Supplementary Tables

Supplementary Table 1: Search Strategy

Embase	
#	**Search Strategy**
1	omega-3':ti,ab,kw OR pufa$:ti,ab,kw OR ((acid* NEAR/5 ('n-3' OR polyunsaturated OR linolenic OR eicosapenta$noic OR timnodonic OR docosahexa$noic)):ti,ab,kw) OR docosahexaenoate:ti,ab,kw OR epa:ti,ab,kw OR dha:ti,ab,kw OR ala:ti,ab,kw
2	omega 3 fatty acid'/exp
3	**#1 OR #2**
4	cholesterol*:ti,ab,kw OR hdl:ti,ab,kw OR ldl:ti,ab,kw OR 'high density lipoprotein*':ti,ab,kw OR 'low density lipoprotein*':ti,ab,kw OR 'beta lipoprotein*':ti,ab,kw OR apo*protein*:ti,ab,kw OR apoa:ti,ab,kw OR apob:ti,ab,kw OR apoc:ti,ab,kw OR apod:ti,ab,kw OR apoe:ti,ab,kw OR apoh:ti,ab,kw OR ((apo NEXT/1 (a OR b OR c OR d OR e OR h)):ti,ab,kw) OR triglyceride*:ti,ab,kw OR triacylglycerol*:ti,ab,kw OR (((serum OR plasma) NEXT/1 (lipid* OR tg OR tag)):ti,ab,kw)
5	cholesterol'/exp OR 'lipoprotein'/exp OR 'triacylglycerol'/exp
6	**#4 OR #5**
7	nutrigenomic*:ti,ab,kw OR nutrigenetic*:ti,ab,kw OR (((nutritional OR expression* OR variation* OR variant*) NEAR/2 (genomic* OR genetic* OR gene OR genes)):ti,ab,kw) OR genotype:ti,ab,kw OR ((('nutrient-gene' OR 'gene-nutrient' OR 'gene-diet') NEXT/1 interaction*):ti,ab,kw) OR 'personali?ed nutrition':ti,ab,kw OR 'precision nutrition':ti,ab,kw
8	nutrigenomics'/exp OR 'nutrigenetics'/exp OR 'genetic variation'/exp OR 'genotype'/exp
9	**#7 OR #8**
10	**#3 AND #6 AND #9**
11	[animals]/lim NOT [humans]/lim
12	**#10 NOT #11**

Medline (Ovid)

#	Search Strategy
1	("omega-3" or PUFA? or (acid* adj5 ("n-3" or polyunsaturated or linolenic or eicosapenta?noic or timnodonic or docosahexa?noic)) or docosahexaenoate or EPA or DHA or ALA).ab,kf,ti.
2	exp Fatty Acids, Omega-3/
3	**1 or 2**
4	(cholesterol* or HDL or LDL or "high density lipoprotein*" or "low density lipoprotein*" or "beta lipoprotein*" or apo*protein* or apoA or apoB or apoC or apoD or apoE or apoH or (apo adj (A or B or C or D or E or H)) or triglyceride* or triacylglycerol* or ((serum or plasma) adj (lipid* or TG or TAG))).ab,kf,ti.
5	exp Cholesterol/ or exp Lipoproteins/ or exp Triglycerides/
6	**4 or 5**
7	(nutrigenomic* or nutrigenetic* or ((nutritional or expression* or variation* or variant*) adj2 (genomic* or genetic* or gene or genes)) or genotype or (("nutrient-gene" or "gene-nutrient" or "gene-diet") adj interaction*) or "personali#ed nutrition" or "precision nutrition").ab,kf,ti.
8	Nutrigenomics/ or Genetic Variation/ or Genotype/
9	**7 or 8**
10	**3 and 6 and 9**
11	exp animals/ not humans.sh.
12	**10 not 11**

Web of Science

Indexes = SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI Timespan =All years

#	Search Strategy
1	TS=("omega-3" or PUFA$ or (acid* NEAR/5 ("n-3" or polyunsaturated or linolenic or eicosapenta$noic or timnodonic or docosahexa$noic)) or docosahexaenoate or EPA or DHA or ALA)
2	TS=(cholesterol* or HDL or LDL or "high density lipoprotein*" or "low density lipoprotein*" or "beta lipoprotein*" or apo*protein* or apoA or apoB or apoC or apoD or apoE or apoH or (apo NEAR/0 (A or B or C or D or E or H)) or triglyceride* or triacylglycerol* or ((serum or plasma) NEAR/0 (lipid* or TG or TAG)))
3	TS=(nutrigenomic* or nutrigenetic* or ((nutritional or expression* or variation* or variant*) NEAR/2 (genomic* or genetic* or gene or genes)) or genotype or (("nutrient-gene" or "gene-nutrient" or "gene-diet") NEAR/0 interaction*) or "personali?ed nutrition" or "precision nutrition")
4	**#1 AND #2 AND #3**
5	TS=(animals OR animal OR mice OR mus OR mouse OR murine OR woodmouse OR rats OR rat OR murinae OR muridae OR cottonrat OR cottonrats OR hamster OR hamsters OR cricetinae OR rodentia OR rodent OR rodents OR pigs OR pig OR swine OR swines OR piglets OR piglet OR boar OR boars OR "sus scrofa" OR ferrets OR ferret OR polecat OR polecats OR "mustela putorius" OR "guinea pigs" OR "guinea pig" OR cavia OR callithrix OR marmoset OR marmosets OR cebuella OR hapale OR octodon OR chinchilla OR chinchillas OR gerbillinae OR gerbil OR gerbils OR jird OR jirds OR merione OR meriones OR rabbits OR rabbit OR hares OR hare OR diptera OR flies OR fly OR dipteral OR drosphila OR drosophilidae OR cats OR cat OR carus OR felis OR nematoda OR nematode OR nematoda OR nematode OR nematodes OR sipunculida OR dogs OR dog OR canine OR canines OR canis OR sheep OR sheeps OR mouflon OR mouflons OR ovis OR goats OR goat OR capra OR capras OR rupicapra OR chamois OR haplorhini OR monkey OR monkeys OR anthropoidea OR anthropoids OR saguinus OR tamarin OR tamarins OR leontopithecus OR hominidae OR ape OR apes OR pan OR paniscus OR "pan paniscus" OR bonobo OR bonobos OR troglodytes OR "pan troglodytes" OR gibbon OR gibbons OR siamang OR siamangs OR nomascus OR symphalangus OR chimpanzee OR chimpanzees OR prosimians OR "bush baby" OR prosimian OR bush babies OR galagos OR galago OR pongidae OR gorilla OR gorillas OR pongo OR pygmaeus OR "pongo pygmaeus" OR orangutans OR pygmaeus OR lemur OR lemurs OR lemuridae OR horse OR horses OR pongo OR equus OR cow OR calf OR bull OR chicken OR chickens OR gallus OR quail OR bird OR birds OR quails OR poultry OR poultries OR fowl OR fowls OR reptile OR reptilia OR reptiles OR snakes OR snake OR lizard OR lizards OR alligator OR alligators OR crocodile OR crocodiles OR turtle OR turtles OR amphibian OR amphibians OR amphibia OR frog OR frogs OR bombina OR salientia OR toad OR toads OR "epidalea calamita" OR salamander OR salamanders OR eel OR eels OR sciuridae OR squirrel OR squirrels OR chipmunk OR chipmunks OR suslik OR susliks OR vole OR voles OR lemming OR lemmings OR muskrat OR muskrats OR lemmus OR otter OR otters OR marten OR martens OR martes OR weasel OR badger OR badgers OR ermine OR mink OR minks OR sable OR sables OR gulo OR gulos OR wolverine OR wolverines OR minks OR mustela OR llama OR llamas OR alpaca OR alpacas OR camelid OR camelids OR guanaco OR guanacos OR chiroptera OR chiropteras OR bat OR bats OR fox OR foxes OR iguana OR iguanas OR xenopus laevis OR parakeet OR parakeets OR parrot OR parrots OR donkey OR donkeys OR mule OR mules OR zebra OR zebras OR shrew OR shrews OR bison OR bisons OR buffalo OR buffaloes OR deer OR deers OR bear OR bears OR panda OR pandas OR "wild hog" OR "wild boar" OR fitchew OR fitch OR beaver OR beavers OR jerboa OR jerboas OR capybara OR capybaras)
6	**#4 not #5**

