

Mendelian Randomized Study

Causal Association Between Physical Activity, Leisure Sedentary Behaviors, Lifestyle Habits, and Multisite Chronic Pain: A Bidirectional Mendelian Randomization Study

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Background: Observational studies have reported relationships among physical activity (PA), leisure sedentary behaviors (LSBs), lifestyle habits, and chronic pain (CP). However, these findings may be unreliable due to confounding biases.

Objectives: To evaluate the causal effects of PA, LSB, and lifestyle habits on CP.

Study Design: This study performed a 2-sample Mendelian randomization to assess the causal effects of the 3 exposures of interest on MCP and evaluated the robustness of the results through a series of sensitivity analyses.

Setting: The genetic instruments were obtained from UK Biobank, which provides publicly accessible genome-wide association studies (GWAS) summary statistics based on individuals of European ancestry.

Methods: We used GWAS summary statistics of multisite chronic pain (MCP) in 387,649 individuals from the UK Biobank to identify genetically predicted MCP. Data on PA, LSBs, and lifestyle habits were derived from large GWAS datasets ($n > 300,000$). Causal effects were assessed by inverse variance weighted (IVW), MR-Egger, weighted median, maximum likelihood, and penalized weighted median. Sensitivity analyses, including MR-PRESSO, Cochran's Q test, MR-Egger intercept, and leave-one-out analysis, were performed to evaluate the robustness of the MR results.

Results: The results of univariable MR analyses indicated that genetically predicted computer use ($OR = 0.905 [0.832, 0.984]$) and strenuous sports or other exercises (SSOEs) ($OR = 0.490 [0.361, 0.664]$) reduced the risk of MCP. Watching television ($OR = 1.320 [1.262, 1.380]$) and smoking initiation ($OR = 1.164 [1.122, 1.207]$) increased the risk of MCP. Reverse inference results showed that watching television ($\beta = 0.256 [0.170, 0.341]$) and smoking initiation ($OR = 1.475 [1.257, 1.732]$) were risk factors for MCP, while SSOEs ($OR = 0.900 [0.871, 0.931]$) and VPA ($OR = 0.945 [0.900, 0.993]$) reduced the likelihood of MCP.

Limitations: This study was unable to use non-overlapping samples to assess the causal association in every 2-sample MR analysis due to the restriction of GWAS datasets, resulting in inevitable bias.

Conclusion: This study revealed that television-watching and smoking initiation increased the risk of CP, while computer use and vigorous PA served as protective factors.

Key words: Multisite chronic pain (MCP), physical activity (PA), leisure sedentary behavior (LSB), Mendelian randomization (MR)

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Chronic pain (CP), defined as persistent pain lasting more than 3 months, is a significant public health problem. Accumulating evidence shows that CP is a serious public health problem that cannot be ignored because it increases the rates of disability and mortality (1). CP is estimated to affect around one out of every 5 to one out of every 3 American adults (2) and over 100 million patients in China (3). However, treating CP remains challenging due to limited understanding of its underlying pathophysiological mechanisms, and the prevalence of CP is expected to rise in the future (4). Previous research has suggested that CP should be redefined as a disease rather than just a symptom, highlighting the complexity it poses for patients and clinicians (5). CP not only decreases the quality of life significantly but also imposes a substantial socioeconomic burden. Multisite chronic pain (MCP), which refers to one or more body sites or widespread pain throughout the body that persists for 3 months or longer, is one phenotypic manifestation of CP (6).

As science and technology advance and lifestyles become modernized, sedentary behavior has become more prevalent across all age groups. High levels of sedentary behavior and low physical activity (PA) during leisure time have been identified as risk factors for negative health outcomes (7). Leisure sedentary behaviors (LSBs) encompass activities with energy expenditure ≤ 1.5 metabolic equivalents while in a reclining or sitting position (8). Common examples of LSBs include leisure television-watching, computer use, and driving. For instance, Lee et al found a correlation between prolonged sedentary behavior and an increased risk of chronic knee pain. Sitting for more than 10 hours per day was associated with a 0.28-fold increase in the risk of chronic knee pain (9). Similarly, Santos et al conducted a study involving 943 teachers of public school and observed that watching more than 60 minutes of television per day significantly increased the risk of CP, even after adjusting for confounders using multiple logistic regression (OR = 1.39; 95% CI = 1.03–1.89) (7).

PA is increasingly recognized as an alternative approach to drugs and invasive treatments (10). A cross-sectional study found that high levels of PA may reduce the risk of chronic knee pain (9). Similarly, Fancourt et al reported that when potential confounders were controlled for, engaging in vigorous weekly activity was found to be protective against CP development (OR = 0.74; 95% CI = 0.62–0.89) (11). However, a Swiss population-based cohort study did not find a signifi-

cant association between CP and PA (12). An overview of Cochrane Reviews, including 381 selected studies examining 37,143 individuals, revealed inadequate evidence regarding the beneficial effects of PA on CP and quality of life improvement, mainly due to small sample sizes and potentially underpowered research (13). Therefore, the relationship between PA and pain severity appears to be variable and complex (14).

Lifestyle habits play a crucial role in the occurrence and development of CP. Smoking initiation, alcohol consumption, and coffee consumption are common lifestyle habit phenotypes. Previous studies have shown a co-occurrence of smoking and CP (15). However, animal studies suggested that nicotine and tobacco smoke may have pain-relieving effects, leading to a contradictory relationship (16). The association between alcohol consumption and CP is controversial, with some studies suggesting a bidirectional relationship (17) and others finding no significant association (18). Coffee consumption has been associated with chronic low back pain, neck and shoulder pain, and musculoskeletal pain (19,20). However, Ferrarelli et al (21) reported that increased caffeine intake might provide more pain relief than typical painkillers.

Traditional observational studies are prone to confounding biases, which limit the level of evidence these studies provide (22). On the other hand, conducting randomized controlled trials (RCTs) is time-consuming and may face ethical limitations. To overcome these challenges, Mendelian randomization (MR) studies can estimate causal effects by leveraging genetic variants associated with exposure, thereby minimizing confounding and reverse causation (23).

In this study, we conducted a 2-sample MR analysis to investigate the causal relationship between LSBs (television-watching, computer use, and driving), PA (VPA), moderate to vigorous physical activity (MVPA), and strenuous sports or other exercises (SSOE), lifestyle habits (smoking initiation, drinks per week, and coffee consumption), and MCP. Additionally, we performed reverse causal inference using genetic variants associated with MCP.

METHODS

Study Design

This 2-sample MR study aims to explore the associations among LSBs, PA, lifestyle habits, and the risk of MCP. Figure 1 illustrates the 3 core assumptions of instrumental variables (IVs) and the study's design

framework. Typical LSBs include television-watching, computer use, and driving, while PA comprises VP, MVPA, and SSOEs. As for lifestyle habits, we emphasized the effects of smoking initiation, drinks per week, and coffee consumption on MCP. We first performed univariable MR analyses to assess the causal effects of the 3 exposures of interest on MCP and evaluated the robustness of the results through a series of sensitivity analyses. In addition, we investigated potential reverse causality.

The genome-wide association studies (GWAS) summary statistics used in this study are publicly available (Table 1). Each study included has been approved by its respective institutional ethics review committee.

Data Sources

GWAS Data for PA

The GWAS summary statistics for PA were obtained from UK Biobank, a large-scale biomedical database. The genetic variants for the 3 PA phenotypes (VPA, MVPA, and SSOE) were selected from a cohort of 387,649 individuals and released by Klimentidis et al (24). The last 7-day, short form of the International Physical Activity Questionnaire (IPAQ) was used for the studies. To have their VPA assessed, patients were asked, "In a typical WEEK, how many days did you do 10 minutes or more of vigorous physical activity? (These are activities that make you sweat or breathe hard such as fast cycling, aerobics, heavy lifting)." For moderate PA (MPA), patients were asked, "In a typical WEEK, on how many days did you do 10 minutes or more of moderate physical activities like carrying light loads, cycling at normal pace? (Do not include walking)." For each of

those questions, those who indicated one or more such days were then asked, "How many minutes did you usually spend doing moderate/vigorous activities on a typical DAY?" Patients were asked to include activities performed for work, leisure, travel, and around the house. Those who selected "prefer not to answer" or "do not know" on the above questions, those unable to walk, and those reporting more than 16 hours of VPA per day were excluded. The patients who reported > 3 hours of VPA or MPA per day were recoded to 3 hours, as recommended. MVPA was calculated by summing the total minutes per week of moderate PA (multiplied by 4) and vigorous PA (multiplied by 8), corresponding to their metabolic equivalents, as previously described (25). In addition, extreme values were also chosen due to the heavily skewed and zero-inflated nature of

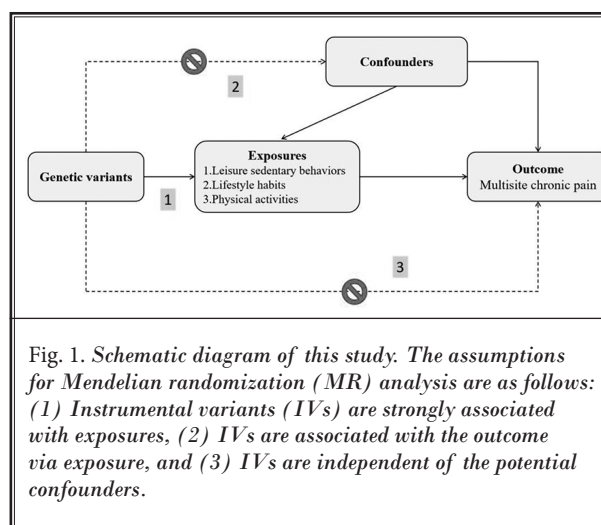


Table 1. Characteristics of GWAS summary statistics.

Traits	Consortium (Authors)	PMID	Population	Samples
Computer use	UK Biobank (26)	16571181	European	422,218
Television watching	UK Biobank (26)	16571181	European	422,218
Driving	UK Biobank (26)	16571181	European	422,218
Smoking initiation	GSCAN (27)	30643251	European	311,629/321,173
Drinks per week	GSCAN (27)	30643251	European	941,280
Coffee consumption	UK Biobank (28)	31046077	European	375,833
VPA	UK Biobank (24)	29899525	European	98,060/162,995
MVPA	UK Biobank (24)	29899525	European	377,234
SSOE	UK Biobank (24)	29899525	European	124,842/225,650
MCP	UK Biobank (29)	33830993	European	387,649

GWAS, Genome-wide association study; GSCAN, GWAS and Sequencing Consortium of Alcohol and Nicotine use; VPA, vigorous physical activity; MVPA, moderate-to-vigorous physical activity; SSOE, strenuous sports or other exercises; MCP, multisite chronic pain

strenuous exercise duration. Those individuals were placed in the group that did not meet for VPA 3 days or more per week or 25 minutes or more per day. For those individuals, the study used responses to the question "In the last 4 weeks did you spend any time doing the following?" and follow-up questions assessing the frequency and typical duration of "strenuous sports" and of "other exercises." The possible responses to the initial question were: 'walking for pleasure,' 'other exercises,' 'strenuous sports,' 'light do-it-yourself (DIY),' 'heavy DIY,' 'none of the above,' and 'prefer not to answer.' We identified individuals who spent 2-3 days or more per week doing SSOE, for a duration of 15-30 minutes or greater each time. Controls were those individuals who did not indicate spending any time in the last 4 weeks doing SSOE. Those who did not fall into either category were excluded from the analysis.

