**Table e-5: Results logistic regressions with metabolite concentrations, lipid lowering medication usage, body mass index, sex, and age as independent variables and migraine status as dependent variable for males and females.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Metabolite abbreviation** | **Males** | | | | | **Females** | | | | |
| Β | CI | Unadjusted P-value | P-value | I2 (%) | Β | CI | Unadjusted P-value | P-value | I2 (%) |
| XXL-VLDL-P | 0.00 | -0.10:0.09 | 0.981 | 1.000 | 0 | 0.05 | -0.02:0.13 | 0.128 | 1.000 | 1 |
| XXL-VLDL-L | 0.00 | -0.10:0.09 | 0.978 | 1.000 | 0 | 0.06 | -0.02:0.13 | 0.123 | 1.000 | 3 |
| XXL-VLDL-PL | -0.02 | -0.11:0.08 | 0.710 | 1.000 | 0 | 0.05 | -0.03:0.12 | 0.203 | 1.000 | 4 |
| XXL-VLDL-C | -0.01 | -0.11:0.09 | 0.814 | 1.000 | 0 | 0.05 | -0.02:0.12 | 0.141 | 1.000 | 1 |
| XXL-VLDL-CE | -0.02 | -0.11:0.08 | 0.734 | 1.000 | 0 | 0.06 | -0.01:0.13 | 0.093 | 1.000 | 3 |
| XXL-VLDL-FC | 0.00 | -0.09:0.10 | 0.987 | 1.000 | 0 | 0.05 | -0.03:0.13 | 0.204 | 1.000 | 14 |
| XXL-VLDL-TG | 0.00 | -0.10:0.09 | 0.979 | 1.000 | 0 | 0.06 | -0.02:0.13 | 0.142 | 1.000 | 7 |
| XL-VLDL-P | -0.03 | -0.12:0.07 | 0.603 | 1.000 | 0 | 0.06 | -0.02:0.15 | 0.129 | 1.000 | 16 |
| XL-VLDL-L | -0.02 | -0.12:0.08 | 0.663 | 1.000 | 0 | 0.07 | -0.02:0.15 | 0.110 | 1.000 | 18 |
| XL-VLDL-PL | -0.02 | -0.12:0.07 | 0.651 | 1.000 | 0 | 0.06 | -0.02:0.13 | 0.145 | 1.000 | 8 |
| XL-VLDL-C | -0.01 | -0.11:0.09 | 0.871 | 1.000 | 0 | 0.06 | -0.02:0.13 | 0.126 | 1.000 | 10 |
| XL-VLDL-CE | 0.00 | -0.10:0.09 | 0.922 | 1.000 | 0 | 0.07 | -0.01:0.14 | 0.096 | 1.000 | 12 |
| XL-VLDL-FC | -0.01 | -0.11:0.08 | 0.778 | 1.000 | 0 | 0.06 | -0.01:0.12 | 0.113 | 1.000 | 0 |
| XL-VLDL-TG | -0.02 | -0.12:0.07 | 0.626 | 1.000 | 0 | 0.07 | -0.02:0.15 | 0.118 | 1.000 | 20 |
| L-VLDL-P | -0.02 | -0.12:0.08 | 0.645 | 1.000 | 0 | 0.07 | -0.01:0.15 | 0.086 | 1.000 | 18 |
| L-VLDL-L | -0.01 | -0.11:0.09 | 0.904 | 1.000 | 0 | 0.08 | -0.01:0.16 | 0.071 | 1.000 | 22 |
| L-VLDL-PL | -0.03 | -0.13:0.07 | 0.517 | 1.000 | 0 | 0.08 | -0.01:0.16 | 0.081 | 1.000 | 25 |
| L-VLDL-C | -0.01 | -0.11:0.09 | 0.842 | 1.000 | 0 | 0.07 | -0.01:0.15 | 0.099 | 1.000 | 22 |
| L-VLDL-CE | 0.01 | -0.09:0.11 | 0.890 | 1.000 | 4 | 0.08 | 0.00:0.17 | 0.063 | 1.000 | 29 |
| L-VLDL-FC | -0.02 | -0.12:0.08 | 0.656 | 1.000 | 0 | 0.06 | -0.02:0.14 | 0.134 | 1.000 | 18 |
| L-VLDL-TG | -0.01 | -0.11:0.09 | 0.788 | 1.000 | 0 | 0.07 | -0.01:0.15 | 0.077 | 1.000 | 18 |
| M-VLDL-P | 0.01 | -0.09:0.11 | 0.836 | 1.000 | 2 | 0.09 | 0.01:0.17 | 0.038 | 1.000 | 21 |
| M-VLDL-L | 0.01 | -0.09:0.12 | 0.776 | 1.000 | 0 | 0.09 | 0.01:0.17 | 0.029 | 1.000 | 22 |
| M-VLDL-PL | 0.01 | -0.09:0.11 | 0.827 | 1.000 | 0 | 0.09 | 0.01:0.17 | 0.031 | 1.000 | 20 |
| M-VLDL-C | -0.01 | -0.12:0.09 | 0.779 | 1.000 | 0 | 0.09 | 0.01:0.17 | 0.026 | 1.000 | 20 |
| M-VLDL-CE | -0.03 | -0.13:0.08 | 0.628 | 1.000 | 0 | 0.09 | 0.01:0.16 | 0.019 | 1.000 | 9 |