Supplementary Table 2: Summary of observational studies

Author, Year	Study Design	Genetic Approach	Population (sample size included in analyses)	Gene(s), SNP(s)	Cytogenic Location of Gene(s)	Quantity, Source and Type of Omega-3[1]	Comparators	Plasma Lipid/ Lipoprotein Outcome(s)	Summary of Statistically Significant Study Findings Relevant to the Research Question[2]
Bouchard-Mercier et al. 2011 (1)	Cross-Sectional	Single SNP	Healthy Caucasian men and women from INFOGENE study (n=674)	*PPARα,* L162V (rs1800206) *PPARγ,* *P*12A (rs1801282) *PPARδ,* –87T→ C (rs2016520)	*PPARα*: 22q13.31 *PPARγ:* 3p25.2 *PPARδ:* 6p21.31	Mean: L162: 2.8 g/day V162: 2.9 g/day (unclear if food and/or supplement sources)	Minor allele carriers vs. Non-carriers	LDL-PPD	**LDL-PPD:** In a model including age, sex, TG, BMI, energy and omega-3 intakes and PPAR*α* L162V (rs1800206) polymorphism, the interaction of PPAR*α*162V and omega-3 intakes explained 0.62% of the variance in LDL-PPD.
Bodhini et al. 2017 (2)	Cross-Sectional	Single SNP	Adults with normal glucose tolerance (n=821) and adults with type 2 diabetes (n=861)	*MC4R,* rs17782313 *TCF7L2,* rs12255372 *TCF7L2,* rs7903146	*MC4R:* 18q21.32 *TCF7L2:* 10q25.2-q25.3	**Low:** 0.38 g/day ALA **Moderate:** 0.58 g/day ALA **High:** 0.89 g/day ALA (means) (food)	Major allele homozygotes vs. Minor allele carriers	HDL-c	**HDL-c:** 'T' allele carriers of *TCF7L2* rs12255372 within the lowest tertile of ALA intake (mean=0.38 g/day) exhibited higher levels of HDL-c compared to GG homozygotes in the lowest tertile of ALA intake (mean=0.38 g/day)
Chen et al. 2019 (3)	Cross-Sectional Analysis within a Prospective Cohort	Single SNP, Haplotype and Gene-Centric	Adults of Swedish ancestry from the GLACIER cohort (n=5160)	All variations in the *FADS1-FADS2-FADS3* gene cluster and variation within 200kb upstream and downstream of the *FADS* region	*FADS1:* 11q12.2 *FADS2:* 11q12.2 *FADS3:* 11q12.2	**High:** >1.6 g/day **Low:** <1.6 g/day (food)	Entire FADS region gene-centric analysis and Variation in individual FADS cluster SNPs: rs174570, rs174602, rs74771917, rs3168072, rs12577276, rs7115739 and Haplotype analysis	HDL-c LDL-c TG Total-c	**HDL-c:** Significant interaction of rs174570 and omega-3 on HDL-c **LDL-c:** Significant interaction of rs174602 and omega-3 on LDL-c **TG:** Gene-centric analyses demonstrated a significant interaction between variation in the *FADS* gene cluster and omega-3 intake on TG **Total-c:** Significant interaction of rs174602 and omega-3 on total-c ('C' allele carriers exhibited lower total-c with low omega-3 intake, while no such relationship was observed with high omega-3 intake)
Ching et al. 2019 (4)	Cross-Sectional	Single SNP	Vegetarian adults of Malaysian ancestry (n=200)	*FADS1,* rs174547	*FADS1:* 11q12.2	**Low:** ≤0.45 g/day ALA **Moderate:** 0.46-0.64 g/day ALA **High:** >0.64 g/day ALA (means) (food)	Comparison between three genotypes	HDL-c TG	**HDL-c:** The TT genotype had significantly lower HDL-c when ALA intake was in the moderate intake range, but there were no significant gene-omega-3 interaction on lipid levels
Dumont et al. 2011 (5)	Cross-Sectional	Single SNP	Adolescents of European ancestry (n=573)	*FADS1,* rs174547	*FADS1:* 11q12.2	**High**: >1.4 g/day ALA **Low**: ≤1.4 g/day ALA (unclear if food and/or supplement sources)	Major allele homozygotes vs. Minor allele carriers	HDL-c LDL-c TG Total-c	**Total-c:** Significant interaction whereby the minor allele (CT+TT genotype) was associated with lower total-c when ALA intake is high as compared to when intake is low. This remained significant after assessing the interaction using ALA intake as a continuous variable.

Dumont et al. 2018 (6)	Cross-Sectional	Single SNP	Men and women aged 35 to 74 years from the MONA LISA Study of three French populations (n=3069)	*FADS1,* rs174547	*FADS1:* 11q12.2	**Low**: 0.6 g/day ALA (mean) **Median**: 0.8 g/day ALA (stratified by median for analyses) **High**: 1.3 g/day ALA (mean) (food and supplement)	Comparison between three genotypes	HDL-c LDL-c TG Total-c	--
Fallaize et al. 2016 (7)	Cross-Sectional (Baseline) and Longitudinal Analyses within a Randomized Intervention	Single SNP*	Healthy adults enrolled in the Food4Me European trial (*n*=1466)	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	**High**: >0.67 %kcal **Low**: <0.67 %kcal **Increased Intake:** reduced omega-3 intake from baseline **Decreased Intake:** decreased omega-3 intake from baseline (unclear if food and/or supplement sources)	*APOE*-E4- vs. *APOE*-E4+	Total-c	**Total-c:** Cross-sectional (baseline) analysis demonstrated a significant genotype effect for *APOE,* omega-3 intake, and total-c. Longitudinal analysis (baseline to month 6) demonstrated a significant genotype effect for *APOE,* change in omega-3 intake (increase or decrease) and total-c.
Fontaine-Bisson and El-Sohemy 2007 (8)	Cross-Sectional	Genetic Score	Men and women aged 20-29 years (n=595)	*TNFα,* rs361525, rs1800629	*TNFα:* 6p21.33	Intake range: 0.2-4.6 %kcal (mean intakes were 0.7 %kcal for 0/0, 0.7% kcal for 0/1 and 0.6%kcal for 1/0) (food)	No minor allele ('A') for both SNPs (0/0) vs. One minor allele for rs361525 (1/0) vs. One minor allele for rs1800625 (0/1)	HDL-c	--
Fontaine-Bisson et al. 2009 (9)	Cross-Sectional	Single SNP	Healthy men and women aged 20-29 years (n=593)	*NF-κB* -94Ins/Del ATTG (rs28362491)	*NF-κB:* 4q24	Mean intake: 0.7 %kcal (unclear if food and/or supplement sources)	Ins/Ins vs. Ins/Del vs. Del/Del	HDL-c	**HDL-c:** Significant interaction between *NF-κB* genotype and omega-3 intake on HDL-c
Hellstrand et al. 2012 (10)	Cross-Sectional	Single SNP	Healthy men and women aged 45-68 years from Sweden (n=4635)	*FADS,* rs174547	*FADS:* 11q12.2	**Low:** ≤0.14 %kcal long-chain omega-3 **Moderate:** 0.14-0.28 %kcal long-chain omega-3 **High:** >0.28 %kcal long-chain omega-3 (tertiles of intake reported only for certain significant findings) (food and supplement)	TT vs. TC vs. CC	HDL-c LDL-c TG	**LDL-c:** Significant interaction between *FADS* rs174547 genotype and long-chain omega-3 on LDL-c whereby the 'C' allele was significantly associated with lower LDL-c when long-chain omega-3 intake was in the lowest tertile (but not in the moderate or highest tertile). High long-chain omega-3 intake was associated with significantly higher LDL-c for CC and TC genotypes but not TT genotypes. Stratified analysis based on sex demonstrated that these significant interactions remained for men, but not women, however there was not a significant difference in interactions by sex.
Hosseini-Esfahani et al. 2017 (11)	Nested Case-Control	Single SNP	Healthy men and women aged ≥18 years from Iran	*ZNT8,* rs13266634	*ZNT8:* 8q24.11	**Tertiles for omega-3:** **Low:** <0.38 %kcal **Moderate:** 0.38-	CC vs. CT+TT	HDL-c TG	**HDL-c:** Significant interaction between *ZNT8* rs13266634 genotype and omega-3 intake on the risk of low HDL-c whereby CC genotypes exhibited a decreased risk of low HDL-c with increasing intake of omega-3; this was not observed in

			(n=1634)			0.54 %kcal **High: >**0.54 %kcal (food)			the CT+TT genotype group. **TG:** Significant interaction between *ZNT8* rs13266634 genotype and omega-3 intake on the risk of high TG whereby CC genotypes exhibited a decreased risk of high TG with increasing intake of omega-3; this was not exhibited in the CT+TT genotype group.
Jang et al. 2014 (12)	Cross-Sectional	Single SNP	Adult: Men and women aged 40-69 from Korea (n=4205) Children: Boys and girls aged 8-13 years from Korea (n=1548)	*PCSK5,* rs1029035	*PCSK5:* 9q21.13	Based on overall median intake (further detailed elsewhere (12)): **Low:** <0.4 %kcal **High:** >0.4 %kcal (food)	CC vs. CA vs. AA	HDL-c	**HDL-c:** Significant interaction between *PCSK5* rs1029035 and omega-3 on HDL-c in male children and male adults. 'C' allele carriers exhibit a tendency to decrease HDL-c with omega-3, while AA genotypes exhibit the opposite effect.
Joffe et al. 2010 (13)	Cross-Sectional	Single SNP	Black women from South Africa, normal weight or with obesity (n=138)	*TNFα,* rs1800629	*TNFα:* 6p21.33	ALA (amount not reported/cannot determine) (food)	GG vs. GA+AA	HDL-c LDL-c TG Total-c Total-c:HDL-c	**Total-c:HDL-c ratio:** Significant interaction between *TNFα,* rs1800629 genotypes and %kcal from ALA whereby increasing %kcal from ALA was associated with increases in Total-c:HDL-c for GG genotypes but decreases in Total-c:HDL-c ratio for GA+AA genotypes
Joffe et al. 2012 (14)	Cross-Sectional	Single SNP	Black and white women from South Africa, normal weight or with obesity (n=263)	*TNFα,* rs361525	*TNFα:* 6p21.33	**Median Intakes:** omega-3: 0.28-0.36 % kcal ALA: 0.21-0.26 %kcal EPA: 0.02 %kcal DHA: 0.04-0.08 %kcal (food)	GG vs. GA(+AA for one participant: black, normal weight)	HDL-c LDL-c TG Total-c Total-c:HDL-c	**LDL-c:** Significant interaction for Caucasian women whereby LDL-c decreased with increasing %kcal from EPA in the GG genotype but not the GA genotype of *TNFα,* rs361525. **Total-c:** Significant interaction for white women whereby total-c decreased with increasing EPA and DHA intakes in the GG genotype group but not the GA genotype group of *TNFα* rs361525 but individual rates were not significant. **Total-c:HDL-c ratio:** Significant interaction for black women whereby Total-c:HDL-c decreased within increasing %kcal from omega-3 in the GA genotype group but not GG of *TNFα* rs361525.
Joffe et al. 2014 (15)	Cross-Sectional	Single SNP	Black and white women from South Africa, normal weight or with obesity (n=268)	*IL-6,* −174 G>C, IVS3 (rs1800795), +281 G>T, IVS4 (rs1554606), +869 A>G (rs2069845)	*IL-6:* 7p15.3	Black Women (%kcal/day): 0.28 omega-3, 0.21 ALA, 0.02 EPA, 0.04 DHA (normal weight); 0.36 omega-3, 0.22 ALA, 0.04 EPA, 0.08 DHA (obesity) White Women (%kcal/day): 0.33 omega-3, 0.26 ALA, 0.01 EPA, 0.05 DHA (normal weight); 0.32 omega-3, 0.25 ALA, 0.02 EPA, 0.05 DHA (food)	Major allele homozygotes vs. Minor allele carriers *or* Comparison between three genotypes	HDL-c LDL-c TG Total-c Total-c:HDL-c	The following results were statistically significant only in white women, but not in black women[3]: **HDL-c:** Significant interaction whereby HDL-c increased with: increasing omega-3 and/or DHA and/or ALA intake in *IL-6* rs1800795 C allele carriers and increasing ALA intake in *IL-6* rs1554606 T allele carriers. HDL-c decreased with: increasing EPA and/or DHA intake in *IL-6* rs2069845 G allele carriers. **TG:** Significant interaction whereby TG reduced with increasing EPA intake in *IL-6* rs1800795 C allele carriers **Total-c:HDL-c:** Significant interaction whereby total-c:HDL-c ratio decreased with: increasing EPA intake in *IL-6* rs1800795 CC genotypes and *IL-6* rs1554606 TT genotypes, increasing DHA intake in *IL-6* rs1800795 CC genotypes, and increasing ALA intake in *IL-6* rs1554606 TT genotypes.
Lai et al. 2006 (16)	Cross-Sectional	Single SNP	Men and women from the Framingham	*APOA5,* rs662799, rs651821, rs3135506,	*APOA5:* 11q23.3	**Mean Intake:** 0.69 %kcal omega-3 **Tertiles for**	Major allele homozygotes vs. Minor allele carriers	TG	--