GWAS Data for LSBs

The genetic instruments for LSBs were obtained from UK Biobank, which provides publicly accessible GWAS summary statistics based on a cohort of 422,218 individuals of European ancestry in relation to 3 phenotypes (26). LSBs primarily include television watching, computer use, and driving. Patients were asked 3 specific questions:

"In a typical day, how many hours do you spend watching TV?"

"In a typical day, how many hours do you spend using the computer? (Do not include using a computer at work)."

"In a typical day, how many hours do you spend driving?"

GWAS Data for Lifestyle Habits

The GWAS data on lifestyle habits selected for this study include smoking, drinking, and coffee consumption. Summary statistics for "smoking initiation" were obtained from a publicly available GWAS meta-analysis that included 311,629 cases and 321,173 controls of European ancestry (27). "Smoking initiation" is a binary phenotype indicating whether an individual has been a regular smoker. Patients were asked related questions in various forms, such as:

1. Have you smoked over 100 cigarettes in your lifetime?
2. Have you ever smoked every day for at least a month?
3. Have you ever smoked regularly?
4. Do you smoke?

Researchers assigned codes to each patient based on their responses. For example, the researchers coded a "2" for those who reported being regular smokers at any point in their lives (currently or formerly) and a "1" for those who denied ever being regular smokers. GWAS data for "drinks per week" were obtained from a meta-analysis involving 941,280 individuals (27). Patients were asked the specific questions "What was the number of alcoholic beverages consumed in the past week?" and "What was the average number of drinks per week over the past year?" Candidate genetic instruments for "coffee consumption" were extracted from GWAS summary data consisting of 375,833 individuals of European ancestry from the UK Biobank (28). The patients were asked about their alcohol-drinking status (never, former, current, unknown), the frequency of their drinking (weekly or monthly), and the types of alcohol they drank (e.g., red wine, white wine, beer/cider, spirits). Total coffee consumption was based on the question "How many cups of coffee do you drink each day (include decaffeinated coffee)?"

GWAS Data for MCP

The GWAS summary data for MCP were obtained from UK Biobank. To our knowledge, this dataset represents one of the largest MCP GWAS studies, including 387,649 individuals of European ancestry (29). Patients with documented CP (lasting at least 3 months) in multiple body sites (0 to 7 sites) were included in the analysis. Patients completed a questionnaire regarding the types of pain they had experienced in the last month, with response options including "none of the above," "pain at any of 7 specific body sites (head, face, neck/shoulder, back, stomach/abdomen, hip, knee)," and "all over the body." If the patients reported recent pain at one or more body sites or widespread pain throughout the body, they were further asked if the pain had persisted for 3 months or longer. MCP was regarded as a quasi-quantitative variable, with phenotypic values ranging from 0 to 7 based on the number of body sites. The original researchers adjusted for age, gender, and genotyping array in their analysis.

Selection of IVs

It is important to note that when using genetic variants as instrumental variables (IVs) for MR analysis, the IVs must satisfy 3 assumptions: the relevance assumption, the independence assumption, and the exclusion restriction assumption (22). The relevance

assumption requires strong associations between the genetic variants and the exposure of interest, and the GWAS datasets should have a sufficient sample size and be published by an authorized consortium. The independence assumption states that the genetic variants should not be correlated with potential confounders other than the exposure being studied. To assess pleiotropy, we examined each candidate single-nucleotide polymorphism (SNP) using PhenoScanner (www.phenoscanter.medschl.cam.ac.uk), a Web site that provides human genotype-phenotype associations. We applied a threshold of 5×10^{-8} to avoid removing an excessive number of SNPs that were being eliminated under relaxed restrictions. Lastly, the exclusion restriction assumptions are defined as genetic variations that affect the outcome only through the exposure of interest. Removing SNPs in linkage disequilibrium (LD) is crucial for quality control. We retained independent SNPs for the exposures with an $LD\ r^2 < 0.001$ and a clump window of 10,000 kb for MR analysis. F-statistics were calculated to assess the strength of the IVs, with an F-statistic value < 10 indicating potential weak IV bias. Harmonization was performed to ensure the alignment of SNP alleles to the exposures of interest and CP (30).

MR Analyses

Five MR analytical methods, namely inverse-variance weighting (IVW), MR-Egger regression, weighted median, penalized weighted median (PWM), and maximum likelihood (ML) were used to estimate the causal effects of LSB, PA, and lifestyle habits on multisite CP. IVW is essentially a meta-analysis method that converts to a weighted regression of the estimation of IVs on CP to obtain an overall effect (30). In this study, IVW is considered the primary MR method for presenting causal estimates between the exposures of interest and CP. The decision to report random or fixed effect IVW results is based on the heterogeneity test. The weighted median method provides robust estimation, even when up to 50% of the SNPs are invalid (31). After calculating the inverse-variance weight of each genetic variant, we incorporated these weights to determine the causal effects, using the weighted median approach. The MR-Egger method accounts for pleiotropy in one or more IVs (6) and can provide unbiased estimates when the selected IVs are ineffective. ML can infer the parameter values that are most likely (maximum probability) to result in the observed outcome, reducing bias caused by misspecification (32). The PWM method causes low bias in estimating causal effects when a few genetic variants are invalid.

MR-PRESSO analysis was conducted to identify possible outliers, using a significance threshold of 0.05 (23). Heterogeneity among genetic variants in the IVW estimation and performance of MR-Egger analyses was assessed using Cochran's Q test (33). Additionally, an MR-Egger intercept was performed to detect horizontal pleiotropy, with a significance level of $P < 0.05$ indicating the presence of horizontal pleiotropy. We generated scatter, forest, and funnel plots to visualize heterogeneity in the causal effects of each SNP.

Reverse MR Analysis

To investigate whether multisite CP has any causal effect on PA, LSB, and lifestyle habits, we conducted a reverse MR analysis. We identified genetic variants significantly associated with MCP through rigorous procedures and reported the results, using IVW as the primary method of analysis. To assess the robustness of the MR findings, we employed 4 additional methods (MR-Egger regression, weighted median, PWM, and ML).

Statistical Analysis

All statistical analyses were performed using R (v4.0.5) with the TwoSampleMR (v0.5.6) and MRPRESSO (v1.0) packages. A *P*-value under 0.05 was considered statistically significant. MR estimates were presented as odds ratios (ORs) or β coefficients with corresponding 95% confidence intervals (CIs).

RESULTS

Selection of IVs

In our study, we carefully selected genetic variants that were significantly associated with various exposures after undergoing a thorough quality control procedure. Specifically, we identified 49 SNPs for computer use, 170 SNPs for television-watching, 5 SNPs for driving, 93 SNPs for smoking initiation, 7 SNPs for drinks per week, 32 SNPs for coffee consumption, 7 SNPs for VPA, 19 SNPs for MVPA, and 13 SNPs for SSOE. (Suppl. Table 1.)

Because obesity is known to be a risk factor for CP, SNPs highly associated with body mass index (BMI) from the PhenoScanner database were excluded to satisfy the independence assumption and avoid confounding bias. For example, we removed 2 SNPs (rs13086611 and rs76824303) for computer use in relation to MCP, 13 SNPs (rs11710798, rs6855246, rs10038055, rs707890, rs9471333, rs62421910, rs917154, rs2920922, rs7036107,

rs10159545, rs44205, rs9563521, and rs62057232) for television-watching and MCP, 11 SNPs (rs12042107, rs6728726, rs6788098, rs12632110, rs66680800, rs9835772, rs993700, rs12333760, rs12112638, rs10159545, rs6265, and rs4759228) for smoking initiation, one SNP (rs151180) for drinks per week, 4 SNPs (rs2867105, rs11854314, rs7206790, and rs4940926) for coffee consumption, one SNP (rs1575676) for VPA, one SNP (rs6857) for MVPA, and 2 SNPs (rs3796386 and rs13088311) for SSOE. Complete information can be found in Suppl. Table 1.

After harmonizing the data, we retained only those genetic variants that aligned with our study's exposures of interest, as indicated by the "TRUE" marking in Suppl. Table 3. Moreover, we identified outliers through MR-PRESSO analyses, and these are listed in Suppl. Table 4. Notably, all the F-statistics of the genetic variants exceeded 10, demonstrating their strength as instrumental variables (Suppl. Table 5). For a comprehensive overview of each step involved in the selection of genetic variants, please see Suppl. Tables 1-4.

Causal Association of Lifestyle Habits with MCP

In our study, we aimed to investigate the causal association between 3 lifestyle habits (smoking initiation, drinks per week, and coffee consumption) and MCP. Through MR-PRESSO analysis, we identified 6 SNPs (rs10233018, rs13145728, rs76214862, rs7921378, rs9401770, and rs9540729) that were relevant to our investigation.

The results of the univariable MR analysis revealed that genetic predisposition to smoking initiation was associated with a significantly higher risk of MCP (IVW: OR = 1.164, 95% CI = 1.122–1.207, and $P = 3.009\text{E-}16$). However, there was uncertainty regarding the effects of drinks per week (IVW: OR = 0.983, 95% CI = 0.854–1.131, and $P = 8.086\text{E-}01$) and coffee consumption (IVW: OR = 0.990, 95% CI = 0.875–1.121, and $P = 8.794\text{E-}01$) on MCP. To ensure the robustness of our findings, we conducted sensitivity analyses using 3 additional MR methods: weighted median (OR = 1.167, 95% CI = 1.120–1.215, and $P = 8.086\text{E-}01$), ML (OR = 1.172, 95% CI = 1.142–1.204, and $P = 2.941\text{E-}32$), and penalized weighted median (OR = 1.171, 95% CI = 1.125–1.218, and $P = 9.831\text{E-}15$). These methods consistently supported the causal association between smoking initiation and MCP, aligning with the IVW analysis. MR-Egger regression also indicated a similar association, albeit with marginal

significance (OR = 1.198, 95% CI = 1.000–1.436, and $P = 5.371\text{E-}02$).

To assess heterogeneity, we performed Cochran's Q test, which revealed no substantial heterogeneity in the relationship between smoking initiation and MCP. Furthermore, the MR-Egger intercept analysis did not detect any horizontal pleiotropy, adding to the validity of our 2-sample MR analysis. Detailed results can be found in Suppl. Tables 6 and 7. Additionally, we visualized the causal estimates using leave-one-out analysis, forest plots, scatter plots, and funnel plots (Fig. 2, Suppl. Figs. 1 and 2) for a comprehensive understanding of the findings.

