data are presented as mean difference (% IHL) with 95% confidence intervals (CI) for individual studies and pooled estimates



Supplementary Fig. S9 Funnel plot displaying the standard error (SE) and mean difference (MD) of intrahepatic lipid (IHL; %)

From studies included in the meta-analysis comparing IHL between populations of black African ancestry (BA) compared to white European ancestry (WE), Hispanic ancestry (HIS), South Asian ancestry (SA) and East Asian ancestry (EA)