			Heart Study (n=2148)	rs2072560, rs2266788		**<u>omega-3:</u>** **Low:** <0.58 %kcal **Moderate:** 0.58-0.74 %kcal **High:** >0.74 %kcal (unclear if food and/or supplement sources)			
Lu et al. 2010 (17)	Cross-Sectional	Single SNP	Men and women of Doetinchem Cohort Study (n=3575)	*FADS,* rs174546, rs482548, rs174570	*FADS:* 11q12.2	Mean intake: 0.5 %kcal (food)	Comparison between three genotypes	HDL-c Total-c	**Total -c**: In high omega-3 intake group, total-c was significantly higher with each added minor 'C' allele of rs174546
Nettleton et al. 2009 (18)	Cross-Sectional	Single SNP	Men and women of Caucasian ancestry (n=8511)	*ANGPTL4* E40K (rs116843064)	*ANGPTL4:* 19p13.2	Not Reported/Cannot Determine (food)	Minor allele carriers vs. Non-allele carriers	HDL-c TG	--
Richardson et al. 2011 (19)	Meta-analysis of the Framingham Offspring Study (FOS) and the Genetics of Lipid Lowering Drugs and Diet Network (GOLDN)	Single SNP	Men and women from FOS and GOLDN studies (*n*=3605)	*PLIN4*, rs8887, rs11673616, rs892158, rs7250947, rs8102428, rs1609717, rs884164	*PLIN4:* 19p13.3	Mean intakes: **FOS Men:** 1.43 g/d **FOS Women:** 1.37 g/d **GOLDN Men:** 1.83 g/d **GOLDN Women:** 1.48 g/d (food and supplement)	Minor allele carriers vs. Non-allele carriers	TG HDL-c	**TG:** Significant interactions for *PLIN4,* rs884164 whereby TG levels increased in minor allele carriers with higher omega-3 intake for males and females combined, and males individually.
Standl et al. 2012 (20)	Cross-Sectional Analysis (10-year time point) within a 10-year longitudinal cohort study	Single SNP	10 year-old children of the GINIplus and LISAplus birth cohort studies (n=1697)	*FADS1/FADS2,* rs174545, rs174546, rs174556, rs174561, rs174575, rs3834458	*FADS1/2:* 11q12.2	Median intake: 0.14 mg/MJ omega-3 (ALA+EPA+DPA +DHA) (food and supplement)	Comparison between three genotypes	HDL-c LDL-c Total-c TG	--
Tai et al. 2005 (21)	Cross-Sectional	Single SNP	Framingham Cohort, men and women (*n*=2106)	*PPARα,* L162V (rs1800206)	*PPARα*: 22q13.31	**High**: >0.69 %kcal **Low**: <0.69 %kcal (food)	PPARα: 162V carriers vs. 162L/162L homozygotes	TG apoC-III	**TG:** 167V carriers had lower TG with high omega-3 intake compared to low omega-3 intake (gene-diet-interaction effects were NS) **apoC-III:** Significant gene-diet interactions; Higher apoC-III in 162V carriers with low omega-3 intake compared to 162V carriers with high omega-3 intake and 162L homozygotes with low omega-3 intake
Volcik et al. 2008 (22)	Cross-Sectional (Baseline) Analysis within a Prospective Cohort	Single SNP	African American (*n*=3480) and Caucasian (*n*=10 134) men and women (*N*=13,614)	*PPARα,* L162V (rs1800206), 3'UTR G>A (rs6008259), 3'UTR C>T (rs3892755)	*PPARα*: 22q13.31	African American: **High:** >0.32 g/d EPA+DHA **Low:** ≤0.32 g/d EPA+DHA Caucasian: **High:** >0.22 g/d EPA+DHA **Low:** ≤0.22 g/d EPA+DHA (food)	Comparison between three genotypes for each SNP	HDL-c LDL-c TG Total-c	**Total-c, LDL-c:** African Americans (but not Caucasians) homozygous for *PPARα* (rs3892755) TT genotype with high EPA+DHA intake had significantly lower total-c and LDL-c compared to CT and TT genotypes (both high and low EPA+DHA intake)

Warodomwichit et al. 2009 (23)	Cross-sectional with fasting and postprandial measures	Single SNP	Men and women of GOLDN study (n=1083)	*TCF7L2* rs7903146, rs12255372	*TCF7L2:* 10q25.2-25.3	N/A (Median omega-3: 0.67% of kcal) (food)	Major allele homozygotes vs. Minor allele carriers	HDL-c LDL-c LDL-c particle size TG Total-c	--

ALA: alpha-linolenic acid, Apo: apolipoprotein, DHA: docosahexaenoic acid, EPA: eicosapentaenoic acid, HDL: high-density lipoprotein cholesterol, LDL: low-density lipoprotein cholesterol, N/A: not applicable, NS: Non-significant, sdLDL-c: small, dense, low-density lipoprotein cholesterol, SNP: single nucleotide polymorphism, TG: triglycerides

1. Intakes are total omega-3 unless otherwise specified

2. All other (not listed) gene/omega-3/lipid/lipoprotein results of interest to the present review were NS

Participants are described as "healthy" for studies that incorporated exclusion criteria for certain conditions, blood lipid levels, etc. and when studies described the population as "healthy."

3. These results were taken from the full-text manuscript's summary table of IL-6 results. Refer to Supplementary Tables S8-S13 in Joffe et al. 2014 (15) for several other significant results, stratified and un-stratified by ethnicity. Note: There were no corrections for multiple testing in the statistical analyses.

'--' indicates that all of the completed gene/omega-3/lipid/lipoprotein analyses were NS

*Human *APOE* is polymorphic at two single nucleotides (rs429358 and rs7412) resulting in three different alleles (ε2, ε3 and ε4)

Supplementary Table 3: Summary of interventional studies

Author, Year	Study Design	Genetic Approach	Population (sample size included in analyses)	Intervention Duration	Gene(s), SNP(s)	Cytogenic Location of Gene(s)	Quantity, Source and Type of Omega-3	Comparators	Plasma Lipid/ Lipoprotein Outcome(s)	Summary of Statistically Significant Study Findings Relevant to the Research Question[1]
AbuMweis et al. 2018 (24)	Randomized, Crossover Controlled Intervention	Single SNP*	Adults with at least one cardiovascular risk factor (n=129)	4 weeks	*FADS1*, rs174561 *FADS2*, rs174583 *ELOVL2*, rs953413 *ELOVL5*, rs2397142 *CETP*, rs5882 *SCD1*, rs2234970, *PPARα*, rs6008259 *LIPF*, rs814628 and *APOE*, rs429358, rs7412	*FADS1/2:* 11q12.2 *ELOVL2:* 6p24.2 *ELOVL5:* 6p12.1 *CETP:* 16q13 *SCD1:* 10q24.31 *PPARα*: 22q13.31 *LIPF:* 10q23.31 *APOE:* 19q13.32	Intake range: 1.0 – 2.5 g/day DHA (supplement)	Comparison between three genotypes for each single SNP (except *PPARA* and *LIPF* whereby analyses were major allele homozygotes vs. minor allele carriers) and *APOE*-E2 vs. *APOE*-E3 vs. *APOE*-E4	apoA1 apoB HDL-c LDL-c TG Total-c	--
Alsaleh et al. 2014 (25)	Randomized Controlled Intervention	Single SNP and Polygenic	Healthy men and women (n=310)	12 months	CETP, rs3764261, *LIPC*, rs1532085 *APOB*, rs1367117 *ABCG5/ABCG*, rs4299376 *TIMD4/HAVCR1*, rs6882076 *GCKR*, rs1260326 *TRIB1*, rs2954029 *ANGPTL3/DOCK7*, rs2131925 *FADS1/2/3*, rs174546 *GALNT2*, rs4846914 *ABCA1*, rs4149268 *APOE/APOC1/APOC2*, rs439401	*CETP:* 16q13 *LIPC:* 15q21.3 *APOB:* 2p24.1 *ABCG5/ABCG8:* 2p.21 *TIMD4/HAVCR1:* 5q33.3 *GCKR:* 2p23.3 *TRIB1:* 8q24.13 *ANGPTL3/DOCK7:* 1p31.3 *FADS:* 11q12.2 *GALNT2:* 1q42.13 *ABCA1:* 9q31.1 *APOE/APOC1/APOC2:* 19q13.32	**Low Dose:** 0.5 g/day EPA and DHA **Moderate Dose:** 0.9 g/day EPA and DHA **High Dose:** 1.8 g/day EPA and DHA (supplement)	Effect sizes per GRS risk allele after omega-3 treatment *and* Risk allele carriers vs. non-risk allele carriers	HDL-c LDL-c TG Total-c	**TG:** significant interaction whereby 1.8 g/day EPA and DHA significantly reduced TG in T allele carriers (21.6% reduction) vs. CC genotypes (3.5% reduction) of *FADS1* rs174546