Causal Association of LSBs with MCP

In our univariate MR analysis, we observed a causal correlation between 2 LSBs, namely computer use and television-watching, and MCP. However, the causal estimates for these relationships displayed directional inconsistency. Specifically, we found that computer use was associated with a reduced risk of MCP (IVW: OR = 0.905, 95% CI = 0.832–0.984, and $P = 1.925\text{E-}02$). This finding was consistent across 3 other MR methods: weighted median (OR = 0.898, 95% CI = 0.818–0.986, and $P = 2.372\text{E-}02$), ML (OR = 0.907, 95% CI = 0.854–0.963, and $P = 1.340\text{E-}03$), and PWM (OR = 0.892, 95% CI = 0.814–0.977, and $P = 1.375\text{E-}02$). On the other hand, leisure television-watching significantly increased the risk of MCP (IVW: OR = 1.320, 95% CI = 1.262–1.380, and $P = 7.749\text{E-}34$). Although MR-Egger regression yielded similar results, the statistical significance was not achieved. The weighted median (OR = 1.252, 95% CI = 1.188–1.319, and $P = 3.182\text{E-}17$), ML (OR = 1.337, 95% CI = 1.293–1.383, and $P = 1.249\text{E-}64$), and PWM (OR = 1.250, 95% CI = 1.187–1.316, and $P = 2.192\text{E-}17$) methods further supported these findings, demonstrating the robustness of our MR results. However, we did not find that driving was associated with any significant effect of on MCP (IVW: OR = 1.007, 95% CI = 0.808–1.255, and $P = 9.492\text{E-}01$). We detected significant heterogeneity for the associations among computer use, television-watching, and MCP using Cochran's Q test (Table 2 and Suppl. Table 6). Additionally, the MR-Egger intercept analysis indicated no substantial pleiotropy (Table 2 and Suppl. Table 7). Furthermore, our leave-one-out analysis did not identify any single SNP that substantially influenced the MR outcome (Fig. 3). Supplementary Figs. 3 and 4 provide visualizations of the causal estimates through scatter plots, funnel plots, and forest plots for a more comprehensive understanding of the findings.

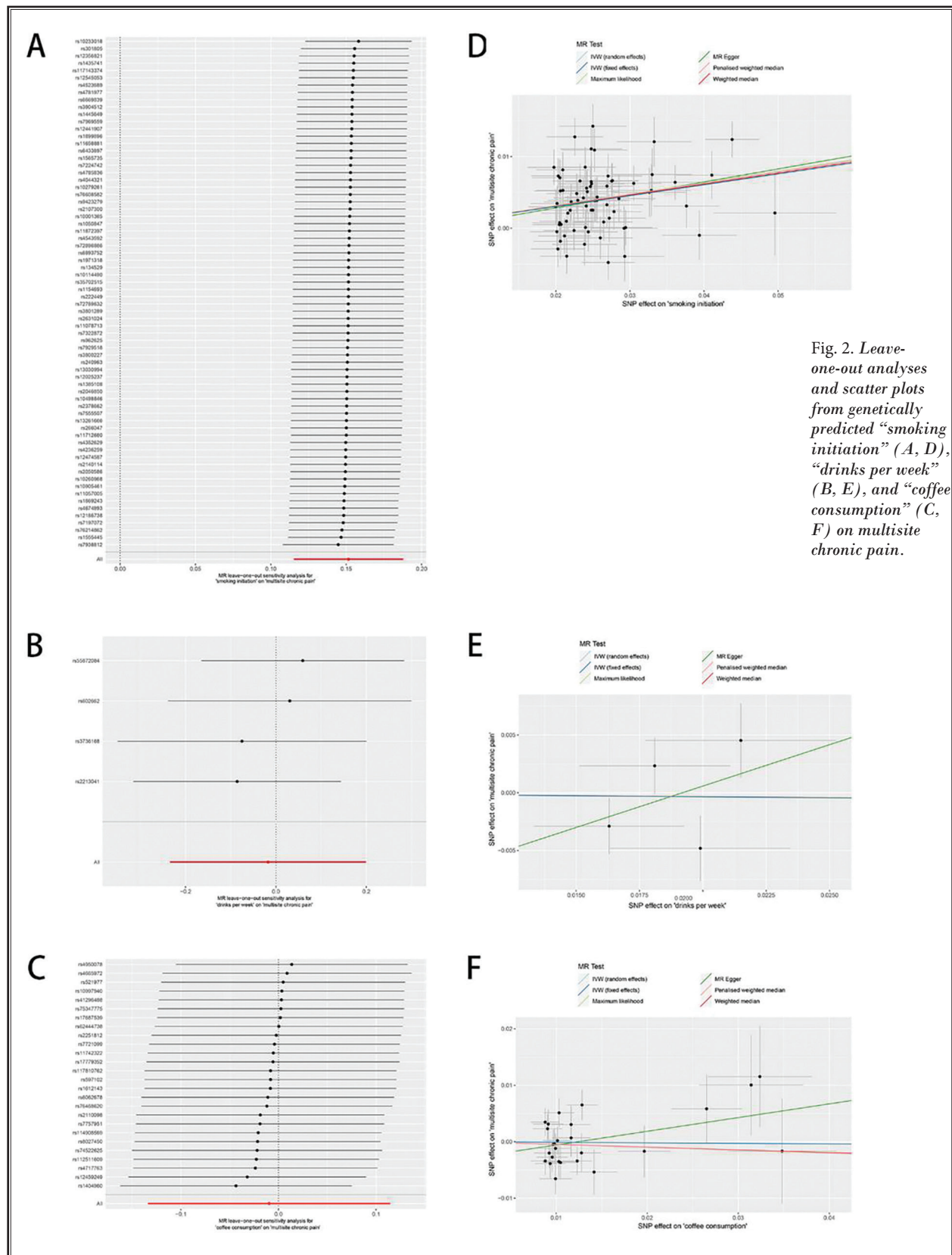


Fig. 2. Leave-one-out analyses and scatter plots from genetically predicted "smoking initiation" (A, D), "drinks per week" (B, E), and "coffee consumption" (C, F) on multisite chronic pain.

Table 2. Causal effects of genetically predicted LSB, lifestyle habits and PA on MCP in univariable MR analyses.

Exposures	nSNPs								
		IVW							
		OR	95%_LCI	95%_UCI	P value	Q statistics	P value		
LSB									
Computer use	42	0.905	0.832	0.984	1.925E-02	84.845	6.837E-05		
Television watching	147	1.320	1.262	1.380	7.749E-34	298.069	1.764E-12		
Driving	3	1.007	0.808	1.255	9.492E-01	1.434	4.882E-01		
Lifestyle habits									
Smoking initiation	70	1.164	1.122	1.207	3.009E-16	147.448	1.256E-07		
Drinks per week	4	0.983	0.854	1.131	8.086E-01	7.132	6.780E-02		
Coffee consumption	26	0.990	0.875	1.121	8.794E-01	37.766	4.875E-02		
PA									
VPA	5	1.242	0.933	1.654	1.374E-01	5.743	2.192E-01		
MVPA	15	1.035	0.938	1.143	4.904E-01	20.505	1.150E-01		
SSOE	11	0.490	0.361	0.664	4.221E-06	18.349	4.936E-02		
		MR-Egger							
		OR	95%_LCI	95%_UCI	P value	Q statistics	P value	Egger-intercept	P value
LSB									
Computer use	42	0.774	0.475	1.262	3.102E-01	83.992	5.825E-05	2.271E-03	5.276E-01
Television watching	147	1.208	1.001	1.456	5.047E-02	296.191	1.997E-12	1.318E-03	3.393E-01
Driving	3	5.657	0.237	134.969	4.783E-01	0.292	5.892E-01	-2.322E-02	4.788E-01
Lifestyle habits									
Smoking initiation	70	1.198	1.000	1.436	5.371E-02	147.216	8.967E-08	-7.755E-04	7.445E-01
Drinks per week	4	2.047	0.179	23.467	6.230E-01	6.067	4.815E-02	-1.375E-02	6.135E-01
Coffee consumption	26	1.275	0.849	1.915	2.535E-01	35.369	6.311E-02	-3.006E-03	2.144E-01
PA									
VPA	5	3.389	0.054	213.781	6.043E-01	5.339	1.486E-01	-9.182E-03	6.662E-01
MVPA	15	1.032	0.478	2.227	9.370E-01	20.505	8.331E-02	4.626E-05	9.935E-01
SSOE	11	0.174	0.018	1.638	1.608E-01	16.792	5.207E-02	7.561E-03	3.849E-01
		Weighted median							
		OR	95%_LCI	95%_UCI	P value				
LSB									
Computer use	42	0.898	0.818	0.986	2.372E-02				
Television watching	147	1.252	1.188	1.319	3.182E-17				
Driving	3	1.066	0.808	1.406	6.520E-01				
Lifestyle habits									
Smoking initiation	70	1.167	1.120	1.215	2.019E-13				
Drinks per week	4	0.984	0.826	1.171	8.530E-01				
Coffee consumption	26	0.953	0.818	1.110	5.354E-01				
PA									
VPA	5	1.424	0.959	2.115	7.950E-02				
MVPA	15	1.057	0.915	1.221	4.487E-01				
SSOE	11	0.615	0.436	0.869	5.779E-03				

Table 2 cont. Causal effects of genetically predicted LSB, lifestyle habits and PA on MCP in univariable MR analyses.

Exposures	nSNPs	Maximum likelihood			
		OR	95%_LCI	95%_UCI	P value
LSB					
Computer use	42	0.907	0.854	0.963	1.340E-03
Television watching	147	1.337	1.293	1.383	1.249E-64
Driving	3	1.007	0.807	1.257	9.488E-01
Lifestyle habits					
Smoking initiation	70	1.172	1.142	1.204	2.941E-32
Drinks per week	4	0.982	0.850	1.135	8.033E-01
Coffee consumption	26	0.990	0.893	1.098	8.493E-01
PA					
VPA	5	1.252	0.934	1.680	1.333E-01
MVPA	15	1.037	0.937	1.147	4.865E-01
SSOE	11	0.485	0.380	0.619	6.376E-09
		Penalised weighted median			
		OR	95%_LCI	95%_UCI	P value
LSB					
Computer use	42	0.892	0.814	0.977	1.375E-02
Television watching	147	1.250	1.187	1.316	2.192E-17
Driving	3	1.066	0.805	1.412	6.569E-01
Lifestyle habits					
Smoking initiation	70	1.171	1.125	1.218	9.831E-15
Drinks per week	4	0.984	0.826	1.172	8.536E-01
Coffee consumption	26	0.951	0.818	1.107	5.174E-01
PA					
VPA	5	1.453	1.005	2.100	4.700E-02
MVPA	15	1.069	0.929	1.231	3.519E-01
SSOE	11	0.623	0.443	0.875	6.401E-03

MR, mendelian randomization; nSNPs, number of single nucleotide polymorphisms; IVW, inverse-variance weighted; LSB, leisure sedentary behaviors; MCP, multisite chronic pain; VPA, Vigorous physical activity; MVPA, Moderate-to-vigorous physical activity; SSOE, strenuous sports or other exercises; OR, odds ratio; 95% CI, 95% confidence interval.