| M-VLDL-FC | -0.01 | -0.11:0.10 | 0.922 | 1.000 | 0 | 0.08 | 0.00:0.16 | 0.043 | 1.000 | 20 |
| M-VLDL-TG | 0.02 | -0.09:0.13 | 0.749 | 1.000 | 8 | 0.09 | 0.00:0.17 | 0.049 | 1.000 | 27 |
| S-VLDL-P | -0.01 | -0.11:0.10 | 0.920 | 1.000 | 0 | 0.09 | 0.03:0.16 | 0.005 | 0.975 | 0 |
| **Metabolite abbreviation** | **Males** | | | | | **Females** | | | | |
| Β | CI | Unadjusted P-value | P-value | I2 (%) | Β | CI | Unadjusted P-value | P-value | I2 (%) |
| S-VLDL-L | 0.00 | -0.10:0.11 | 0.933 | 1.000 | 0 | 0.10 | 0.03:0.16 | 0.003 | 0.659 | 0 |
| S-VLDL-PL | -0.01 | -0.12:0.10 | 0.847 | 1.000 | 0 | 0.09 | 0.02:0.15 | 0.007 | 1.000 | 0 |
| S-VLDL-C | -0.01 | -0.12:0.10 | 0.825 | 1.000 | 0 | 0.09 | 0.03:0.16 | 0.004 | 0.725 | 0 |
| S-VLDL-CE | -0.02 | -0.13:0.10 | 0.783 | 1.000 | 0 | 0.09 | 0.03:0.16 | 0.004 | 0.799 | 0 |
| S-VLDL-FC | -0.01 | -0.12:0.10 | 0.853 | 1.000 | 0 | 0.08 | 0.02:0.15 | 0.009 | 1.000 | 0 |
| S-VLDL-TG | 0.02 | -0.09:0.12 | 0.780 | 1.000 | 2 | 0.10 | 0.02:0.18 | 0.014 | 1.000 | 22 |
| XS-VLDL-P | -0.03 | -0.14:0.09 | 0.676 | 1.000 | 0 | 0.10 | 0.03:0.16 | 0.002 | 0.506 | 0 |
| XS-VLDL-L | -0.01 | -0.13:0.10 | 0.810 | 1.000 | 0 | 0.09 | 0.03:0.16 | 0.003 | 0.639 | 0 |
| XS-VLDL-PL | -0.04 | -0.15:0.08 | 0.518 | 1.000 | 0 | 0.08 | 0.01:0.14 | 0.016 | 1.000 | 0 |
| XS-VLDL-C | 0.00 | -0.12:0.11 | 0.948 | 1.000 | 0 | 0.09 | 0.03:0.16 | 0.003 | 0.654 | 0 |
| XS-VLDL-CE | -0.01 | -0.12:0.11 | 0.879 | 1.000 | 0 | 0.09 | 0.03:0.15 | 0.005 | 0.978 | 0 |
| XS-VLDL-FC | 0.00 | -0.11:0.11 | 0.991 | 1.000 | 0 | 0.09 | 0.03:0.16 | 0.003 | 0.614 | 0 |
| XS-VLDL-TG | -0.01 | -0.12:0.10 | 0.866 | 1.000 | 0 | 0.08 | 0.02:0.14 | 0.012 | 1.000 | 0 |
| VLDL-D | 0.05 | -0.08:0.17 | 0.484 | 1.000 | 20 | 0.06 | -0.03:0.14 | 0.191 | 1.000 | 29 |
| VLDL-C | -0.01 | -0.12:0.10 | 0.826 | 1.000 | 0 | 0.09 | 0.03:0.16 | 0.006 | 1.000 | 0 |
| VLDL-TG | 0.02 | -0.09:0.13 | 0.710 | 1.000 | 7 | 0.09 | 0.01:0.18 | 0.032 | 1.000 | 27 |
| IDL-P | -0.05 | -0.16:0.07 | 0.438 | 1.000 | 0 | 0.07 | 0.01:0.13 | 0.023 | 1.000 | 0 |
| IDL-L | -0.04 | -0.15:0.07 | 0.492 | 1.000 | 0 | 0.07 | 0.01:0.14 | 0.026 | 1.000 | 0 |
| IDL-PL | -0.05 | -0.16:0.06 | 0.392 | 1.000 | 0 | 0.06 | 0.00:0.13 | 0.046 | 1.000 | 0 |
| IDL-C | -0.04 | -0.15:0.07 | 0.473 | 1.000 | 0 | 0.07 | 0.00:0.13 | 0.037 | 1.000 | 0 |
| IDL-CE | -0.04 | -0.16:0.07 | 0.468 | 1.000 | 0 | 0.07 | 0.00:0.13 | 0.036 | 1.000 | 0 |
| IDL-FC | -0.04 | -0.15:0.07 | 0.518 | 1.000 | 0 | 0.07 | 0.00:0.13 | 0.045 | 1.000 | 0 |
| IDL-TG | -0.05 | -0.17:0.07 | 0.408 | 1.000 | 0 | 0.06 | 0.01:0.12 | 0.030 | 1.000 | 0 |
| L-LDL-P | -0.06 | -0.17:0.06 | 0.348 | 1.000 | 0 | 0.07 | 0.01:0.13 | 0.030 | 1.000 | 0 |
| L-LDL-L | -0.05 | -0.16:0.07 | 0.412 | 1.000 | 0 | 0.07 | 0.01:0.14 | 0.030 | 1.000 | 0 |
| L-LDL-PL | -0.05 | -0.17:0.06 | 0.365 | 1.000 | 0 | 0.07 | 0.00:0.13 | 0.037 | 1.000 | 0 |