Armstrong et al. 2012 (26)	Double-Blind, Placebo-Controlled Randomized Intervention	Single SNP (deletion polymorphism)	Healthy adults of African ancestry (n=98)	6 weeks	*ALOX5,* dd (33, 34 or 44), d5 (35, 45) and 55 (control) genotypes	*ALOX5:* 10q11.21	Fish oil: 5.0 g/day containing 2.0 g/day EPA and 1.0 g/day DHA Control oil: 5.0 g/day corn/soy oil (supplement)	dd vs. d5 vs. 55	TG Mean lipoprotein particle diameter, total number of particles and particle concentration for: HDL-c and LDL-c	**TG:** significant interaction whereby decreases in TG from omega-3 supplementation were specific to d5 genotype group **HDL-c particle concentration:** significant decrease with omega-3 intervention in the d5 and 55 genotype groups compared to placebo, but no decreases in the dd genotype group **Medium HDL-c particles and HDL-c (mmol/L):** significant gene-treatment interaction but no significant differences after post-hoc analysis for comparisons among genotypes
Binia et al. 2017 (27)	Single-Arm Clinical Trial	Single SNP	Mexican adults 18-40 years (n=191)	6 weeks	*PPARα*, L162V (rs1800206), *PPARγ2*, P12A (rs1801282)	*PPARα*: 22q13.31 *PPARγ2*: 3p25.2	Fish oil: 2.7 g/day containing 1.9 g/d EPA and 0.8 g/day DHA (supplement)	Major allele homozygotes vs. Minor allele carriers	HDL-c LDL-c TG Total-c	**LDL-c:** significant increase in LDL-c among minor allele carriers (PPARγ2 Pro12Ala and Ala12Ala) only vs. PPARγ2 Pro12Pro genotypes only for individuals with BMI>25.0 kg/m^2 **Total-c:** significant increase in total-c among minor allele carriers (PPARγ2 Pro12Ala and Ala12Ala) only vs. PPARγ2 Pro12Pro genotypes only for individuals with BMI>25.0 kg/m^2
Bouchard Mercier et al. 2013 (28)	Single Arm Clinical Trial	Single SNP	Healthy adults aged 18-50 years (n=208)	6 weeks	*SREBF1,* rs4925115, rs4925118, rs12953299 *ACLY,* rs8071753, rs8065502, rs2304497 *ACACA* rs2017571, rs29221368, rs9906044, rs2229416, rs1714987, rs1266175, rs3815059, rs829165	*SREBF1:* 17p11.2 *ACLY:* 17q21.2 *ACACA:* 17q12	Fish oil: 5.0 g/day containing 1.9-2.2 g/day EPA and 1.1 g/day DHA (supplement)	Major allele homozygotes vs. Minor allele carriers *or* Comparison between three genotypes (when minor allele frequencies were >0.05)	TG	**TG:** Significant gene-diet interaction whereby individuals with the GG genotype of *ACLY* rs8071753 and individuals with the GG or CG genotype of *ACACA* rs1714987 exhibited greater TG lower effects following omega-3 supplementation; these two SNPs explained approximately 8% of the variance in plasma TG responses to omega-3 supplementation. There were significant differences in genotype frequencies of *ACLY* rs8071753 for responders and non-responders to omega-3 for TG lowering.
Bouchard-Mercier et al. 2014 (29)	Single Arm Clinical Trial	Single SNP	Healthy men and women aged 18-50 years (n=208)	6 weeks	*RXRA* (12 SNPs), *CPT1A* (9 SNPs), *ACADVL* (1 SNP), *ACAA2* (6 SNPs), *ABCD2* (8 SNPs), *ACOX1* (8 SNPs), *ACAA1* (3 SNPs) [outlined in Supplementary Table 5]	*RXRA:* 9q34.2 *CPT1A:* 11q13.3 *ACADVL:* 17p13.1 *ACAA2:* 18q21.1 *ABCD2:* 12q12 *ACOX1:* 17q25.1 *ACAA1:* 3p22.2	Fish oil: 5.0 g/day containing 1.9-2.2 g/day EPA and 1.1 g/day DHA (supplement)	Major allele homozygotes vs. Minor allele carriers *or* Comparison between three genotypes (when minor allele frequencies were >0.05)	TG	**TG:** There were significant gene-diet interaction effects on TG responses to omega-3 for RXRA rs11185660 genotype dependent on total fat intake, RXRA rs10881576, rs12339187 and rs11185660 genotypes dependent on saturated fat intake, and ACOX1 rs17583163 dependent on total polyunsaturated fat intake
Bouchard-Mercier et al. 2014 (30)	Single Arm Clinical Trial	Single SNP	Healthy men and women aged 18-50 years (n=208)	6 weeks	*GCK* (13 SNPs) [outlined in Supplementary Table 5]	*GCK:* 7p13	Fish oil: 5.0 g/day containing 1.9-2.2 g/day EPA and 1.1 g/day DHA (supplement)	Major allele homozygotes vs. Minor allele carriers *or* Comparison between three genotypes	TG	**TG:** CC genotypes of *GCK* rs741038 exhibited significantly greater TG reduction in response to omega-3 when their carbohydrate intake was high (>48.6%kcal) compared to those with the CC genotype of rs741038 with low carbohydrate intake (≤48.6%kcal) and compared to CT or TT genotypes with either high or low carbohydrate intake.

								(when minor allele frequencies were >0.05)		
Caron-Dorval et al. 2008 (31)	Single Arm Clinical Trial	Single SNP	Healthy men of Caucasian ancestry aged 18-55 years (n=28)	6 weeks	*PPARα*, L162V (rs1800206)	*PPARα*: 22q13.31	Fish oil: 5.0 g/day containing 1.9 g/day EPA and 1.1 g/day DHA (supplement)	V162 carriers vs. non-carriers	apoB-100 HDL-c LDL-c TG Total-c Total-C:HDL-c	--
Carvalho-Wells et al. 2012 (32)	Sequential Non-Randomized, Cross-Over Dietary Intervention	Single SNP*	Healthy men and women aged 35-70 years (*n*=88)	8 weeks per diet	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	**Low-Fat**: 4.0 mg/day EPA, 10.6 mg/d DPA, 11.7 mg/d DHA **High-SFA**: 20.2 mg/d EPA, 27.1 mg/d DPA, 15.4 mg/d DHA **High-SFA+DHA**: 524.3 mg/d EPA, 215.5 mg/d DPA, 3017.3 mg/d DHA [actual intakes reported (33)] (supplemental DHA for High-SFA+DHA; others from food sources)	*APOE*-E3/3 vs. *APOE*-E3/4	apoB apoC-III apoE HDL-c LDL-c sdLDL-c TG Total-c	**TG:** Significant diet x genotype interaction for TG; greater TG lowering response to high-SFA+DHA diet in *APOE*-E3/4 carriers (compared to high-SFA diet alone)
Caslake et al. 2008 (34)	Double-Blind, Randomized, Placebo-Controlled, Crossover Intervention	Single SNP*	Healthy men and women aged 20-70 years (*n*=312)	8 weeks per diet	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	Control oil: 0.0 g/d EPA and DHA Fish oil: 0.7 g/d EPA and DHA Fish oil: 1.8 g/d EPA and DHA (supplement)	*APOE*-E2/E2 + E2/E3 vs. *APOE*-E3/E3 vs. *APOE*-E3/E4 + E4/E4	HDL-c LDL-c TG Total-c	**TG:** Significant interaction between treatment x sex x genotype whereby *APOE*-E3/E4 + E4/E4 males exhibited the greatest TG reductions with both 0.7 g/d EPA and DHA as well as 1.8 g/d EPA and DHA compared to other genotypes
Cormier et al. 2012 (35)	Single Arm Clinical Trial	Single SNP	Healthy men and women aged 18-50 years (n=208)	6 weeks	*FADS* gene cluster (19 SNPs) [outlined in Supplementary Table 5]	*FADS:* 11q12.2	Fish oil: 5.0 g/day containing 1.9 g/day EPA and 1.1 g/day DHA (supplement)	Major allele homozygotes vs. Minor allele carriers	TG	--
Dang et al. 2015 (36)	Single Arm Clinical Trial	Single SNP*	Healthy men and women aged 20-35 years (n=80)	4 weeks	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	Fish oil containing 900 mg EPA and 680 mg DHA (supplement)	*APOE*-E4+ vs. *APOE*-E4-	HDL-c LDL-c TG Total-c	--
Dawczynski et al. 2013 (37)	Randomized, Placebo-Controlled, Double-Blind Intervention	Single SNP	Men and women with TG ≥ 1.7 mmol/L, otherwise healthy (n=47)	10 weeks	*CD36*, rs1761667, rs1049673	*CD36:* 7q21.11	Yogurt with lower dose fish oil: 0.8g/day omega-3 containing 0.01g ALA, 0.44g EPA, 0.06g DPA and 0.31g DHA (fish oil) Yogurt with higher dose fish oil: 3.0 g/day omega-3	Comparison between three genotypes	HDL-c TG	**HDL-c**: In response to omega-3 supplementation (0.8-3.0 g/day), HDL-c increased in GA genotype of *CD36* rs1761667 and CG genotype of *CD36* rs1049673. **TG**: In response to omega-3 supplementation (0.8-3.0 g/day), TG decreased in GA genotype of *CD36* rs1761667.