Causal Association of PA with MCP

In our study, we investigated the causal relationships between 3 phenotypes of PA and MCP. However, we did not find evidence of a causal relationship between genetically predicted VPA (IVW: OR = 1.242, 95% CI = 0.933–1.654, and $P = 1.374E-01$), moderate-to-vigorous physical activity (MVPA) (IVW: OR = 1.035, 95% CI = 0.938–1.143, and $P = 4.904E-01$), and MCP. On the other hand, SSOE showed a significant association with a reduced risk of MCP, according to the IVW analysis (OR

= 0.490, 95% CI = 0.361–0.664, and $P = 4.221E-06$). This finding was consistent across the weighted median (OR = 0.615, 95% CI = 0.436–0.869, and $P = 5.779E-03$), ML (OR = 0.485, 95% CI = 0.380–0.619, and $P = 6.376E-09$), and PWM (OR = 0.623, 95% CI = 0.443–0.875, and $P = 6.401E-03$) methods. The results of MR-Egger regression, however, showed an inconsistent effect estimation (OR = 0.174 and 95% CI = 0.018–1.638) without statistical significance ($P = 1.608E-01$). Heterogeneity was only observed in the causal inference for SSOE on MCP using

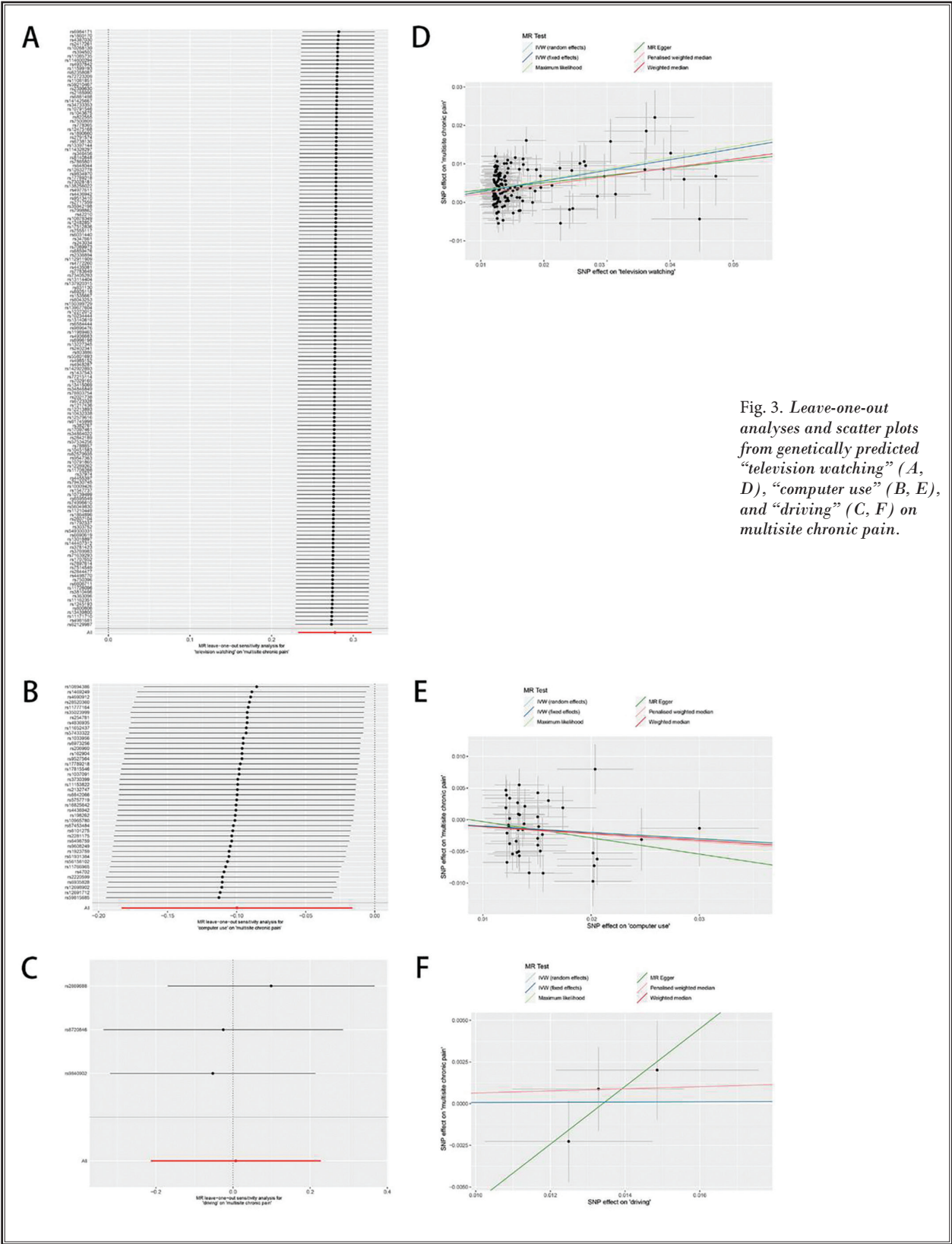


Fig. 3. Leave-one-out analyses and scatter plots from genetically predicted “television watching” (A, D), “computer use” (B, E), and “driving” (C, F) on multisite chronic pain.

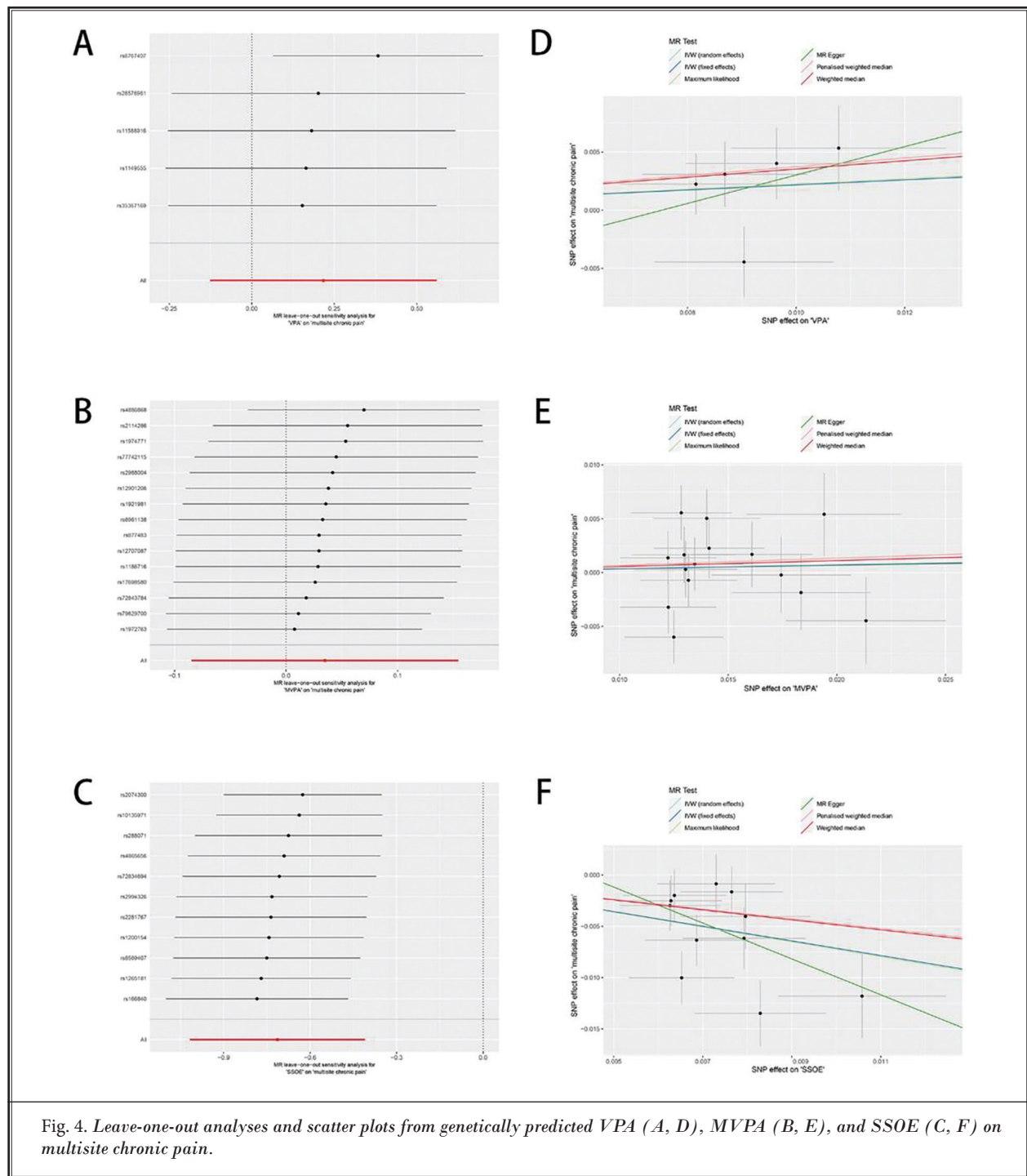


Fig. 4. Leave-one-out analyses and scatter plots from genetically predicted VPA (A, D), MVPA (B, E), and SSOE (C, F) on multisite chronic pain.

Cochran's Q test (Table 2 and Suppl. Table 6). Based on the results of the MR-Egger intercept analysis, we did not detect any substantial horizontal pleiotropy (Table 2 and Suppl. Table 7). For a more comprehensive understanding, detailed information related to the visualiza-

tion of causal estimates can be found in Fig. 4, Suppl. Figs. 5 and 6.

Reverse MR Analysis

In our 2-sample MR analyses, we investigated the

reverse relationship between MCP and several lifestyle factors. Detailed information can be found in Table 3. We found that MCP was associated with a great amount of time spent watching television (IVW: $\beta = 0.256$, 95% CI = 0.170–0.341, and $P = 5.259\text{E-}09$), an increased risk of smoking initiation (IVW: OR = 1.475, 95% CI = 1.257–1.732, and $P = 2.016\text{E-}06$), and a reduced possibility of VPA (IVW: OR = 0.945, 95% CI = 0.900–0.993, and $P = 2.595\text{E-}02$), and SSOE (IVW: OR = 0.900, 95% CI = 0.871–0.931, and $P = 1.041\text{E-}09$). MR-Egger estimates showed a different trend in the assessment of MCP on VPA (OR = 1.083, 95% CI = 0.800–1.466, and $P = 6.107\text{E-}01$). However, none of the MR-Egger intercepts deviated from the null value, indicating the absence of horizontal pleiotropy (Suppl. Table 7). The results of Cochran's Q test can be found in Suppl. Table 6.