| L-LDL-C | -0.04 | -0.15:0.07 | 0.461 | 1.000 | 0 | 0.07 | 0.01:0.13 | 0.033 | 1.000 | 0 |
| L-LDL-CE | -0.04 | -0.16:0.07 | 0.461 | 1.000 | 0 | 0.07 | 0.01:0.13 | 0.031 | 1.000 | 0 |
| L-LDL-FC | -0.05 | -0.16:0.07 | 0.422 | 1.000 | 0 | 0.07 | 0.00:0.13 | 0.035 | 1.000 | 0 |
| L-LDL-TG | -0.08 | -0.02:0.05 | 0.226 | 1.000 | 0 | 0.04 | -0.02:0.1 | 0.145 | 1.000 | 0 |
| M-LDL-P | -0.04 | -0.16:0.07 | 0.468 | 1.000 | 0 | 0.07 | 0.01:0.14 | 0.025 | 1.000 | 0 |
| M-LDL-L | -0.03 | -0.14:0.08 | 0.585 | 1.000 | 0 | 0.08 | 0.01:0.14 | 0.022 | 1.000 | 0 |
| **Metabolite abbreviation** | **Males** | | | | | **Females** | | | | |
| Β | CI | Unadjusted P-value | P-value | I2 (%) | Β | CI | Unadjusted P-value | P-value | I2 (%) |
| M-LDL-PL | -0.03 | -0.14:0.07 | 0.556 | 1.000 | 0 | 0.07 | 0.01:0.14 | 0.034 | 1.000 | 0 |
| M-LDL-C | -0.03 | -0.14:0.08 | 0.612 | 1.000 | 0 | 0.08 | 0.01:0.14 | 0.020 | 1.000 | 0 |
| M-LDL-CE | -0.03 | -0.15:0.08 | 0.568 | 1.000 | 0 | 0.08 | 0.01:0.14 | 0.018 | 1.000 | 0 |
| M-LDL-FC | -0.05 | -0.16:0.06 | 0.375 | 1.000 | 0 | 0.07 | 0.01:0.14 | 0.024 | 1.000 | 0 |
| M-LDL-TG | -0.09 | -0.22:0.04 | 0.167 | 1.000 | 0 | 0.03 | -0.03:0.09 | 0.280 | 1.000 | 0 |
| S-LDL-P | -0.04 | -0.16:0.07 | 0.467 | 1.000 | 0 | 0.07 | 0.01:0.13 | 0.034 | 1.000 | 0 |
| S-LDL-L | -0.03 | -0.14:0.08 | 0.581 | 1.000 | 0 | 0.07 | 0.01:0.14 | 0.030 | 1.000 | 0 |
| S-LDL-PL | -0.04 | -0.16:0.07 | 0.453 | 1.000 | 0 | 0.06 | -0.01:0.12 | 0.089 | 1.000 | 0 |
| S-LDL-C | -0.03 | -0.14:0.08 | 0.607 | 1.000 | 0 | 0.07 | 0.01:0.14 | 0.025 | 1.000 | 0 |
| S-LDL-CE | -0.04 | -0.15:0.07 | 0.487 | 1.000 | 0 | 0.08 | 0.01:0.14 | 0.020 | 1.000 | 0 |
| S-LDL-FC | -0.01 | -0.12:0.10 | 0.867 | 1.000 | 0 | 0.06 | 0.00:0.13 | 0.051 | 1.000 | 0 |
| S-LDL-TG | -0.06 | -0.18:0.05 | 0.296 | 1.000 | 0 | 0.04 | -0.02:0.10 | 0.250 | 1.000 | 0 |
| LDL-D | 0.03 | -0.07:0.13 | 0.603 | 1.000 | 0 | -0.04 | -0.10:0.02 | 0.233 | 1.000 | 0 |
| LDL-C | -0.03 | -0.14:0.08 | 0.544 | 1.000 | 0 | 0.07 | 0.01:0.14 | 0.026 | 1.000 | 0 |
| LDL-TG | -0.08 | -0.21:0.04 | 0.195 | 1.000 | 0 | 0.04 | -0.02:0.10 | 0.200 | 1.000 | 0 |
| XL-HDL-P | -0.19 | -0.35:-0.03 | 0.019 | 1.000 | 16 | -0.08 | -0.14:-0.02 | 0.011 | 1.000 | 0 |
| XL-HDL-L | -0.16 | -0.31:-0.01 | 0.034 | 1.000 | 19 | -0.08 | -0.14:-0.02 | 0.013 | 1.000 | 0 |
| XL-HDL-PL | -0.23 | -0.38:-0.09 | 0.002 | 0.350 | 0 | -0.10 | -0.16:-0.03 | 0.003 | 0.577 | 0 |
| XL-HDL-C | -0.11 | -0.23:0.02 | 0.098 | 1.000 | 6 | -0.06 | -0.13:0.00 | 0.065 | 1.000 | 8 |
| XL-HDL-CE | -0.08 | -0.19:0.04 | 0.188 | 1.000 | 1 | -0.06 | -0.13:0.01 | 0.080 | 1.000 | 14 |
| XL-HDL-FC | -0.17 | -0.32:-0.02 | 0.030 | 1.000 | 18 | -0.07 | -0.13:-0.01 | 0.026 | 1.000 | 0 |
| XL-HDL-TG | -0.02 | -0.12:0.08 | 0.643 | 1.000 | 0 | -0.01 | -0.08:0.06 | 0.828 | 1.000 | 13 |
| L-HDL-P | -0.20 | -0.34:-0.07 | 0.004 | 0.841 | 0 | -0.13 | -0.19:-0.06 | 0.000 | **0.023** | 0 |