							containing 0.07g ALA, 1.59g EPA, 0.23g DPA and 1.12g DHA (fish oil) Control yogurt: commercial whole fruit yogurt with 3.5% milk fat (food)			
Ferguson et al. 2010 (38)	Randomized Intervention and Cross-Sectional (Baseline) Analysis	Single SNP	Men and women with metabolic syndrome from LIPGENE cohort (*n*=450)	12 weeks	*NOS3,* rs11771443, rs1800783, rs1800779, rs1799983, rs3918227, rs743507	*NOS3:* 7q36.1	1.24 g/d EPA+DHA supplement (intervention); quantity of omega-3 not reported for observational analyses	Major allele homozygotes vs. Minor allele carriers	apoA-1 apoB apoB-48 apoC-II apoC-III apoE HDL-c LDL-c TG Total-c	**TG:** For *NOS3* rs1799983 minor-allele (A) carriers only, the observational analysis indicated higher TG with lower EPA+DHA intake (and lower TG with higher EPA+DHA intake). Post-intervention with omega-3 supplementation indicated that only minor-allele (A) carriers exhibited significant TG reduction (accompanied by increases in plasma omega-3).
Harsløf et al. 2014 (39)	Randomized, Controlled Intervention	Single SNP and Genetic Score	Infants of Danish ancestry (n=133)	9 months	*PPARγ2*, Pro12Ala (rs1801282), *FADS1,* rs1535, *FADS2,* rs174575, *FADS3,* rs174448 *COX2,* rs5275, rs689466	*PPARγ2*: 3p25.2 *FADS:* 11q12.2 *COX2:* 1q25.2-q25.3	5.0 mL/day fish oil (median reported intake: 3.8 g/day containing 630 mg/day EPA and 620 mg/day DHA) (supplement)	*PPARγ2* genotype analyses were by major allele homozygotes vs. heterozygotes and *FADS* genotype analyses were by the number of DHA-increasing alleles and *COX2* genotype analyses were by major allele homozygotes vs. heterozygotes vs. minor allele homozygotes	HDL-c LDL-c TG Total-c	**TG:** *PPARγ2* heterozygotes exhibited reduced TG in response to omega-3 when compared to *PPARγ2* heterozygotes in the control (sunflower oil) group
Itariu et al. 2012 (40)	Randomized, Controlled Intervention	Single SNP	Men and women without diabetes with a BMI ≥40 kg/m^2 aged 20-65 years (n=55)	8 weeks	*PPARγ2*, Pro12Ala (rs1801282)	*PPARγ2*: 3p25.2	Fish oil containing 3.4 g/day EPA + DHA (supplement)	*PPARγ2*, Ala12 carriers vs. Pro12Pro	apoB HDL-c LDL-c TG Total-c	**apoB:** Significant increases in apoB with omega-3 intervention in Ala12 carriers when compared to Pro12 carriers. **Total-c:** Significant interaction effect whereby increases in total-c were exhibited with omega-3 intervention in Ala12 carriers when compared to the Pro12Pro genotype.
Jackson et al. 2012 (41)	Non-Randomized Intervention	Single SNP*	Healthy men aged 35-70 years (n=23)	8 weeks and 480-min postprandial	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	Fish oil containing 3.45 g/day DHA (supplement)	*APOE*-E3/3 vs. *APOE*-E3/4	apoB apoC-III apoE HDL-c LDL-c TG	**TG:** *APOE*-E3/E4 exhibited reduced fasting TG in response to a high saturated fat + DHA intervention when compared to the high saturated fat diet alone. There was also a significant interaction (meal x time x genotype) for the postprandial TG lowering response whereby *APOE*-E3/4 consuming a high saturated fat + DHA intervention exhibited significantly lower

									Total-c	postprandial TG, TG area under the curve, and TG maximum concentration compared to those consuming the high saturated fat diet alone.
Jackson et al. 2017 (42)	Non-Randomized Intervention	Single SNP*	Healthy men aged 35-70 years (n=23)	480-min postprandial	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	Fish oil containing 3.45 g/day DHA (supplement)	*APOE*-E3/3 vs. *APOE*-E3/4	apoB-48 apoB-100	--
Lindi et al. 2003 (43)	Randomized Intervention	Single SNP	Healthy men and women aged 30-65 years (*n*=150)	3 months	*PPARγ2*, Pro12Ala (rs1801282)	*PPARγ2*: 3p25.2	Fish oil containing 2.4 g/d EPA + DHA (supplement)	*PPARγ2*, Ala12 carriers vs. Pro12Pro	HDL-c LDL-c TG Total-c	**TG:** Compared to Pro12Pro, Ala12 carriers exhibited significantly greater TG reductions in response to omega-3 supplementation only when total fat intake was ≤37 %kcal or SFA intake was ≤10 %kcal
Lindman et al. (44)	Randomized, Controlled Intervention	Single SNP	Men at high risk of cardiovascular disease aged 65-75 years (n=204)	6 months	*FVII,* rs6046	*FVII:* 13q34	Fish oil containing 2.4 g/d EPA + DHA Dietary advice including recommendations to increase omega-3 (supplement and food)	Major allele homozygotes vs. Minor allele carriers	TG	**--**
Madden et al. 2008 (45)	Non-Randomized Intervention	Single SNP	Healthy men aged 43-84 years (*n*=111)	12 weeks	*CD36,* rs1527483, rs1049673, rs1761667, rs1984112	*CD36:* 7q21.11	Fish oil containing 1.02 g/d EPA and 0.69 g/d DHA (supplement)	For each SNP: AA vs. AG vs. GG	HDL-c LDL-c LDL-c:HDL-c TG	**TG:** In response to omega-3 supplementation, TG significantly reduced only in individuals with the GG genotype, for each SNP individually (i.e. for rs1527483, rs1049673, rs1761667 and rs1984112 individually) **LDL-c:** In response to omega-3 supplementation, LDL-c increased only in individuals with the rs1761667 AA genotype as well as for individuals with the rs1984112 AA genotype **HDL-c:** In response to omega-3 supplementation, HDL-c significantly increased in individuals with rs1761667 AA or AG as well as for individuals with the CC or CG genotype for either rs1984112, rs1527483 and/or rs1049673; NOTE: rs1527483 results should be interpreted with caution due to low sample sizes for AA and AG genotypes thus reducing statistical power)
Markovic et al. 2004 (46)	Single-Arm Clinical Trial	Single SNP	Healthy men (n=159)	12 weeks	*TNFα,* -308 (rs1800629) *LT-α,* +252 (rs909253) *IL-1β,* -511 (rs16944) *IL-6,* -174 (rs1800795)	*TNFα:* 6p21.33 *LT-α:* 6p21.33 *IL-1β:* 2q14.1 *IL-6:* 7p15.3	Fish oil containing 1.8 g/d EPA+DHA (supplement)	Major allele homozygotes vs. Minor allele carriers *or* Comparison between three genotypes (depending on allele frequencies)	TG	**TG:** Significant negative correlation between pre-supplementation TG and change of TG during omega-3 supplementation for all genotypes of genes studied except for *LT-α* rs909253 GG genotype and *IL-1β* rs16944 TT genotype. In *LT-α* rs909253 AA genotype and *TNFα* rs1800629 AA genotype, signification association between BMI (divided in tertiles) and TG changes.
McColley et al. 2011 (47)	Crossover Intervention	Single SNP	Healthy post-menopausal women (n=16)	8 weeks per diet	*FABP2,* rs1799883	*FABP2:* 4q26	**High-Fat:** 50 %kcal from dietary fat **Low-Fat:** 20 %kcal from dietary fat **Low-Fat + omega-3:** 23% kcal from dietary fat with 3 %kcal from omega-3 (food)	Major allele homozygotes vs. Minor allele carriers	TG	--