DISCUSSION

To the best of our knowledge, ours is the first bidirectional MR study using a 2-sample MR analysis to investigate the potential associations of MCP with between LSB (computer use, television watching, and driving), PA (VPA, MVPA, and SSOE), and lifestyle habits (smoking, drinking, and coffee consumption). We extracted genetic variants that were significantly related to exposures from large-scale biomedical databases to explore causal associations. Our MR results indicate that leisure television-watching (IVW: OR = 1.320, 95% CI = 1.262–1.380, and $P = 7.749\text{E-}34$) and smoking initiation (IVW: OR = 1.164, 95% CI = 1.122–1.207, and $P = 3.009\text{E-}16$) are associated with a high risk of MCP, while leisure computer use (IVW: OR = 0.905, 95% CI = 0.832–0.984, and $P = 1.925\text{E-}02$) and SSOE (IVW: OR = 0.900, 95% CI = 0.871–0.931, and $P = 1.041\text{E-}09$) appear to be protective factors against MCP. In addition, we did not find evidence of a causal relationship between other related phenotypes (driving, VPA, MVPA, drinking, and coffee consumption) and MCP. In reverse causal inference, our findings suggested that MCP increased the time spent watching TV and the risk of smoking while decreasing engagement in physical activities such as VPA and SSOE.

The relationship between LSB and CP pain remains unclear. A meta-analysis involving 16 longitudinal studies with over 100,000 patients found no association between sedentary behaviors and the occurrence of lower back pain (LBP) (34). Another study, which conducted a nationwide survey using online questionnaires during the COVID-19 pandemic, found that sedentary behaviors were associated with worsening symptoms of back pain (35). Our MR analysis contributes new

evidence by presenting different results obtained from 3 phenotypes of LSB. Specifically, the causal relationship between leisure television-watching and chronic pain is consistent with the conclusions of many observational studies (35,36). Television-watching is a common sedentary behavior, but the time spent watching television can be influenced by various factors such as gender, age, and employment status. These 2 types of LSB may exhibit underlying group differences because middle-aged and elderly individuals compose the primary audience for television. In countries with highly developed information technology and economies, this demographic group enjoys better social security, resulting in more opportunities and time for viewing television at home. From another perspective, research has suggested that television-watching is generally considered a “mentally passive” activity, whereas computer use is usually considered a “mentally active” activity (37-39). The observation that engaging in “mentally passive” activities may be associated with depression possibly provides an additional clue. A meta-analysis by Rodriguez-Ayllon et al found significant associations between LSB and the risk of depression in teenagers. Besides, Huang et al (40) and Rodriguez-Ayllon et al (41) also demonstrated a strong link between sedentary behavior and depression. These studies have confirmed the close relationship between LSB and mental disorders (such as depression). Moreover, we have also noticed that depression increases the risk of CP, as confirmed in previous research (31,42). Therefore, mental disorders, including depression, may serve as potential mediators that cannot be overlooked.

Results from a subgroup analysis showed that “television-watching” was positively associated with the risk of depression, while “computer use” did not show a significant association (40). These findings suggested that “mentally passive” behavior like television-watching may increase the risk of depression, whereas “mentally active” behavior like computer use has a nonsignificant effect. The protective effect of “mentally active” behavior (computer use) on the incidence of depression has also been proven in a cohort study (37). In this study, this difference in results could also be the result of a potential bias problem introduced by the use of overlapping samples in the MR analysis. However, this bias is greatly reduced when the instrumental variable intensity variability is very high. Additionally, this study shows better performance and less bias when multiple MR methods are used. Therefore, we hypothesize that sedentary behaviors beneficial to mental health may

Table 3. Results of reversed MR analyses.

Outcomes	Multisite chronic pain			
	Beta / OR	95%_LCI	95%_UCI	P value
Computer use				
IVW	-0.035	-0.128	0.058	4.589E-01
MR-Egger	-0.126	-0.609	0.357	6.124E-01
Weighted median	-0.039	-0.135	0.057	4.220E-01
Maximum likelihood	-0.034	-0.096	0.028	2.843E-01
Penalised weighted median	-0.042	-0.136	0.052	3.841E-01
Television watching				
IVW	0.256	0.170	0.341	5.259E-09
MR-Egger	0.407	-0.021	0.834	7.313E-02
Weighted median	0.232	0.139	0.326	1.194E-06
Maximum likelihood	0.262	0.201	0.324	4.396E-17
Penalised weighted median	0.237	0.142	0.332	9.460E-07
Driving				
IVW	0.041	-0.017	0.099	1.686E-01
MR-Egger	-0.103	-0.400	0.193	5.009E-01
Weighted median	-0.001	-0.086	0.083	9.725E-01
Maximum likelihood	0.043	-0.017	0.102	1.582E-01
Penalised weighted median	-0.012	-0.096	0.071	7.717E-01
Smoking initiation				
IVW	1.475	1.257	1.732	2.016E-06
MR-Egger	1.747	0.644	4.736	2.850E-01
Weighted median	1.363	1.158	1.605	2.041E-04
Maximum likelihood	1.495	1.339	1.669	8.133E-13
Penalised weighted median	1.365	1.158	1.610	2.162E-04
Drinks per week				
IVW	0.046	-0.040	0.132	2.950E-01
MR-Egger	-0.057	-0.595	0.482	8.384E-01
Weighted median	0.053	-0.064	0.170	3.732E-01
Maximum likelihood	0.047	-0.040	0.134	2.868E-01
Penalised weighted median	0.053	-0.064	0.170	3.733E-01
Coffee consumption				
IVW	-0.025	-0.070	0.019	2.667E-01
MR-Egger	0.027	-0.292	0.346	8.689E-01
Weighted median	-0.028	-0.092	0.036	3.926E-01
Maximum likelihood	-0.026	-0.071	0.020	2.742E-01
Penalised weighted median	-0.031	-0.095	0.032	3.338E-01
Vigorous PA				
IVW	0.945	0.900	0.993	2.595E-02
MR-Egger	1.083	0.800	1.466	6.107E-01
Weighted median	0.928	0.877	0.981	8.461E-03
Maximum likelihood	0.945	0.909	0.983	4.770E-03
Penalised weighted median	0.924	0.871	0.981	9.034E-03

Table 3 cont. *Results of reversed MR analyses.*

Moderate-to-vigorous PA				
IVW	-0.053	-0.118	0.011	1.060E-01
MR-Egger	-0.027	-0.492	0.438	9.103E-01
Weighted median	-0.084	-0.181	0.012	8.726E-02
Maximum likelihood	-0.052	-0.118	0.014	1.236E-01
Penalised weighted median	-0.085	-0.181	0.012	8.477E-02
SSOE				
IVW	0.900	0.871	0.931	1.041E-09
MR-Egger	0.826	0.646	1.055	1.414E-01
Weighted median	0.902	0.858	0.948	4.963E-05
Maximum likelihood	0.901	0.869	0.933	5.517E-09
Penalised weighted median	0.896	0.853	0.941	1.117E-05

VPA, vigorous physical activity; MVPA, Moderate-to-vigorous physical activity; SSOE, strenuous sports or other exercises; MR, mendelian randomization; IVW, inverse-variance weighted; OR, odds ratio; 95% CI, 95% confidence interval.

have a positive effect on MCP, which is supported by our MR analysis (OR = 0.905 and 95% CI = 0.832–0.984). Thus, we recommend that individuals at high risk of CP (especially the elderly) should be urged to reduce the amount of time they spend watching television.

Furthermore, our MR analysis revealed that SSOE significantly reduces the risk of MCP (OR = 0.490, 95% CI = 0.361–0.664). Our study highlights the importance of PA, which is consistent with the findings of most investigations. A study of ageing patients found that only high levels of PA were associated with a reduced risk of musculoskeletal pain (43). Systemic inflammation, obesity, and mechanical overload are recognized as key factors contributing to the prevalence and severity of CP. Managing patients with both CP and obesity can be particularly challenging due to adipose tissue hypoxia caused by decreased angiogenesis and blood flow, possibly triggering an increase of inflammatory macrophages (44). Exercise plays a key role in pain relief through various mechanisms, including reducing abdominal fat, systemic inflammation, and pain perception, making exercise a promising non-pharmacological treatment option (45). Therefore, interventions that target CP relief should consider incorporating SSOEs.

The relationship between smoking and CP is still debated, with different epidemiological investigations yielding conflicting results (46–48). Although many researchers believe that smoking is a risk factor in the etiology of CP, the available evidence remains insufficient. Due to ethical considerations, conducting high-quality RCTs for further causal inference is challenging. Our MR analysis provides new evidence suggesting that smoking

may indeed be a risk factor for MCP (OR = 1.164; 95% CI = 1.122–1.207). However, the potential mechanism through which smoking causes CP warrants further exploration. Conversely, reverse MR analysis indicated that CP increased the risk of smoking (OR = 1.475 and 95% CI = 1.257–1.732). A national survey of 9,282 adults in the United States found that the prevalence of smoking among CP patients may be twice as high as in the general population. Moreover, an observational study suggested that smokers found it particularly difficult to quit during CP treatment, even with effective tobacco intervention services (49). One possible explanation for this observation is that nicotine intake can reduce pain sensitivity, highlighting CP as a potential underlying cause for the continuation of the habit (50).

Limitations

There are some limitations to this study. First, because the biological functions of the included SNPs had not been fully elucidated, it was difficult to completely rule out potential horizontal pleiotropy, which might have introduced biases. Secondly, caution should be exercised when generalizing the conclusions to ethnic groups with different histories, cultures, and lifestyles. Finally, due to the restriction of GWAS datasets, we were unable to use nonoverlapping samples to assess the causal association in every 2-sample MR analysis, resulting in inevitable bias.

CONCLUSION

The findings from this MR analysis suggest that engaging in “mentally active” behavior has a positive effect on MCP, while participating in “mentally passive”

sedentary behavior increases the risk for the condition. These results highlight the importance of distinguishing between different types of leisure sedentary behaviors. Additionally, smoking cessation and engaging in strenuous sports or other exercises for more than 2-3 days per week may prove beneficial in reducing the number of pain sites.

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Author Contributions

Qiuli He and Lei Liu designed this study. Yahui Wang performed the statistical analyses. Yixing Xiao prepared the tables and figures. Housheng Deng contributed to drafting the manuscript. All authors take responsibility for the integrity of the study.