| L-HDL-L | -0.17 | -0.30:-0.04 | 0.010 | 1.000 | 2 | -0.13 | -0.20:-0.06 | 0.000 | **0.025** | 0 |
| L-HDL-PL | -0.20 | -0.33:-0.07 | 0.003 | 0.645 | 1 | -0.13 | -0.19:-0.06 | 0.000 | **0.025** | 0 |
| L-HDL-C | -0.15 | -0.28:-0.03 | 0.019 | 1.000 | 0 | -0.13 | -0.20:-0.07 | 0.000 | **0.020** | 0 |
| L-HDL-CE | -0.15 | -0.28:-0.03 | 0.018 | 1.000 | 0 | -0.13 | -0.20:-0.07 | 0.000 | **0.020** | 0 |
| L-HDL-FC | -0.19 | -0.35:-0.04 | 0.017 | 1.000 | 17 | -0.13 | -0.19:-0.06 | 0.000 | **0.021** | 0 |
| L-HDL-TG | -0.17 | -0.30:-0.03 | 0.016 | 1.000 | 0 | -0.05 | -0.11:0.01 | 0.090 | 1.000 | 0 |
| M-HDL-P | -0.15 | -0.26:-0.03 | 0.012 | 1.000 | 0 | -0.08 | -0.14:-0.02 | 0.011 | 1.000 | 0 |
| M-HDL-L | -0.13 | -0.24:-0.02 | 0.021 | 1.000 | 0 | -0.08 | -0.14:-0.02 | 0.011 | 1.000 | 0 |
| M-HDL-PL | -0.13 | -0.24:-0.02 | 0.024 | 1.000 | 0 | -0.08 | -0.14:-0.02 | 0.009 | 1.000 | 0 |
| **Metabolite abbreviation** | **Males** | | | | | **Females** | | | | |
| Β | CI | Unadjusted P-value | P-value | I2 (%) | Β | CI | Unadjusted P-value | P-value | I2 (%) |
| M-HDL-C | -0.13 | -0.24:-0.02 | 0.025 | 1.000 | 0 | -0.09 | -0.15:-0.03 | 0.006 | 1.000 | 0 |
| M-HDL-CE | -0.12 | -0.23:-0.02 | 0.025 | 1.000 | 0 | -0.09 | -0.16:-0.03 | 0.003 | 0.536 | 0 |
| M-HDL-FC | -0.13 | -0.25:-0.01 | 0.040 | 1.000 | 0 | -0.05 | -0.13:0.04 | 0.285 | 1.000 | 38 |
| M-HDL-TG | -0.09 | -0.20:0.02 | 0.093 | 1.000 | 0 | 0.03 | -0.04:0.10 | 0.431 | 1.000 | 13 |
| S-HDL-P | -0.07 | -0.23:0.08 | 0.347 | 1.000 | 26 | -0.03 | -0.08:0.03 | 0.377 | 1.000 | 5 |
| S-HDL-L | -0.08 | -0.23:0.07 | 0.315 | 1.000 | 27 | -0.03 | -0.09:0.03 | 0.366 | 1.000 | 7 |
| S-HDL-PL | -0.05 | -0.17:0.06 | 0.366 | 1.000 | 2 | -0.06 | -0.13:0.01 | 0.073 | 1.000 | 21 |
| S-HDL-C | -0.09 | -0.20:0.02 | 0.096 | 1.000 | 0 | 0.02 | -0.05:0.08 | 0.605 | 1.000 | 0 |
| S-HDL-CE | -0.09 | -0.19:0.02 | 0.112 | 1.000 | 0 | 0.05 | -0.02:0.11 | 0.137 | 1.000 | 0 |
| S-HDL-FC | -0.03 | -0.19:0.13 | 0.694 | 1.000 | 39 | -0.07 | -0.13:-0.01 | 0.029 | 1.000 | 12 |
| S-HDL-TG | 0.01 | -0.10:0.13 | 0.803 | 1.000 | 5 | 0.05 | -0.01:0.12 | 0.079 | 1.000 | 0 |
| HDL-D | -0.18 | -0.32:-0.05 | 0.006 | 1.000 | 4 | -0.11 | -0.18:-0.04 | 0.001 | 0.295 | 0 |
| HDL-C | -0.18 | -0.31:-0.06 | 0.003 | 0.733 | 0 | -0.10 | -0.17:-0.04 | 0.002 | 0.390 | 0 |
| HDL2-C | -0.19 | -0.31:-0.06 | 0.003 | 0.723 | 0 | -0.12 | -0.18:-0.05 | 0.000 | 0.068 | 0 |
| HDL3-C | -0.04 | -0.15:0.06 | 0.428 | 1.000 | 0 | 0.04 | -0.03:0.10 | 0.277 | 1.000 | 0 |
| HDL-TG | -0.09 | -0.20:0.02 | 0.123 | 1.000 | 0 | 0.01 | -0.05:0.07 | 0.793 | 1.000 | 0 |
| Serum-C | -0.08 | -0.20:0.03 | 0.141 | 1.000 | 0 | 0.04 | -0.02:0.11 | 0.201 | 1.000 | 0 |
| Remnant-C | -0.02 | -0.14:0.09 | 0.661 | 1.000 | 0 | 0.09 | 0.02:0.15 | 0.009 | 1.000 | 0 |
| EstC | -0.08 | -0.20:0.03 | 0.140 | 1.000 | 0 | 0.03 | -0.03:0.10 | 0.328 | 1.000 | 0 |
| FreeC | -0.07 | -0.19:0.04 | 0.215 | 1.000 | 0 | 0.06 | 0.00:0.13 | 0.065 | 1.000 | 0 |