Minihane et al. 2000 (48)	Double-Blind, Randomized, Placebo-Controlled, Crossover Intervention	Single SNP*	Healthy men aged 30-70 years at risk of atherogenic lipoprotein phenotype (*n*=50)	6 weeks per diet and 480 minute postprandial	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	Fish oil containing 3.0 g/d EPA and DHA, Control oil: 6.0 g/d olive oil capsule (supplement)	*APOE*-E2/E3 vs. *APOE*-E3/E3 vs. *APOE*-E3/E4 + E4/E4	HDL-c LDL-c TG Total-c Total-c:HDL	**TG:** Postprandial: Significantly greater reduction in TG incremental area under postprandial TG curve in *APOE*-E2/E3 relative to other *APOE* genotype categories **Total-c:** 6-week: *APOE*-E3/E4 + E4/E4 genotype group exhibited significantly different changes in total-c (increase), relative to other *APOE* genotypes, whereby reductions in total-c occurred
Olano-Martin et al. 2010 (49)	Randomized, Cross-Over Intervention	Single SNP*	Healthy normolipidemic men (*n*=38)	4 weeks per diet	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	EPA-rich fish oil: 3.3 g/d EPA DHA-rich fish oil: 3.7 g/d DHA Control oil: 80:20 palm olein:soyabean (supplement)	*APOE*-E3/3 vs. *APOE*-E3/4 (carriers)	apoB apoE HDL-c LDL-c TG TG:HDL-c Total-c	**apoB, LDL-c:** In *APOE*-E4 carriers only, DHA-rich oil treatment resulted in significant increases in apoB and LDL-c **TG:** Significant reduction in TG in response to both EPA and DHA in *APOE*-E3/E3 group; significant reduction in TG in *APOE*-E4 carriers with EPA only. No significant interactions. **Total-c:** Significant genotype x treatment interaction whereby *APOE*-E4 carriers exhibit total-c reductions in response to EPA-rich oil.
Ouellette et al. 2013 (50)	Single-Arm Clinical Trial	Single SNP	Healthy men and women aged 18-50 (*n*=210)	6 weeks	*GPAM* (3 SNPs), *AGPAT3* (13 SNPs), *AGPAT4* (35 SNPs) [outlined in Supplementary Table 5]	*GPAM:* 10q25.2 *AGPAT3:* 21q22.3 *AGPAT4:* 6q26	Fish oil containing 1.9-2.2 g/d EPA + 1.1 g/d DHA (supplement)	Major allele homozygotes vs. Minor allele carriers *or* Comparison between three genotypes (depending on allele frequencies)	HDL-c LDL-c TG Total-c	**LDL-c:** Significant *GPAM*, rs2792751 genotype x supplementation interaction on LDL-c **TG:** Significant genotype x supplementation interaction on TG for *GPAM,* rs2792751 and rs17129561 as well as *AGPAT4,* rs9458172 and rs3798943
Ouellette et al. 2014 (51)	Single-Arm Clinical Trial	Single SNP	Healthy men and women 18-50 years (*n*=208)	6 weeks	*MGLL* (18 SNPs) [outlined in Supplementary Table 5]	*MGLL:* 3q21.3	Fish oil containing 1.9-2.2 g/d EPA + 1.1 g/d DHA (supplement)	Major allele homozygotes vs. Minor allele carriers *or* Comparison between three genotypes (depending on allele frequencies)	apoB HDL-c LDL-c LDL particle size TG Total-c	**LDL-c:** Significant interactions for *MGLL* rs6776142, rs555183, rs782444, rs6787155 and rs1466571 whereby omega-3 supplementation modulated LDL-c levels; rs782444 and rs555183 minor allele homozygotes more likely to be negative responders to omega-3 supplementation (i.e. exhibit reduced LDL-c); rs6780384, rs782444 and rs6787155 major allele homozygotes more likely to be negative responders to omega-3 supplementation **LDL particle size:** Significant interactions for *MGLL* rs782440, rs13076543 and rs9877819 whereby omega-3 supplementation modulated LDL particle size; rs549662 minor allele homozygotes more likely to be positive responders to omega-3 supplementation (i.e. exhibit increased LDL particle size)
Paschos et al. 2005 (52)	Single-Arm Clinical Trial	Single SNP*	Men with dyslipidemia, aged 35 to 67 years (n=50)	12 weeks	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	8.1 g/day ALA (via 15 ml of Flaxseed oil supplementation)	*APOE*-E2/E3 vs. *APOE*-E3/E3 vs. *APOE*-E3/E4	ApoA-I ApoB HDL-c LDL-c TG Total-c	**ApoA-I:** Significant decrease in E3/E3 **HDL-c:** Significant decrease in E3/E3
Pishva et al. 2010 (53)	Single-Arm Clinical Trial	Single SNP	Adults with hypertriglyceridemia (n=46)	8 weeks	*FABP2,* Ala54Thr (rs1799883)	*FABP2:* 4q26	2.0 g/day pure EPA (supplement)	Ala54Ala (GG) vs. Thr54 carriers (GT+TT)	ApoB ApoC-III HDL-c LDL-c TG Total-c	**ApoC-III:** In response to EPA supplementation, significantly greater reductions in ApoC-III in GT+TT genotypes of rs1799883 compared to GG genotype. **HDL-c:** In response to EPA supplementation, significantly greater increases in HDL-c in GT+TT genotypes of rs1799883 compared to GG genotype. **LDL-c:** In response to EPA supplementation, LDL-c significantly decreased in GG genotypes of rs1799883 but not GT+TT genotypes. **TG:** In response to EPA supplementation, significantly greater reductions in TG in GT+TT genotypes of rs1799883 compared to GG genotype.
Pishva et al.	Single-Arm	Single SNP	Adults with	8 weeks	*PPARα*,	*PPARα* : 22q13.31	2.0 g/day pure	Leu162	ApoB	--

2014 (54)	Clinical Trial		hypertriglyceridemia (n=46)		Leu162Val (rs1800206) *PPARα*, Intron 7 SNP		EPA (supplement)	vs. Val162 carriers *and* Intron 7 GG vs Intron 7 GC	ApoCIII HDL-c LDL-c TG Total-c	
Roke and Mutch, 2014 (55)	Single-Arm Clinical Trial	Single SNP	Men aged 18-25 years (n=12)	12 weeks (+8 week washout)	*FADS1*, rs174537 *FADS2*, rs174576 (LD=1.0 therefore presented results for rs174537)	*FADS1/2:* 11q12.2	Fish oil containing 1.8 g/d EPA+DHA (supplement)	Major allele homozygotes vs. Minor allele carriers	HDL-c LDL-c TG Total-c Total-c:HDL-c	--
Rudkowska et al. 2014 (56)	Single-Arm Clinical Trial	Single SNP	Healthy men and women aged 18-50 (*n*=210)	6 weeks	*SCD1*, rs1502593, rs522951, rs11190480, rs3071, rs3829160, rs2234970, rs10883463, rs508384	*SCD1 :* 10q24.31	Fish oil containing 1.9-2.2 g/d EPA + 1.1 g/d DHA (supplement)	Comparison between three genotypes	HDL-c LDL-c TG Total-c Total-c:HDL-c	**TG:** For *SCD1* rs508384, AA genotype was associated with lower TG than CA and CC genotypes both pre- and post-supplementation.
Rudkowska et al. 2014 (57)	Single-Arm Clinical Trial	Nutrigenomic GWAS	Healthy men and women aged 18-50 (*n*=141) + Replication of GRS in FINGEN study (n=310)	6 weeks	Genetic Risk Score including: *IQCJ-SCHIP1* (4 SNPs), *SLIT2* (3 SNPs), *PHF17* (3 SNPs), *MYB* (1 SNP), *NXPH1* (1SNP), *NELL1* (1SNP) [outlined in Supplementary Table 5]	*IQCJ-SCHIP1:* 3q25.32 *SLIT2:* 4p15.31 *PHF17:* 4q28.2 *MYB:* 6q23.3 *NXPH1:* 7p21.3 *NELL1:* 11p15.1	Fish oil containing 1.9-2.2 g/d EPA + 1.1 g/d DHA (supplement)	Responders versus non-responders (i.e. TG response) to supplementation	TG	Thirteen SNPs were associated with TG response to omega-3 supplementation and 10 were used in the GRS calculation. The GRS was significantly associated with TG response. **TG**: The GRS explained 21.5% of the variation in TG response when adjusted for age, sex and BMI. Replication of this GRS in the FINGEN study: the GRS explained 2.0% of the TG change but the association as NS (adjusted for age, sex and BMI).
Scorletti et al. 2015 (58)	Randomized, Placebo-Controlled, Double-Blind Intervention	Single SNP	Men and women with non-alcoholic fatty liver disease (n=95)	15-18 months	*PNPLA3, I148M (rs738409) TM6SF2, E167K (rs58542926)*	*PNPLA3:* 22q13.31 *TM6SF2:* 19p13.11	1.8 g/day EPA+ 1.5 g/day DHA (supplement)	Comparison between three genotypes *and* Major allele homozygotes vs. Minor allele carriers	TG	--
Thifault et al. 2013 (59)	Single-Arm Clinical Trial	Single SNP*	Healthy men and women with overweight or obesity aged 18-50 (*n*=210)	6 weeks	*APOE*, rs429358, rs7412	*APOE:* 19q13.32	Fish oil containing 1.9-2.2 g/d EPA and 1.1 g/d DHA (supplement)	*APOE*-E2 vs. *APOE*-E3 vs. *APOE*-E4	apoB HDL-c LDL-c TG Total-c	--
Tremblay et	Single-Arm	Single SNP	Healthy men	6 weeks	*PLA2G2A* (5	*PLA2G2A:*	Fish oil containing	Major allele	apoB-100	**TG:** omega-3 supplementation significantly reduced TG in