Supplemental material available at www.painphysicianjournal.com

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Suppl. Table 1. *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
1. Leisure sedentary behavior										
Computer use	rs2281175	1	1665702	T	C	0.593738	-0.013387	0.0023563	1.30E-08	
Computer use	rs600806	1	109840629	G	A	0.276897	0.0161605	0.002464	5.40E-11	
Computer use	rs1923759	1	197414097	G	A	0.55503	0.0121204	0.0022113	4.20E-08	
Computer use	rs12691712	2	146446673	A	G	0.110364	0.0203661	0.0035181	7.10E-09	
Computer use	rs1037091	2	155652357	C	T	0.67295	0.0154966	0.0023914	9.20E-11	
Computer use	rs17815546	2	215021870	G	A	0.573234	-0.0122195	0.0022269	4.10E-08	
Computer use	rs4436942	2	221042140	T	A	0.394172	0.0123617	0.0022548	4.20E-08	
Computer use	rs13086611	3	49385417	A	T	0.696044	-0.015117	0.0023927	2.60E-10	Body mass index
Computer use	rs76824303	3	62459819	A	C	0.901115	0.0225383	0.0037785	2.40E-09	Body mass index
Computer use	rs16825642	3	116520381	C	T	0.796078	-0.0151534	0.0027451	3.40E-08	
Computer use	rs6842066	4	39393801	C	T	0.430421	0.012588	0.0022345	1.80E-08	
Computer use	rs4690912	4	159672059	G	T	0.423077	-0.0122167	0.0022319	4.40E-08	
Computer use	rs2220599	5	7378854	C	G	0.632986	-0.0160514	0.0022902	2.40E-12	
Computer use	rs254781	5	88000636	C	T	0.415839	0.013144	0.0022391	4.40E-09	
Computer use	rs1469249	5	113837198	G	A	0.788564	0.0155576	0.0027109	9.50E-09	
Computer use	rs162904	5	131595784	T	C	0.332694	0.0130747	0.0023365	2.20E-08	
Computer use	rs56158102	5	144027803	C	T	0.344405	0.0132096	0.0023851	3.10E-08	
Computer use	rs1033956	6	18970793	G	A	0.0980101	0.0205563	0.003715	3.10E-08	
Computer use	rs2179517	6	26198845	G	C	0.551298	-0.0124261	0.0022091	1.90E-08	
Computer use	rs11153822	6	98214814	C	T	0.502398	-0.0132527	0.002221	2.40E-09	
Computer use	rs17789218	6	100600097	T	C	0.756018	-0.0150545	0.0025613	4.20E-09	
Computer use	rs6935828	6	140811367	C	T	0.446483	-0.0121206	0.0022128	4.30E-08	
Computer use	rs12698902	7	69837319	A	G	0.71129	0.0150725	0.0024264	5.20E-10	
Computer use	rs67453484	7	124454524	T	A	0.616938	-0.0124605	0.0022727	4.20E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Computer use	rs11766965	7	126956866	G	C	0.623046	0.0124757	0.0022816	4.60E-08	
Computer use	rs6973256	7	133055603	C	T	0.401474	-0.0124671	0.0022647	3.70E-08	
Computer use	rs11777164	8	143297312	C	T	0.633775	0.0133623	0.0022887	5.30E-09	
Computer use	rs10965780	9	23341715	C	G	0.415161	-0.0138038	0.0022401	7.20E-10	
Computer use	rs28520360	9	98283580	T	G	0.893083	-0.0201613	0.0035625	1.50E-08	
Computer use	rs7034544	9	116825464	A	G	0.757223	0.0144108	0.0025644	1.90E-08	
Computer use	rs4836935	9	126345893	T	G	0.632362	0.0127341	0.002295	2.90E-08	
Computer use	rs35023999	11	113266411	A	C	0.491252	-0.0133101	0.0022017	1.50E-09	
Computer use	rs10894386	11	131278575	G	C	0.38315	-0.0142716	0.002266	3.00E-10	
Computer use	rs61931384	12	38515006	T	C	0.720434	-0.013873	0.0024853	2.40E-08	
Computer use	rs2132747	12	40348056	A	C	0.732264	0.0136702	0.0024812	3.60E-08	
Computer use	rs206960	12	120842051	T	C	0.208485	0.0150714	0.0027092	2.70E-08	
Computer use	rs9527564	13	57555325	T	C	0.896865	-0.0201729	0.0036499	3.30E-08	
Computer use	rs198262	14	57283283	C	T	0.0435078	0.0300048	0.00546	3.90E-08	
Computer use	rs59815685	15	47714368	C	T	0.480901	0.0133546	0.0022744	4.30E-09	
Computer use	rs4702	15	91426560	G	A	0.443547	0.0121782	0.0022147	3.80E-08	
Computer use	rs6498759	16	18020295	T	C	0.309602	0.0132648	0.0023861	2.70E-08	
Computer use	rs3730399	16	67229019	A	G	0.934805	0.0246511	0.0044612	3.30E-08	
Computer use	rs57433322	17	19141582	C	G	0.88314	0.0202734	0.0034329	3.50E-09	
Computer use	rs3744760	17	43195981	T	C	0.731947	0.0137348	0.0024869	3.30E-08	
Computer use	rs11652437	17	79338469	C	A	0.676602	-0.0152959	0.0023853	1.40E-10	
Computer use	rs613872	18	53210302	G	T	0.174492	0.0181819	0.0029031	3.80E-10	
Computer use	rs6101275	20	59807062	C	T	0.780869	0.0150559	0.0026774	1.90E-08	
Computer use	rs9608249	22	24613952	G	A	0.851351	0.0173846	0.0031076	2.20E-08	
Computer use	rs5757719	22	39945791	T	C	0.441935	0.0123921	0.0022195	2.40E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Television watching	rs2842189	1	44007648	T	C	0.376934	-0.0121628	0.0022304	4.90E-08	
Television watching	rs7555117	1	61060280	T	C	0.513858	0.0119805	0.0021598	2.90E-08	
Television watching	rs7514549	1	62403507	C	T	0.798975	0.0147821	0.0027089	4.80E-08	
Television watching	rs1547737	1	66983920	G	T	0.347704	-0.0128072	0.0022821	2.00E-08	
Television watching	rs11210449	1	74785991	A	G	0.288479	-0.0131107	0.0023881	4.00E-08	
Television watching	rs11162351	1	77944732	C	G	0.602486	-0.0123268	0.0022043	2.20E-08	
Television watching	rs114328297	1	91190854	T	G	0.777756	0.0143839	0.0026285	4.40E-08	
Television watching	rs631130	1	96043010	T	A	0.369158	-0.0138158	0.0023634	5.00E-09	
Television watching	rs144407312	1	98012151	T	C	0.969134	-0.0375809	0.0062924	2.30E-09	
Television watching	rs822555	1	98667546	A	G	0.379129	-0.0124942	0.002226	2.00E-08	
Television watching	rs600806	1	109840629	G	A	0.276828	-0.0142629	0.0024174	3.60E-09	
Television watching	rs141425667	1	114930465	G	A	0.934868	-0.0240563	0.004381	4.00E-08	
Television watching	rs6690619	1	153765399	C	T	0.491113	0.0128488	0.002168	3.10E-09	
Television watching	rs4498770	1	184638266	C	T	0.483118	0.0125713	0.0021546	5.40E-09	
Television watching	rs72723209	1	187974627	A	T	0.979039	-0.0446583	0.0076185	4.60E-09	
Television watching	rs1890660	1	193036952	G	A	0.273677	0.0142821	0.002418	3.50E-09	
Television watching	rs6721975	2	5832667	T	C	0.231524	-0.0166905	0.002614	1.70E-10	
Television watching	rs13397144	2	17406100	A	G	0.849038	0.0166372	0.0030134	3.40E-08	
Television watching	rs139677604	2	24366132	C	G	0.746509	-0.0143056	0.0025005	1.10E-08	
Television watching	rs13018897	2	41707765	G	T	0.640324	-0.0123059	0.0022495	4.50E-08	
Television watching	rs1217436	2	50562960	T	G	0.661753	0.0131333	0.0022874	9.40E-09	
Television watching	rs12475168	2	58992704	G	T	0.869409	-0.018196	0.0032266	1.70E-08	
Television watching	rs243034	2	60602892	C	T	0.381197	0.0150926	0.0022209	1.10E-11	
Television watching	rs59210467	2	97097291	C	T	0.69262	-0.0134192	0.002345	1.00E-08	
Television watching	rs79430745	2	100296525	C	T	0.972372	0.0362106	0.0066268	4.60E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Television watching	rs6723328	2	105469864	A	G	0.362079	-0.0124654	0.0022464	2.90E-08	
Television watching	rs6738130	2	116327375	C	T	0.289725	-0.0130392	0.0023785	4.20E-08	
Television watching	rs10432338	2	147806785	G	T	0.817643	-0.0194503	0.0027931	3.30E-12	
Television watching	rs3769983	2	161994383	G	A	0.514651	-0.0142159	0.0021583	4.50E-11	
Television watching	rs2060199	2	166196681	T	A	0.446311	0.012079	0.0021637	2.40E-08	
Television watching	rs56049830	2	185708081	C	T	0.819721	-0.016105	0.0028122	1.00E-08	
Television watching	rs1860170	2	191702719	T	C	0.286686	0.0135204	0.0023978	1.70E-08	
Television watching	rs13415069	2	193709357	T	C	0.593498	0.0127352	0.0022029	7.40E-09	
Television watching	rs10451583	2	215247022	C	A	0.605205	-0.0137792	0.0022226	5.70E-10	
Television watching	rs4436942	2	221042140	T	A	0.394033	-0.0120799	0.0022107	4.60E-08	
Television watching	rs778365	2	233774828	T	C	0.701765	0.0139956	0.002365	3.30E-09	
Television watching	rs138256022	3	11603090	C	T	0.958546	-0.0313469	0.0056532	2.90E-08	
Television watching	rs9834970	3	36856030	T	C	0.501031	0.0127684	0.0021578	3.30E-09	
Television watching	rs11710798	3	48570686	A	C	0.8913	0.0212628	0.0035018	1.30E-09	Body mass index
Television watching	rs137920315	3	49220504	A	C	0.948399	-0.0359994	0.0049519	3.60E-13	
Television watching	rs142922893	3	50570449	T	C	0.970694	-0.0400785	0.0065019	7.10E-10	
Television watching	rs11708288	3	60884267	A	G	0.601768	0.0129066	0.002211	5.30E-09	
Television watching	rs1864896	3	71469845	A	G	0.438721	0.0123983	0.0021881	1.50E-08	
Television watching	rs112911909	3	85517112	G	A	0.635037	0.0136503	0.0022396	1.10E-09	
Television watching	rs67316928	3	89482234	T	C	0.60799	-0.0123545	0.0022134	2.40E-08	
Television watching	rs12632778	3	106452359	T	G	0.954031	-0.028473	0.0051805	3.90E-08	
Television watching	rs1707652	3	165478799	C	T	0.631082	-0.0124026	0.0022392	3.00E-08	