| Serum-TG | 0.01 | -0.10:0.11 | 0.903 | 1.000 | 1 | 0.09 | 0.01:0.17 | 0.025 | 1.000 | 22 |
| TotPG | -0.19 | -0.30:-0.07 | 0.002 | 0.532 | 0 | -0.02 | -0.08:0.04 | 0.463 | 1.000 | 0 |
| PC | -0.20 | -0.33:-0.08 | 0.002 | 0.367 | 0 | -0.01 | -0.07:0.05 | 0.724 | 1.000 | 0 |
| SM | -0.07 | -0.19:0.06 | 0.280 | 1.000 | 0 | 0.05 | -0.01:0.12 | 0.125 | 1.000 | 3 |
| TotCho | -0.19 | -0.31:-0.07 | 0.002 | 0.521 | 0 | -0.01 | -0.08:0.05 | 0.660 | 1.000 | 0 |
| ApoA1 | -0.25 | -0.38:-0.12 | 0.000 | **0.035** | 0 | -0.08 | -0.14:-0.02 | 0.011 | 1.000 | 0 |
| ApoB | -0.03 | -0.14:0.08 | 0.633 | 1.000 | 0 | 0.09 | 0.03:0.15 | 0.006 | 1.000 | 0 |
| TotFA | -0.11 | -0.22:0.00 | 0.048 | 1.000 | 0 | 0.03 | -0.03:0.09 | 0.365 | 1.000 | 0 |
| UnsatDeg | -0.11 | -0.22:-0.01 | 0.030 | 1.000 | 0 | -0.02 | -0.09:0.06 | 0.697 | 1.000 | 27 |
| FAw3 | -0.24 | -0.36:-0.12 | 0.000 | **0.033** | 0 | 0.01 | -0.07:0.09 | 0.866 | 1.000 | 28 |
| FAw6 | -0.12 | -0.22:-0.01 | 0.039 | 1.000 | 0 | 0.04 | -0.03:0.10 | 0.259 | 1.000 | 0 |
| PUFA | -0.13 | -0.24:-0.02 | 0.017 | 1.000 | 0 | 0.03 | -0.03:0.09 | 0.342 | 1.000 | 0 |
| **Metabolite abbreviation** | **Males** | | | | | **Females** | | | | |
| Β | CI | Unadjusted P-value | P-value | I2 (%) | Β | CI | Unadjusted P-value | P-value | I2 (%) |
| MUFA | -0.05 | -0.18:0.07 | 0.411 | 1.000 | 19 | 0.06 | -0.04:0.16 | 0.244 | 1.000 | 47 |
| SFA | -0.10 | -0.21:0.01 | 0.069 | 1.000 | 0 | 0.02 | -0.04:0.09 | 0.456 | 1.000 | 0 |
| DHA | -0.23 | -0.36:-0.1 | 0.000 | 0.109 | 0 | 0.03 | -0.05:0.11 | 0.472 | 1.000 | 32 |
| LA | -0.09 | -0.20:0.02 | 0.098 | 1.000 | 0 | 0.03 | -0.03:0.10 | 0.282 | 1.000 | 0 |
| Glc | 0.02 | -0.15:0.18 | 0.843 | 1.000 | 43 | 0.01 | -0.06:0.08 | 0.802 | 1.000 | 0 |
| Lac | -0.01 | -0.14:0.11 | 0.847 | 1.000 | 23 | 0.01 | -0.05:0.07 | 0.783 | 1.000 | 0 |
| Pyr | -0.04 | -0.18:0.11 | 0.624 | 1.000 | 0 | 0.08 | -0.01:0.17 | 0.073 | 1.000 | 19 |
| Cit | -0.06 | -0.20:0.07 | 0.357 | 1.000 | 26 | 0.03 | -0.05:0.11 | 0.479 | 1.000 | 38 |
| Ala | 0.04 | -0.11:0.18 | 0.630 | 1.000 | 37 | -0.02 | -0.08:0.04 | 0.527 | 1.000 | 1 |
| Gln | 0.05 | -0.12:0.21 | 0.578 | 1.000 | 9 | -0.06 | -0.14:0.03 | 0.178 | 1.000 | 2 |
| His | -0.03 | -0.15:0.10 | 0.648 | 1.000 | 18 | 0.01 | -0.05:0.07 | 0.804 | 1.000 | 4 |
| Ile | -0.02 | -0.20:0.16 | 0.809 | 1.000 | 46 | 0.02 | -0.13:0.17 | 0.777 | 1.000 | 66 |
| Leu | -0.01 | -0.25:0.23 | 0.936 | 1.000 | 67 | -0.04 | -0.21:0.13 | 0.633 | 1.000 | 75 |
| Val | -0.04 | -0.25:0.17 | 0.714 | 1.000 | 62 | -0.01 | -0.12:0.11 | 0.916 | 1.000 | 60 |
| Phe | -0.03 | -0.13:0.08 | 0.636 | 1.000 | 0 | -0.03 | -0.14:0.08 | 0.591 | 1.000 | 55 |
| Tyr | -0.13 | -0.25:0.00 | 0.043 | 1.000 | 0 | -0.04 | -0.14:0.05 | 0.370 | 1.000 | 43 |
| AcAce | -0.11 | -0.22:-0.01 | 0.030 | 1.000 | 0 | 0.07 | -0.02:0.15 | 0.137 | 1.000 | 42 |
| bOHBut | -0.14 | -0.26:-0.02 | 0.018 | 1.000 | 0 | 0.03 | -0.02:0.09 | 0.267 | 1.000 | 0 |