al. 2015 (60)	Clinical Trial		and women aged 18-50 years (*n*=208)		SNPs), *PLA2G2C* (6 SNPs), *PLA2G2D* (8 SNPs), *PLA2G2F* (6 SNPs), *PLA2G4A* (22 SNPs), *PLA2G6* (5 SNPs), *PLA2G7* (9 SNPs) [outlined in Supplementary Table 5]	1p36.13 *PLA2G2C*: 1p36.13 *PLA2G2D*: 1p36.12 *PLA2G2F*: 1p36.12 *PLA2G4A:* 1q31.1 *PLA2G6:* 22q13.1 *PLA2G7:* 6p12.3	1.9 g/d EPA + 1.1 g/d DHA (supplement)	homozygotes vs. Minor allele carriers *or* Comparison between three genotypes (depending on allele frequencies)	HDL-c LDL-c TG Total-c	*PLA2G7* rs1805018 as well as *PLA2G4A* rs10752979, rs10737277, rs7540602 and rs3820185; in the linear regression model, *PLA2G6* rs132989, *PLA2G7* rs679667, *PLA2G2D* rs12045689, *PLA2G4A* rs 10752979 and rs1160719 together explained 5.9% of post-supplementation TG levels
Vallée Marcotte et al. 2016 (61)	Single-Arm Clinical Trial	Nutrigenomic GWAS	Men and woman aged 18-50 years (*n*=208)	6 weeks	*IQCJ* (16 SNPs), *NXPH1* (34 SNPs), *PHF17* (8 SNPs), *MYB* (9 SNPs) [outlined in Supplementary Table 5]	*IQCJ:* 3q25.32 *NXPH1:* 7p21.3 *PHF17:* 4q28.2 *MYB:* 6q23.3	Fish oil containing 1.9-2.2 g/d EPA + 1.1 g/d DHA (supplement)	Comparison between three genotypes	TG	**TG:** Significant gene-diet interaction on TG levels pre- vs. post-supplementation for the following SNPs: *IQCJ* (10 SNPs: rs2044704, rs1962071, rs6800211, rs17782879, rs1868414, rs2595260, rs9827242, rs1449009, rs2621309, rs61332355), *NXPH1* (4 SNPs: rs7806226, rs7805772, rs2349780, rs6974252), *MYB* (3 SNPs: rs9321493, rs11154794, rs210962). Four SNPs were still significant after applying the false discovery rate to account for multiple testing: rs1449009, rs2621309, rs61332355 in *IQCJ*; rs7805772 in *NXPH1*. There were four dominant SNPs driving the association with the TG response: rs61332355 and rs9827242 in *IQCJ*, rs7805772 in *NXPH1* and rs11154794 in *MYB*. Significant differences in genotype frequencies between positive and negative responders to omega-3 for TG changes for *IQCJ* rs2044704, rs1962071, rs17782879, rs1868414, rs2595260, rs9827242, rs1449009, rs2621309, rs61332355, *NXPH1* rs7806226, rs7805772, *MYB* rs11154794 and rs210936.
Vallée Marcotte et al. 2019 (62)	Single-Arm Clinical Trial (replication of GRS in a novel cohort)	Nutrigenomic GWAS	Healthy adults of Mexican descent aged 18-40 years (n=191)	6 weeks	Genetic Risk Score including 103 SNPs: [outlined in Supplementary Table 5]	NA	Fish oil containing 1.9 g/day EPA + 0.8 g/day DHA (supplement)	Responders versus non-responders (i.e. TG response) to supplementation	TG	**TG:** A first 7-SNP GRS [SNPs selected based on previously developed GRS (57,61)] did not explain TG variation. A second GRS calculated from 103 SNPs significantly explained 4.4% of TG variation. A third GRS including the 5 most relevant SNPs significantly explained 11.0% of TG variation (*NXPH1* rs10265408, rs10486228, rs10486228, rs17150341, rs6974252 and *IQCJ-SCHIP1* rs2595241). When subjects with the lowest TG change were not included, this third GRS explained more TG variation. Including only the 28 responders and 28 non-responders with the greatest TG variation, this third GRS explained 29.1% of TG variation.
Vallée Marcotte et al. 2019 (63)	Single-Arm Clinical Trial	Nutrigenomics GWAS (polygenic)	Men and woman aged 18-50 years with overweight or obesity (*n*=208)	6 weeks	GWAS; GRS included 31 SNPs [outlined in Supplementary Table 5]	NA	Fish oil containing 1.9-2.2g/d EPA + 1.1g/d DHA (supplement)	Responders to omega-3 supplementation for TG reduction vs. Non-Responders	TG	**TG:** 31 SNPs associated with TG response to omega-3 supplementation and used in GRS calculation; Lower GRSs were significantly more responsive to omega-3 supplementation for TG reduction compared to higher GRS (GRS accounted for 49.7% of TG responses); These findings were replicated in the FINGEN study with 23 SNPs (GRS accounted for 3.7% of TG responses).
Vallée Marcotte et al. 2020 (64)	Double-Blind, Randomized, Controlled, Crossover Intervention	Nutrigenomics GWAS (polygenic)	Men and women with abdominal obesity and elevated CRP aged 18-70	10 weeks per diet	GRS included 30 SNPs [outlined in Supplementary Table 5]	NA	Control oil: 3 g/d corn oil Pure EPA: 2.7 g/d Pure DHA: 2.7 g/d (supplement)	Responders to different types of omega-3 supplementation for TG reduction vs.	TG	**TG:** The GRS was significantly associated with responsiveness to EPA for TG reduction when comparing responders vs. non-responders vs. adverse responders (trend, p=0.08, for DHA). The GRS was significantly associated with responsiveness to both EPA and DHA for TG reduction when comparing responders vs. adverse responders.

			years (n=122)					Non-Responders vs. Adverse Responders *and* Responders vs. Adverse Responders		
Wu et al. 2014 (65)	Double-Blind, Randomized, Placebo-Controlled, Crossover Intervention	Single SNP	Men and women with moderate risk of CVD (n=84)	8 weeks	*eNOS* Glu298Asp (rs1799983)	*NOS3:* 7q36.1	Fish oil containing 0.9 g/day EPA + 0.6 g/day DHA (supplement)	Major allele homozygotes (GG) vs. Minor allele carriers (GT+TT)	LDL-c HDL-c TG Total-c	--
Zheng et al. 2018 (66)	Double-Blind, Randomized, Controlled Intervention	Single SNP and Polygenic	Men and women with type 2 diabetes aged 35-80 years for men or postmenopausal and 80 years for women (*n*=139)	25 weeks	*CD36,* rs1527483 NOS3, rs1799983 *PPARγ2,* rs1801282	*CD36:* 7q21.11 *NOS3:* 7q36.1 *PPARγ2*: 3p25.2	Fish oil: 2.0 g/d EPA and DHA Flaxseed oil: 2.5 g/d ALA Control oil: corn oil (supplement)	Major allele homozygotes vs. Minor allele carriers and High vs. low genetic score calculated based on three SNPs	HDL-c LDL-c TG Total-c:HDL-c Total-c	**LDL-c:** significant interaction for *PPARγ2* rs1801282 genotype, intervention group and LDL-c change; but increased LDL-c in G allele carriers of *PPARγ2* rs1801282 compared to CC genotype *only in the control* (corn oil) group **TG:** omega-3 fish oil (but not flaxseed oil) supplementation reduced TG for individuals with the *CD36* rs1527483 GG genotype (significant interaction); significant interaction between genetic score and omega-3 on TG levels whereby omega-3 (fish oil and flaxseed oil) supplementation significantly reduced TG levels compared to control only in individuals with high genetic scores

ALA: alpha-linolenic acid, Apo: apolipoprotein, DHA: docosahexaenoic acid, EPA: eicosapentaenoic acid, HDL: high-density lipoprotein cholesterol, LDL: low-density lipoprotein cholesterol, omega-3: omega-3, N/A: not applicable, NS: Non-significant, sdLDL-c: small, dense, low-density lipoprotein cholesterol, SNP: single nucleotide polymorphism, TG: triglycerides

1. All other (not listed) gene/omega-3/lipid/lipoprotein results of interest to the present review were NS

Participants are described as "healthy" for studies that incorporated exclusion criteria for certain conditions, blood lipid levels, etc. and when studies described the population as "healthy."

'--' indicates that all the completed gene/omega-3/lipid/lipoprotein analyses were NS

*Human *APOE* is polymorphic at two single nucleotides (rs429358 and rs7412) resulting in three different alleles (ε 2, ε 3 and ε 4)

Supplementary Table 4: Genes, SNPs, lipid/lipoprotein outcomes and studies included in evidence grading process and guideline development

Gene, SNP(s)	Outcome	Studies
APOE: rs429358, rs7412	TG	AbuMweis et al. 2018 (24) Carvalho-Wells et al. 2012 (32) Caslake et al. 2008 (34) Dang et al. 2015 (36) Jackson et al. 2012 (41) Olano-Martin et al. 2010 (49) Minihane et al. 2000 (48) Paschos et al. 2005 (52) Thifault et al. 2013 (59)
APOE: rs429358, rs7412	Total-c	Fallaize et al. 2016 (7) AbuMweis et al. 2018 (24) Carvalho-Wells et al. 2012 (32) Caslake et al. 2008 (34) Dang et al. 2015 (36) Jackson et al. 2012 (41) Olano-Martin et al. 2010 (49) Paschos et al. 2005 (52) Thifault et al. 2013 (59)
PPARγ2: rs1801282	LDL-c	Binia et al. 2017 (27) Harsløf et al. 2014 (39) Itariu et al. 2012 (40) Lindi et al. 2003 (43) Zheng et al. 2018 (66)
PPARγ2: rs1801282	Total-c	Binia et al. 2017 (27) Harsløf et al. 2014 (39) Itariu et al. 2012 (40) Lindi et al. 2003 (43) Zheng et al. 2018 (66)
PPARγ2: rs1801282	TG	Binia et al. 2017 (27) Harsløf et al. 2014 (39) Itariu et al. 2012 (40) Lindi et al. 2003 (43) Zheng et al. 2018 (66)
CD36: rs1761667	HDL-c	Dawczynski et al. 2013 (37) Madden et al. 2008 (45)
CD36: rs1761667	TG	Dawczynski et al. 2013 (37) Madden et al. 2008 (45)
CD36: rs1049673	HDL-c	Dawczynski et al. 2013 (37) Madden et al. 2008 (45)
CD36: rs1527483	TG	Madden et al. 2008 (45) Zheng et al. 2018 (66)
FADS: rs174547*	Total-c	Dumont et al. 2011 (5) Dumont et al. 2018 (6) Lu et al. 2010 (17) Standl et al. 2012 (20) Alsaleh et al. 2014 (25) AbuMweis et al. 2018 (24) Roke et al. 2014 (55)
31-SNP Genetic Risk Score	TG	Vallée Marcotte et al. 2019 (67) Vallée Marcotte et al. 2020 (64)

Supplementary Table 5: Additional list of gene(s) and SNP(s) tested in studies

Study	*Gene(s)*, SNP(s)
Chen et al. Int J Obes;43:808-820 (2019)	*FADS2,* rs174599, rs174601, rs556656, rs11501631, rs74771917, rs3168072, rs182008711, rs73487492, rs174602, rs12577276 *FADS3,* rs191972868, rs115905177, rs174635, rs174634, rs174454, rs12292968, rs174570, rs7930349, rs116672159, rs116139751, rs7942717, rs7115739, rs174450, rs74626285 *RAB3IL1,* rs741887, rs2521561, rs2727258, rs2524288, rs117518711, rs74957100, rs77071864, rs78243280, rs741888, rs2524287, rs12420625, rs77229376, rs187943834, rs78156005, rs190738753, rs11230827, rs76133863, rs116985542, rs73491252
Cormier et al. Nutrients;4:1026-41 (2012)	*FADS* gene cluster rs174456, rs174627, rs482548, rs2072114, rs12807005, rs174448, rs2845573, rs7394871, rs7942717, rs74823126, rs174602, rs498793, rs7935946, rs174546, rs174570, rs174579, rs174611, rs174616, rs968567
Vallée Marcotte et al. Am J Clin Nutr;109:176–185 (2019)	*IQCJ-SCHIP1*, rs7639707, rs62270407 NXPH1, rs61569932, rs1990554, rs6463808, rs6966968, rs28473103, rs28673635, rs12702829, rs78943417, rs293180, rs1837523 *PHF17*, rs1216346, rs114348423, rs75007521 *MYB,* rs72560788, rs72974149, rs210962, rs6933462 *NELL1*, rs79624996, rs1850875, rs78786240, rs117114492 *SLIT2,* rs184945470, rs143662727, rs10009109, rs10009535, rs61790364, rs73241936, rs16869663, rs76015249
Tremblay et al. Lipids in Health and Disease (2015) 14:12	*PLA2G2A*, rs876018, rs955587, rs3753827, rs11573156, rs11573142 *PLA2G2C*, rs6426616, rs12139100, rs10916716, rs2301475, rs10916712, rs10916718 *PLA2G2D*, rs578459, rs16823482, rs3736979, rs584367, rs12045689, rs679667, rs17354769, rs1091671 *PLA2G2F*, rs12065685, rs6657574, rs11582551, rs818571, rs631134, rs11583904 *PLA2G4A*, rs979924, rs2076075, rs3736741, rs10911949, rs10752979, rs1160719, rs10737277, rs12720702, rs7522213,