Television watching	rs114600294	3	181419367	G	C	0.788982	-0.0162426	0.0026422	7.90E-10	
Television watching	rs363096	4	3180021	T	C	0.424891	0.0123786	0.0021877	1.50E-08	
Television watching	rs7697614	4	17821177	T	A	0.849136	-0.0167006	0.0030149	3.00E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Television watching	rs77215114	4	45187658	A	T	0.930462	0.024415	0.0043092	1.50E-08	
Television watching	rs10009426	4	52710913	A	G	0.707433	-0.0130528	0.0023789	4.10E-08	
Television watching	rs788857	4	82138551	A	G	0.718481	-0.0132963	0.0024099	3.40E-08	
Television watching	rs6855246	4	103112470	A	G	0.920433	-0.0227263	0.004144	4.20E-08	Body mass index
Television watching	rs13114404	4	118334362	A	G	0.913412	0.0212707	0.0038659	3.80E-08	
Television watching	rs13140619	4	130230742	G	A	0.433569	0.0119145	0.0021802	4.60E-08	
Television watching	rs4455397	4	152256290	T	C	0.437483	-0.0128466	0.0021814	3.90E-09	
Television watching	rs11726096	4	159789000	A	C	0.617891	-0.0122038	0.002223	4.00E-08	
Television watching	rs6859476	5	59334302	C	T	0.531667	-0.012091	0.0022008	3.90E-08	
Television watching	rs549300331	5	60233914	T	A	0.601899	0.0129051	0.0022826	1.60E-08	
Television watching	rs347661	5	62549141	T	C	0.435345	0.0130859	0.0022004	2.70E-09	
Television watching	rs10038055	5	88783421	G	T	0.632747	-0.0128295	0.0022506	1.20E-08	Body mass index
Television watching	rs71639293	5	92995013	A	G	0.797367	0.016731	0.0026916	5.10E-10	
Television watching	rs62358087	5	107170148	A	G	0.818927	-0.0160521	0.0028218	1.30E-08	
Television watching	rs9326862	5	112054547	A	T	0.467982	0.0120385	0.0021629	2.60E-08	
Television watching	rs6595549	5	124139761	G	C	0.821204	0.0174453	0.0028145	5.70E-10	
Television watching	rs34846849	5	138360578	T	C	0.668557	-0.0133936	0.0022932	5.20E-09	
Television watching	rs17097461	5	141077992	T	C	0.927892	-0.025698	0.0042049	9.90E-10	
Television watching	rs6881498	5	147880181	A	G	0.564177	0.0161652	0.0021788	1.20E-13	
Television watching	rs42210	5	166408788	G	C	0.289169	-0.0138517	0.0023954	7.30E-09	
Television watching	rs2336894	5	166990595	T	G	0.359908	0.0122961	0.0022525	4.80E-08	
Television watching	rs707890	6	26105504	A	C	0.838104	0.0184505	0.0029265	2.90E-10	Body mass index
Television watching	rs2844477	6	31578772	T	C	0.653839	-0.0143312	0.0022742	2.90E-10	
Television watching	rs9471333	6	40362023	C	T	0.450187	0.0131038	0.0021694	1.50E-09	Body mass index
Television watching	rs12213893	6	67488168	G	C	0.613831	-0.0133075	0.0022248	2.20E-09	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Television watching	rs34733353	6	89788797	G	C	0.590727	0.0119877	0.0021978	4.90E-08	
Television watching	rs62421910	6	98228405	A	G	0.922902	-0.0231964	0.0041265	1.90E-08	Body mass index
Television watching	rs17789218	6	100600097	T	C	0.75605	0.0185965	0.002514	1.40E-13	
Television watching	rs6925118	6	143165488	A	G	0.811879	0.0157402	0.0027673	1.30E-08	
Television watching	rs73028181	6	166115539	G	T	0.97372	-0.0472356	0.0067443	2.50E-12	
Television watching	rs37974	7	8010386	A	G	0.517757	0.0120648	0.002176	2.90E-08	
Television watching	rs10234444	7	41828527	G	A	0.823392	0.0158909	0.0028646	2.90E-08	
Television watching	rs10268139	7	77328100	A	C	0.586067	-0.0125292	0.0021972	1.20E-08	
Television watching	rs6951746	7	89364651	C	A	0.151725	0.0164726	0.0030163	4.70E-08	
Television watching	rs917154	7	99020806	A	G	0.845322	0.0165682	0.0029944	3.10E-08	Body mass index
Television watching	rs2021738	7	101901641	A	G	0.0544593	0.0266082	0.0047697	2.40E-08	
Television watching	rs13227345	7	112934071	G	A	0.672243	-0.0129636	0.0023037	1.80E-08	
Television watching	rs7783649	7	115515952	C	A	0.111925	0.0195135	0.0035061	2.60E-08	
Television watching	rs57534256	7	126311654	T	C	0.430662	-0.0125669	0.0021818	8.40E-09	
Television watching	rs6984171	8	10734662	A	G	0.609548	-0.0127934	0.0022274	9.30E-09	
Television watching	rs13439800	8	30819854	G	T	0.547231	0.0140864	0.0021692	8.40E-11	
Television watching	rs6996198	8	65463442	C	T	0.84333	-0.0163982	0.0029738	3.50E-08	
Television watching	rs2920922	8	76708077	T	C	0.423584	0.0126979	0.0021927	7.00E-09	Body mass index
Television watching	rs2607104	8	92563922	G	A	0.483088	-0.0121294	0.0021744	2.40E-08	
Television watching	rs11989463	8	118846051	A	C	0.79881	-0.0154062	0.0026967	1.10E-08	
Television watching	rs2717559	8	143882420	A	G	0.55928	0.0124298	0.0021944	1.50E-08	
Television watching	rs4387030	9	1627292	G	A	0.354551	0.0125957	0.0022661	2.70E-08	
Television watching	rs7865801	9	14745886	G	A	0.367473	0.0127451	0.0022625	1.80E-08	
Television watching	rs34864022	9	22609110	A	G	0.933558	-0.0263815	0.0043571	1.40E-09	
Television watching	rs4977611	9	23303417	A	C	0.376863	0.0123088	0.0022341	3.60E-08	
Television watching	rs2791574	9	82212094	T	G	0.657382	-0.0126402	0.0022821	3.00E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Television watching	rs7036107	9	92177897	A	G	0.489528	-0.0130632	0.0022026	3.00E-09	Body mass index
Television watching	rs1535667	9	102894255	C	T	0.545367	-0.0120318	0.0021679	2.90E-08	
Television watching	rs10739499	9	120514261	C	G	0.33716	0.0138371	0.00229	1.50E-09	
Television watching	rs62579935	9	126116581	C	A	0.885382	-0.0187988	0.0033955	3.10E-08	
Television watching	rs7029165	9	134802170	T	C	0.309181	0.0133658	0.0023566	1.40E-08	
Television watching	rs382767	9	135690582	G	A	0.912449	0.0225316	0.0038207	3.70E-09	
Television watching	rs2399630	10	11149643	T	C	0.532514	-0.0122336	0.0021736	1.80E-08	
Television watching	rs10159545	10	21766969	C	G	0.652227	-0.0158165	0.0022842	4.40E-12	Body mass index
Television watching	rs7915418	10	56630610	C	G	0.426331	0.0120745	0.0021924	3.60E-08	
Television watching	rs4948287	10	63584531	T	A	0.581513	0.0129088	0.0021919	3.90E-09	
Television watching	rs35942198	10	86923036	G	C	0.669564	0.0126668	0.0023002	3.70E-08	
Television watching	rs6584444	10	103455809	C	T	0.321908	0.0128688	0.0023236	3.10E-08	
Television watching	rs7089973	10	116569565	C	A	0.6186	-0.013355	0.0022366	2.40E-09	
Television watching	rs3781423	10	126704704	G	C	0.630584	-0.0124343	0.0022427	2.90E-08	
Television watching	rs11599193	10	127153283	A	T	0.80911	0.0151287	0.0027629	4.40E-08	
Television watching	rs12289262	11	12894758	C	T	0.730942	-0.0137276	0.0024453	2.00E-08	
Television watching	rs44205	11	65564786	G	A	0.671016	0.012541	0.0022956	4.70E-08	Body mass index
Television watching	rs10791865	11	66035608	A	C	0.443042	0.0127248	0.0021871	6.00E-09	
Television watching	rs12272012	11	84861286	G	C	0.955687	-0.0295782	0.0052581	1.90E-08	
Television watching	rs1792337	11	92431686	T	C	0.682611	-0.0130208	0.0023283	2.20E-08	
Television watching	rs10831412	11	95449528	T	A	0.570049	0.0121553	0.0021826	2.60E-08	
Television watching	rs10791546	11	101830126	C	T	0.589106	0.0120455	0.0021952	4.10E-08	
Television watching	rs648044	11	114030799	A	G	0.395242	-0.013834	0.0022659	1.00E-09	
Television watching	rs4936683	11	122167127	C	T	0.553209	-0.0120749	0.0021771	2.90E-08	
Television watching	rs4937842	11	133734542	G	C	0.633634	-0.0128044	0.0022564	1.40E-08	
Television watching	rs2417261	12	13414139	T	G	0.107191	0.0245714	0.0035083	2.50E-12	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Television watching	rs74996610	12	24075007	C	G	0.954131	-0.0305519	0.0051959	4.10E-09	
Television watching	rs12579616	12	30775978	C	T	0.748112	-0.0139253	0.0024884	2.20E-08	
Television watching	rs11171710	12	56368078	G	A	0.552587	-0.0125994	0.0021902	8.80E-09	
Television watching	rs10878349	12	66327632	A	G	0.489295	-0.0123509	0.0021691	1.20E-08	
Television watching	rs4435081	12	74331820	C	T	0.529508	0.0121101	0.0021675	2.30E-08	
Television watching	rs6606711	12	109849297	A	G	0.657805	-0.012613	0.002288	3.50E-08	
Television watching	rs73405293	12	117522917	G	A	0.852472	0.0178118	0.0030505	5.30E-09	
Television watching	rs7998862	13	54190736	C	T	0.727611	0.0148586	0.0024371	1.10E-09	
Television watching	rs9563521	13	58254773	A	C	0.869929	0.0177907	0.0032381	3.90E-08	Body mass index
Television watching	rs9547363	13	86322442	T	C	0.510581	-0.0121164	0.002198	3.50E-08	
Television watching	rs9513410	13	99013541	G	A	0.762838	0.0142356	0.0025677	3.00E-08	