| Crea | 0.05 | -0.07:0.17 | 0.415 | 1.000 | 0 | -0.01 | -0.09:0.06 | 0.754 | 1.000 | 0 |
| Alb | 0.05 | -0.06:0.16 | 0.375 | 1.000 | 0 | -0.04 | -0.10:0.02 | 0.210 | 1.000 | 0 |
| Gp | -0.03 | -0.17:0.12 | 0.707 | 1.000 | 31 | 0.07 | -0.04:0.18 | 0.194 | 1.000 | 55 |
| XXL-VLDL-PL\_% | 0.03 | -0.11:0.18 | 0.643 | 1.000 | 0 | -0.02 | -0.08:0.03 | 0.394 | 1.000 | 0 |
| XXL-VLDL-C\_% | -0.02 | -0.15:0.11 | 0.766 | 1.000 | 0 | 0.03 | -0.03:0.08 | 0.379 | 1.000 | 0 |
| XXL-VLDL-CE\_% | -0.01 | -0.13:0.11 | 0.865 | 1.000 | 0 | 0.03 | -0.03:0.09 | 0.309 | 1.000 | 0 |
| XXL-VLDL-FC\_% | -0.04 | -0.15:0.08 | 0.531 | 1.000 | 0 | -0.02 | -0.08:0.04 | 0.565 | 1.000 | 12 |
| XXL-VLDL-TG\_% | 0.00 | -0.13:0.14 | 0.957 | 1.000 | 0 | 0.04 | -0.03:0.11 | 0.300 | 1.000 | 26 |
| XL-VLDL-PL\_% | -0.02 | -0.15:0.11 | 0.787 | 1.000 | 13 | 0.03 | -0.03:0.09 | 0.279 | 1.000 | 0 |
| XL-VLDL-C\_% | 0.03 | -0.12:0.18 | 0.654 | 1.000 | 18 | 0.02 | -0.05:0.08 | 0.592 | 1.000 | 19 |
| XL-VLDL-CE\_% | 0.05 | -0.09:0.20 | 0.479 | 1.000 | 20 | 0.01 | -0.06:0.08 | 0.744 | 1.000 | 20 |
| XL-VLDL-FC\_% | -0.03 | -0.14:0.08 | 0.617 | 1.000 | 0 | 0.03 | -0.05:0.10 | 0.458 | 1.000 | 33 |
| XL-VLDL-TG\_% | 0.05 | -0.11:0.21 | 0.524 | 1.000 | 0 | 0.02 | -0.03:0.07 | 0.487 | 1.000 | 0 |
| L-VLDL-PL\_% | 0.01 | -0.11:0.12 | 0.923 | 1.000 | 0 | 0.03 | -0.03:0.09 | 0.328 | 1.000 | 0 |
| **Metabolite abbreviation** | **Males** | | | | | **Females** | | | | |
| Β | CI | Unadjusted P-value | P-value | I2 (%) | Β | CI | Unadjusted P-value | P-value | I2 (%) |
| L-VLDL-C\_% | -0.03 | -0.14:0.08 | 0.582 | 1.000 | 0 | -0.01 | -0.06:0.05 | 0.836 | 1.000 | 0 |
| L-VLDL-CE\_% | 0.03 | -0.09:0.15 | 0.598 | 1.000 | 0 | 0.02 | -0.04:0.07 | 0.586 | 1.000 | 0 |
| L-VLDL-FC\_% | 0.02 | -0.10:0.15 | 0.691 | 1.000 | 5 | 0.02 | -0.04:0.08 | 0.544 | 1.000 | 0 |
| L-VLDL-TG\_% | 0.03 | -0.09:0.15 | 0.641 | 1.000 | 0 | 0.00 | -0.05:0.06 | 0.863 | 1.000 | 0 |
| M-VLDL-PL\_% | 0.12 | 0.00:0.24 | 0.060 | 1.000 | 0 | 0.00 | -0.05:0.06 | 0.927 | 1.000 | 0 |
| M-VLDL-C\_% | -0.10 | -0.21:0.02 | 0.113 | 1.000 | 0 | -0.01 | -0.07:0.05 | 0.779 | 1.000 | 0 |
| M-VLDL-CE\_% | -0.08 | -0.20:0.03 | 0.168 | 1.000 | 0 | -0.02 | -0.08:0.04 | 0.526 | 1.000 | 0 |
| M-VLDL-FC\_% | -0.05 | -0.17:0.07 | 0.394 | 1.000 | 0 | 0.01 | -0.05:0.06 | 0.764 | 1.000 | 0 |
| M-VLDL-TG\_% | 0.08 | -0.06:0.21 | 0.265 | 1.000 | 0 | 0.01 | -0.05:0.07 | 0.744 | 1.000 | 0 |
| S-VLDL-PL\_% | -0.03 | -0.15:0.08 | 0.598 | 1.000 | 0 | -0.06 | -0.11:0.00 | 0.065 | 1.000 | 0 |
| S-VLDL-C\_% | -0.03 | -0.14:0.08 | 0.582 | 1.000 | 0 | -0.03 | -0.11:0.04 | 0.403 | 1.000 | 23 |
| S-VLDL-CE\_% | -0.03 | -0.14:0.08 | 0.579 | 1.000 | 0 | -0.03 | -0.11:0.05 | 0.453 | 1.000 | 32 |
| S-VLDL-FC\_% | -0.04 | -0.16:0.09 | 0.553 | 1.000 | 7 | -0.05 | -0.11:0.01 | 0.113 | 1.000 | 0 |
| S-VLDL-TG\_% | 0.06 | -0.06:0.19 | 0.327 | 1.000 | 12 | 0.06 | -0.02:0.15 | 0.161 | 1.000 | 37 |