	rs7540602, rs10157410, rs12720497, rs4651331, rs1569480, rs10911935, rs12353944, rs11576330, rs10489410, rs10911946, rs3820185, rs12746200, rs11587539 *PLA2G6*, rs5750546, rs132989, rs133016, rs2235346, rs2284060 *PLA2G7*, rs12195701, rs12528807, rs1421368, rs1421378, rs17288905, rs1805017, rs1805018, rs6929105, rs7756935
Ouellette et al. J Nutrigenet Nutrigenomics;6:268–280 (2013)	*GPAM*, rs17129561, rs10787428, rs2792751 *AGPAT3*, rs999519, rs2838440, rs2838445, rs2838458, rs4818873, rs9978441, rs9982600, rs11700575, rs17004619, rs2838452, rs2838456, rs3788086, rs2838429 *AGPAT4*, rs746731, rs747866, rs1125640, rs2277092, rs2293286, rs3757025, rs3798225, rs3798920, rs3798924, rs3798929, rs3798943, rs3798945, rs3822853, rs3823058, rs4709501, rs6906489, rs6923835, rs7750302, rs7769321, rs9458172, rs10945713, rs10945719, rs11965825, rs12202278, rs17627837, rs12524665, rs1001422, rs6455711, rs9456642, rs2064721, rs3778227, rs3798922, rs11967514, rs7768457, rs12662114
Ouellette et al. Lipids in Health and Disease, 13:86 (2014)	*MGLL,* rs782440, rs16826716, rs6776142, rs9877819, rs555183, rs6780384, rs13076593, rs605188, rs6765071, rs782444, rs549662, rs3773155, rs541855, rs6439081, rs6439082, rs6787155, rs1466571, rs893294
Bouchard-Mercier et al. Genes Nutr 9:395 (2014)	*GCK,* rs2268573, rs2908297, rs2971676, rs758989, rs12673242, rs2908290, rs2284777, rs2300584, rs1990458, rs741038, rs1799884, rs2908277, rs3757838
Bouchard-Mercier et al. Nutrients, 6, 1145-1163 (2014)	*RXRA*, rs10881576, rs7871655, rs12339187, rs11185660, rs11103473, rs10776909, rs12004589, rs3132301, rs1805352, rs3132294, rs1805343, rs1045570 *CPT1A*, rs3019598, rs897048, rs7942147, rs4930248, rs11228364, rs11228368, rs10896371, rs1017640, rs613084 *ACADVL*, rs2017365 *ACAA2*, rs529556, rs10502901, rs631536, rs1942421, rs2276168, rs7237253 *ABCD2*, rs4072006, rs10877201, rs12582802, rs4294600, rs11172696, rs10877173, rs7133376, rs7968837 *ACOX1*, rs10852766, rs3744033, rs12430, rs8065144, rs11651351, rs3643, rs7213998, rs17583163

	ACAA1, rs2239621, rs156265, rs5875
AlSaleh et al. Genes Nutr 9:412 (2014)	*CETP*, rs3764261, rs247616, rs7205804 *LIPC*, rs1532085 *APOB*, rs1367117 *ABCG5, ABCG8*, rs4299376 *TIMD4, HAVCR1*, rs6882076, rs1501908, rs1553318 GCKR, rs1260326, rs780094 TRIB1, rs2954022, rs10808546, rs2954029 *ANGPTL3, DOCK7*, rs3850634, rs1167998, rs2131925 *FADS1, FADS2, FADS3*, rs174550, rs174547, rs174546, rs174583 *GALNT2*, rs4846914, rs1321257 *ABCA1,* rs4149268 *APOE, APOC1, APOC2,* rs439401
Vallée Marcotte et al. Genes & Nutrition 15:10 (2020)	*IQCJ-SCHIP1*, rs7639707, rs62270407 NXPH1, rs61569932, rs1990554, rs6463808, rs6966968, rs28473103, rs28673635, rs12702829, rs78943417, rs293180, rs1837523 *PHF17*, rs1216346, rs114348423, rs75007521 *MYB,* rs72560788, rs72974149, rs210962, rs6933462 *NELL1*, rs79624996, rs1850875, rs78786240, rs117114492 *SLIT2,* rs184945470, rs143662727, rs10009109, rs10009535, rs61790364, rs73241936, rs16869663, rs76015249
Rudkowska et al. Journal of Lipid Research 55 (2014)	*IQCJ-SCHIP1, MYB, NELL1, NXPH1, PHF17, SLIT2,* rs2621308, rs1449009, rs61332355, rs2621309, rs2952724, rs2629715, rs1216352, rs1216365, rs931681, rs6920829, rs6463808, rs752088
Vallée Marcotte et al. J Nutrigenet Nutrigenomics;9 :1-11 (2016)	*IQCJ*, rs12497650, rs4501157, rs13091349, rs2044704, rs1062071, rs7634829, rs2621294, rs6800211, rs17782879, rs1868414, rs2595260, rs6763890, rs9827242, rs1449009, rs2621309, rs61332355 *NXPH1*, rs6956210, rs2107779, rs10273195, rs12216689, rs6963644, rs17150341, rs1013868, rs12537067, rs4318981,

	rs17153997, rs7801099, rs4725120, rs1859275, rs10238726, rs1012960, rs11767429, rs4333500, rs7793115, rs7799856, rs7806226, rs13221144, rs17406479, rs10486228, rs17154569, rs4141002, rs7805772, rs2349780, rs2107474, rs11769942, rs6952383, rs6974252, rs10265408, rs2189904, rs2057862 PHF17, rs2217023, rs4975270, rs11722830, rs12505447, rs6534704, rs13148510, rs13143771, rs13142964 *MYB*, rs9321493, rs11154794, rs210798, rs210936, rs7757388, rs210962, rs17639758, rs1013891, rs2179308
Vallée Marcotte et al. Nutrients; 11, 737 (2019)	*IQCJ-SCHIP1*, rs12497650, rs4501157, rs13091349, rs2044704, rs1962071, rs7634829, rs2621294, rs6800211, rs17782879, rs1868414, rs2595260, rs6763890, rs1449009, rs61332355, rs12485627, rs2595242, rs7639937, rs9820807, rs1375409, rs1967363, rs9824310, rs11915303, rs9835214, rs11921343, rs13066560, rs1675497, rs9839862, rs16829875, rs17795566, rs9860588, rs16830408, rs17798579, rs2364930, rs9865997, rs2595241, rs7632574, rs2621308 *NXPH1*, rs6956210, rs2107779, rs10273195, rs12216689, rs6963644, rs17150341, rs1013868, rs4318981, rs17153997, rs7801099, rs4725120, rs10238726, rs1012960, rs11767429, rs4333500, rs7793115, rs7799856, rs7806226, rs13221144, rs17406479, rs10486228, rs17154569, rs4141002, rs7805772, rs2349780, rs2107474, rs11769942, rs6952383, rs6974252, rs10265408, rs2189904, rs2057862, rs6463808 *PHF17*, rs2217023, rs4975270, rs11722830, rs12505447, rs6534704, rs13148510, rs13143771, rs13142964, rs1216352, rs1216365 *MYB*, rs9321493, rs11154794, rs210798, rs210936, rs7757388, rs17639758, rs1013891, rs2179308, rs6920829, *SLIT2,* rs2952724 *NELL1*, rs752088

Supplementary Table 6: 31-SNP Nutri-GRS

***Gene*, rs Number**	**Alleles[1]**	**Associated Points**
IQCJ-SCHIP1, rs7639707	A/G	+1
IQCJ-SCHIP1, rs62270407	C/T	-1
NXPH1, rs61569932,	G/T	+1
NXPH1, rs1990554	A/C	+1
NXPH1, rs6463808	A/G	+1
NXPH1, rs6966968	A/G	+1
NXPH1, rs28473103	A/G	-1
NXPH1, rs28673635	A/G	+1
NXPH1, rs12702829	C/T	+1
NXPH1, rs78943417	A/T	-1
NXPH1, rs293180	G/T	+1
NXPH1, rs1837523	C/T	-1
PHF17, rs1216346	C/T	+1
PHF17, rs114348423	A/G	+1
PHF17, rs75007521	G/T	-1
MYB, rs72560788	C/T	-1
MYB, rs72974149	A/G	-1
MYB, rs210962	C/T	-1
MYB, rs6933462	C/G	+1
NELL1, rs79624996	A/G	+1
NELL1, rs1850875	C/T	+1
NELL1, rs78786240	C/T	-1
NELL1, rs117114492	G/T	+1
SLIT2, rs184945470	C/T	+1
SLIT2, rs143662727	A/G	-1
SLIT2, rs10009109	C/T	+1
SLIT2, rs10009535	A/G	+1
SLIT2, rs61790364	A/G	+1
SLIT2, rs73241936	C/T	+1
SLIT2, rs16869663	A/G	+1
SLIT2, rs76015249	A/G	+1

1. Minor alleles are underlined

For individuals carrying one or two minor alleles, provide the associated number of points (either +1 or -1). For individuals homozygous for the major allele, provide 0 points. Count the overall number of points. Individuals with lower nutri-GRS are more likely to respond to approximately 3.0 g/day EPA+DHA for TG lowering.

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