| XS-VLDL-PL\_% | -0.05 | -0.15:0.05 | 0.351 | 1.000 | 0 | 0.01 | -0.06:0.08 | 0.833 | 1.000 | 6 |
| XS-VLDL-C\_% | 0.00 | -0.14:0.13 | 0.962 | 1.000 | 27 | -0.05 | -0.14:0.04 | 0.254 | 1.000 | 41 |
| XS-VLDL-CE\_% | 0.02 | -0.10:0.13 | 0.772 | 1.000 | 0 | -0.06 | -0.14:0.02 | 0.161 | 1.000 | 34 |
| XS-VLDL-FC\_% | -0.02 | -0.15:0.11 | 0.757 | 1.000 | 33 | -0.01 | -0.07:0.06 | 0.804 | 1.000 | 0 |
| XS-VLDL-TG\_% | 0.04 | -0.08:0.16 | 0.562 | 1.000 | 12 | 0.05 | -0.03:0.13 | 0.235 | 1.000 | 33 |
| IDL-PL\_% | -0.05 | -0.14:0.05 | 0.336 | 1.000 | 0 | -0.08 | -0.17:0.02 | 0.121 | 1.000 | 40 |
| IDL-C\_% | -0.01 | -0.13:0.10 | 0.820 | 1.000 | 0 | -0.01 | -0.06:0.05 | 0.854 | 1.000 | 0 |
| IDL-CE\_% | 0.02 | -0.11:0.15 | 0.757 | 1.000 | 12 | -0.01 | -0.07:0.05 | 0.752 | 1.000 | 0 |
| IDL-FC\_% | 0.01 | -0.09:0.10 | 0.910 | 1.000 | 0 | 0.01 | -0.06:0.08 | 0.734 | 1.000 | 0 |
| IDL-TG\_% | 0.00 | -0.13:0.13 | 0.958 | 1.000 | 24 | 0.02 | -0.05:0.08 | 0.617 | 1.000 | 3 |
| L-LDL-PL\_% | 0.02 | -0.09:0.12 | 0.752 | 1.000 | 0 | -0.07 | -0.14:-0.01 | 0.030 | 1.000 | 0 |
| L-LDL-C\_% | 0.00 | -0.10:0.10 | 0.950 | 1.000 | 0 | 0.04 | -0.03:0.10 | 0.253 | 1.000 | 0 |
| L-LDL-CE\_% | -0.01 | -0.11:0.09 | 0.867 | 1.000 | 0 | 0.06 | -0.01:0.12 | 0.092 | 1.000 | 0 |
| L-LDL-FC\_% | 0.01 | -0.11:0.13 | 0.863 | 1.000 | 13 | -0.04 | -0.11:0.02 | 0.182 | 1.000 | 0 |
| L-LDL-TG\_% | -0.02 | -0.12:0.09 | 0.767 | 1.000 | 0 | 0.00 | -0.06:0.06 | 0.950 | 1.000 | 0 |
| M-LDL-PL\_% | 0.01 | -0.09:0.12 | 0.835 | 1.000 | 0 | -0.08 | -0.15:-0.01 | 0.017 | 1.000 | 1 |
| M-LDL-C\_% | 0.01 | -0.09:0.11 | 0.814 | 1.000 | 0 | 0.05 | -0.01:0.11 | 0.133 | 1.000 | 0 |
| M-LDL-CE\_% | 0.04 | -0.06:0.13 | 0.445 | 1.000 | 0 | 0.06 | -0.01:0.13 | 0.094 | 1.000 | 1 |
| **Metabolite abbreviation** | **Males** | | | | | **Females** | | | | |
| Β | CI | Unadjusted P-value | P-value | I2 (%) | Β | CI | Unadjusted P-value | P-value | I2 (%) |
| M-LDL-FC\_% | 0.04 | -0.07:0.14 | 0.520 | 1.000 | 0 | -0.09 | -0.15:-0.02 | 0.016 | 1.000 | 6 |
| M-LDL-TG\_% | -0.01 | -0.10:0.09 | 0.878 | 1.000 | 0 | 0.00 | -0.07:0.06 | 0.881 | 1.000 | 0 |
| S-LDL-PL\_% | 0.01 | -0.09:0.12 | 0.810 | 1.000 | 0 | -0.09 | -0.15:-0.02 | 0.008 | 1.000 | 0 |
| S-LDL-C\_% | 0.01 | -0.08:0.11 | 0.778 | 1.000 | 0 | 0.06 | -0.01:0.12 | 0.083 | 1.000 | 0 |
| S-LDL-CE\_% | 0.03 | -0.07:0.12 | 0.557 | 1.000 | 0 | 0.06 | -0.01:0.13 | 0.107 | 1.000 | 0 |
| S-LDL-FC\_% | 0.08 | -0.03:0.19 | 0.149 | 1.000 | 0 | -0.07 | -0.14:-0.01 | 0.034 | 1.000 | 0 |
| S-LDL-TG\_% | -0.01 | -0.11:0.09 | 0.851 | 1.000 | 0 | 0.02 | -0.04:0.08 | 0.571 | 1.000 | 0 |
| XL-HDL-PL\_% | -0.05 | -0.14:0.04 | 0.298 | 1.000 | 11 | -0.05 | -0.13:0.04 | 0.280 | 1.000 | 0 |
| XL-HDL-C\_% | 0.15 | 0.02:0.28 | 0.026 | 1.000 | 31 | 0.10 | 0.02:0.17 | 0.010 | 1.000 | 0 |
| XL-HDL-CE\_% | 0.17 | 0.00:0.34 | 0.044 | 1.000 | 45 | 0.06 | -0.01:0.14 | 0.095 | 1.000 | 0 |
| XL-HDL-FC\_% | -0.02 | -0.11:0.07 | 0.700 | 1.000 | 0 | 0.02 | -0.04:0.09 | 0.515 | 1.000 | 0 |
| XL-HDL-TG\_% | 0.05 | -0.04:0.14 | 0.247 | 1.000 | 0 | 0.10 | 0.00:0.20 | 0.049 | 1.000 | 39 |
| L-HDL-PL\_% | -0.06 | -0.15:0.02 | 0.128 | 1.000 | 0 | 0.00 | -0.07:0.07 | 0.997 | 1.000 | 0 |
| L-HDL-C\_% | 0.05 | -0.05:0.14 | 0.330 | 1.000 | 0 | -0.04 | -0.11:0.03 | 0.242 | 1.000 | 0 |
| L-HDL-CE\_% | 0.05 | -0.04:0.14 | 0.235 | 1.000 | 0 | -0.03 | -0.10:0.04 | 0.413 | 1.000 | 0 |
| L-HDL-FC\_% | -0.01 | -0.10:0.08 | 0.764 | 1.000 | 0 | -0.06 | -0.13:0.02 | 0.134 | 1.000 | 0 |
| L-HDL-TG\_% | -0.01 | -0.09:0.08 | 0.834 | 1.000 | 0 | 0.06 | -0.01:0.13 | 0.070 | 1.000 | 0 |
| M-HDL-PL\_% | 0.00 | -0.11:0.11 | 0.948 | 1.000 | 8 | 0.01 | -0.06:0.08 | 0.866 | 1.000 | 17 |
| M-HDL-C\_% | -0.02 | -0.12:0.08 | 0.701 | 1.000 | 0 | -0.04 | -0.11:0.02 | 0.175 | 1.000 | 0 |
| M-HDL-CE\_% | -0.01 | -0.11:0.10 | 0.923 | 1.000 | 0 | -0.05 | -0.11:0.01 | 0.105 | 1.000 | 0 |
| M-HDL-FC\_% | -0.02 | -0.11:0.08 | 0.708 | 1.000 | 0 | 0.01 | -0.12:0.13 | 0.900 | 1.000 | 61 |
| M-HDL-TG\_% | 0.01 | -0.09:0.11 | 0.841 | 1.000 | 0 | 0.08 | 0.01:0.14 | 0.020 | 1.000 | 0 |
| S-HDL-PL\_% | 0.03 | -0.08:0.14 | 0.595 | 1.000 | 0 | -0.09 | -0.15:-0.03 | 0.006 | 1.000 | 1 |
| S-HDL-C\_% | -0.04 | -0.14:0.06 | 0.452 | 1.000 | 0 | 0.06 | -0.01:0.12 | 0.080 | 1.000 | 0 |
| S-HDL-CE\_% | -0.04 | -0.13:0.06 | 0.460 | 1.000 | 0 | 0.07 | 0.00:0.15 | 0.045 | 1.000 | 9 |
| S-HDL-FC\_% | 0.03 | -0.08:0.14 | 0.629 | 1.000 | 0 | -0.11 | -0.16:-0.05 | 0.000 | 0.093 | 0 |
| S-HDL-TG\_% | 0.07 | -0.04:0.17 | 0.215 | 1.000 | 0 | 0.09 | 0.03:0.15 | 0.006 | 1.000 | 0 |
| TG/PG | 0.09 | -0.01:0.19 | 0.093 | 1.000 | 0 | 0.10 | 0.03:0.17 | 0.005 | 0.940 | 1 |
| DHA/FA | -0.17 | -0.30:-0.03 | 0.019 | 1.000 | 23 | 0.00 | -0.07:0.07 | 0.985 | 1.000 | 23 |
| LA/FA | 0.02 | -0.08:0.13 | 0.673 | 1.000 | 0 | 0.00 | -0.10:0.10 | 0.971 | 1.000 | 51 |
| FAw3/FA | -0.22 | -0.38:-0.07 | 0.005 | 0.971 | 35 | -0.05 | -0.13:0.03 | 0.254 | 1.000 | 32 |
| FAw6/FA | -0.01 | -0.11:0.09 | 0.901 | 1.000 | 0 | -0.01 | -0.10:0.09 | 0.889 | 1.000 | 44 |
| **Metabolite abbreviation** | **Males** | | | | | **Females** | | | | |
| Β | CI | Unadjusted P-value | P-value | I2 (%) | Β | CI | Unadjusted P-value | P-value | I2 (%) |
| PUFA/FA | -0.04 | -0.14:0.06 | 0.419 | 1.000 | 0 | -0.02 | -0.11:0.07 | 0.613 | 1.000 | 38 |
| MUFA/FA | 0.02 | -0.11:0.14 | 0.769 | 1.000 | 22 | 0.06 | -0.04:0.16 | 0.250 | 1.000 | 53 |
| SFA/FA | 0.02 | -0.10:0.14 | 0.734 | 1.000 | 20 | -0.05 | -0.14:0.05 | 0.352 | 1.000 | 53 |
| ApoB/ApoA1 | 0.06 | -0.06:0.17 | 0.324 | 1.000 | 0 | 0.14 | 0.08:0.20 | 0.000 | **0.005** | 0 |

Abbreviations: B=Beta coefficient, CI=Confidence interval, I2=measure of heterogeneity, P-value=Bonferroni-Holm corrected p-value. All metabolite abbreviations can be found in e-tables 1 and 2.