Television watching	rs4772260	13	100645723	T	C	0.594634	-0.0139762	0.0022223	3.20E-10	
Television watching	rs1043675	14	23456315	T	C	0.593398	-0.0122781	0.002214	2.90E-08	
Television watching	rs1245193	14	26918468	T	C	0.218957	-0.0154607	0.0026709	7.10E-09	
Television watching	rs4981681	14	29539038	C	T	0.142841	0.0172045	0.0031162	3.40E-08	
Television watching	rs2402341	14	94287048	T	C	0.479155	-0.0120616	0.0021699	2.70E-08	
Television watching	rs8043253	15	41503730	C	T	0.572917	-0.0120657	0.0021867	3.40E-08	
Television watching	rs2165990	15	53069747	A	G	0.694477	-0.0137722	0.0023944	8.80E-09	
Television watching	rs1437543	15	61468467	G	A	0.765013	-0.0139416	0.0025562	4.90E-08	
Television watching	rs61331678	15	77995949	G	C	0.567932	0.0150461	0.0021875	6.10E-12	
Television watching	rs4985152	16	15136619	T	A	0.704761	-0.0129977	0.0023708	4.20E-08	
Television watching	rs394502	16	28383026	G	A	0.578933	-0.0125182	0.0022434	2.40E-08	
Television watching	rs62057232	16	30820866	T	C	0.608849	0.0144177	0.0022172	7.90E-11	Body mass index
Television watching	rs7500809	16	53428157	T	G	0.667847	0.0157278	0.0023244	1.30E-11	
Television watching	rs55801693	16	72148390	T	C	0.486678	0.0122527	0.0022321	4.00E-08	
Television watching	rs78803754	17	2260020	A	G	0.555705	-0.0125555	0.0021879	9.50E-09	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Television watching	rs9896476	17	61629692	G	C	0.747573	0.0146621	0.0024845	3.60E-09	
Television watching	rs887069	17	65062629	T	G	0.683079	0.0152211	0.0023279	6.20E-11	
Television watching	rs61745998	17	79354342	T	C	0.629695	0.012283	0.0022375	4.00E-08	
Television watching	rs303752	18	21074255	G	A	0.59039	-0.0127143	0.0022293	1.20E-08	
Television watching	rs11081851	18	31783262	G	A	0.437533	-0.0125498	0.0021906	1.00E-08	
Television watching	rs346456	18	39936781	T	C	0.776951	-0.0142066	0.0026038	4.90E-08	
Television watching	rs17512836	18	53194961	T	C	0.974385	0.0422142	0.0068464	7.00E-10	
Television watching	rs11085735	19	10602180	A	C	0.076238	0.0226232	0.0040983	3.40E-08	
Television watching	rs62129987	19	10744807	C	T	0.374198	0.012283	0.0022447	4.40E-08	
Television watching	rs803886	20	11845781	G	A	0.590152	0.013637	0.0021982	5.50E-10	
Television watching	rs750396	20	31218729	T	G	0.735963	-0.0137061	0.002471	2.90E-08	
Television watching	rs4810312	20	39968707	C	G	0.578878	-0.0125284	0.0021988	1.20E-08	
Television watching	rs6031440	20	42809317	A	T	0.397797	0.0124464	0.0022124	1.80E-08	
Television watching	rs3810496	20	62406886	T	C	0.385833	-0.012666	0.0022345	1.40E-08	
Television watching	rs12482857	21	40514861	T	C	0.640696	0.012413	0.0022708	4.60E-08	
Television watching	rs8140848	22	29889650	G	A	0.765904	-0.0142695	0.0025535	2.30E-08	
Television watching	rs150399729	22	42969453	C	G	0.968958	0.0389574	0.0070731	3.60E-08	
Driving	rs75641275	1	98327133	A	C	0.855772	-0.0179629	0.0031708	1.50E-08	
Driving	rs6720846	2	44123073	A	T	0.613229	-0.0132879	0.0023006	7.70E-09	
Driving	rs9840902	3	78369573	G	A	0.781431	-0.0148575	0.0027164	4.50E-08	
Driving	rs12317176	12	124404718	T	C	0.663663	0.0131141	0.0023563	2.60E-08	
Driving	rs2869688	20	47514881	T	C	0.468382	0.0124886	0.0022464	2.70E-08	
2. Lifestyle habits										
Smoking initiation	rs3001723	1	44037685	A	G	0.321	0.0335118	0.0038983	8.12E-18	
Smoking initiation	rs7555507	1	73766037	T	C	0.496	-0.0241444	0.003556	1.14E-11	
Smoking initiation	rs6669839	1	50625979	T	C	0.204	0.0260041	0.0043955	3.36E-09	
Smoking initiation	rs12042107	1	91196176	C	T	0.527	-0.0222834	0.0035682	4.22E-10	Body mass index
Smoking initiation	rs2186122	1	66470206	T	A	0.561	0.0260573	0.003586	3.61E-13	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Smoking initiation	rs301805	1	8481016	G	T	0.559	0.0214679	0.0036133	2.80E-09	
Smoking initiation	rs12025237	1	154205120	C	A	0.124	-0.0329992	0.0053392	6.52E-10	
Smoking initiation	rs2050586	1	87905828	C	G	0.355	-0.0205467	0.0037083	3.00E-08	
Smoking initiation	rs2046850	1	210304319	T	C	0.187	-0.0248139	0.0044784	3.03E-08	
Smoking initiation	rs6728726	2	623976	C	T	0.829	0.0354486	0.0047328	6.73E-14	Body mass index
Smoking initiation	rs78411160	2	58171220	C	A	0.631	0.0205357	0.0036589	2.03E-08	
Smoking initiation	rs6433897	2	182034448	C	T	0.754	0.0224483	0.0040581	3.16E-08	
Smoking initiation	rs266047	2	104088751	A	G	0.529	-0.0305098	0.0037386	3.36E-16	
Smoking initiation	rs4674993	2	226332033	G	A	0.207	-0.0252122	0.0044362	1.32E-08	
Smoking initiation	rs578584	2	45143175	T	A	0.605	0.0286801	0.0035963	1.50E-15	
Smoking initiation	rs35702515	2	137542847	T	G	0.162	0.0252442	0.0042309	2.43E-09	
Smoking initiation	rs13030994	2	146143090	A	G	0.485	0.0360925	0.0035563	3.56E-24	
Smoking initiation	rs12474587	2	162802993	T	G	0.404	0.0276329	0.0035823	1.25E-14	
Smoking initiation	rs2107300	2	200937901	G	C	0.845	-0.027201	0.0049253	3.27E-08	
Smoking initiation	rs7585579	2	60024857	G	C	0.505	0.0223996	0.0037281	1.88E-09	
Smoking initiation	rs1445649	2	155682556	C	T	0.525	0.0239932	0.0035648	1.68E-11	
Smoking initiation	rs6788098	3	85624131	T	A	0.623	-0.0313461	0.0036891	1.91E-17	Body mass index
Smoking initiation	rs12632110	3	50224225	G	A	0.647	-0.0233768	0.0037529	4.78E-10	Body mass index
Smoking initiation	rs11712680	3	75009019	C	A	0.174	-0.0270476	0.0045784	3.51E-09	
Smoking initiation	rs1154693	3	117804154	G	A	0.856	0.0326217	0.0049123	3.12E-11	
Smoking initiation	rs66680800	3	85985324	T	G	0.397	-0.0202716	0.0036527	2.83E-08	Body mass index
Smoking initiation	rs1869243	3	5724536	C	T	0.481	0.0197411	0.0035629	2.97E-08	
Smoking initiation	rs9835772	3	85766025	T	A	0.235	0.0240472	0.0041424	6.32E-09	Body mass index
Smoking initiation	rs962625	4	28473524	G	A	0.24	0.0237181	0.004038	4.37E-09	
Smoking initiation	rs993700	4	67825894	C	T	0.766	-0.025928	0.0042916	1.53E-09	Body mass index
Smoking initiation	rs13145728	4	140927812	C	G	0.358	-0.0232512	0.0036626	2.14E-10	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Smoking initiation	rs10001365	4	147797214	A	G	0.405	-0.0249918	0.0036416	6.65E-12	
Smoking initiation	rs1160685	4	94052854	G	C	0.478	0.0207724	0.0035889	7.20E-09	
Smoking initiation	rs6893752	5	60374912	G	A	0.766	-0.0240995	0.0040736	3.25E-09	
Smoking initiation	rs12186738	5	103816655	T	G	0.154	-0.0332644	0.0050205	3.42E-11	
Smoking initiation	rs1385108	5	154839646	T	C	0.239	0.0246617	0.0041567	3.00E-09	
Smoking initiation	rs4044321	5	166989513	G	A	0.642	-0.0278417	0.0037106	6.08E-14	
Smoking initiation	rs4352629	5	87756821	T	C	0.492	-0.0275284	0.0035688	1.22E-14	
Smoking initiation	rs72789632	5	106834363	T	C	0.12	-0.0328856	0.0052863	5.02E-10	
Smoking initiation	rs9401770	6	98748008	A	G	0.273	0.0277307	0.003986	3.47E-12	
Smoking initiation	rs222449	6	52916062	T	A	0.793	-0.0253208	0.004428	1.08E-08	
Smoking initiation	rs3800227	6	108994161	G	A	0.701	0.0228121	0.0040581	1.93E-08	
Smoking initiation	rs10498846	6	67405337	T	C	0.473	0.0206103	0.0035556	6.62E-09	
Smoking initiation	rs240963	6	111644332	C	T	0.836	-0.0410444	0.0048371	2.16E-17	
Smoking initiation	rs12333760	7	99185406	C	T	0.204	-0.0290467	0.0048013	1.44E-09	Body mass index
Smoking initiation	rs10233018	7	117523709	G	A	0.503	0.027069	0.0035574	2.75E-14	
Smoking initiation	rs10279261	7	133589846	A	G	0.619	-0.0214194	0.0036626	5.00E-09	
Smoking initiation	rs10260968	7	1889773	A	G	0.597	-0.0203218	0.0036094	1.75E-08	
Smoking initiation	rs12112638	7	69735251	G	A	0.275	-0.024526	0.004043	1.34E-09	Body mass index
Smoking initiation	rs4236259	7	1708080	G	T	0.499	-0.0247689	0.0035566	3.35E-12	
Smoking initiation	rs2140114	7	3407568	T	C	0.518	-0.0232591	0.003734	4.70E-10	
Smoking initiation	rs3801289	7	96638267	C	A	0.351	-0.0220618	0.0037398	3.74E-09	
Smoking initiation	rs1565735	8	27426077	A	T	0.212	-0.037618	0.0044613	3.42E-17	
Smoking initiation	rs1899896	8	93201036	T	C	0.286	0.0264481	0.0038869	1.04E-11	
Smoking initiation	rs13261666	8	59814666	T	G	0.522	-0.0268946	0.003556	3.90E-14	
Smoking initiation	rs12545053	8	65073605	G	A	0.397	0.0202808	0.0036367	2.43E-08	
Smoking initiation	rs2631024	8	91995577	G	A	0.737	-0.0229645	0.0040282	1.18E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Smoking initiation	rs4543592	9	3014254	C	T	0.468	0.0219314	0.0035624	7.46E-10	
Smoking initiation	rs2378662	9	86707289	A	G	0.556	0.0209482	0.0035665	4.16E-09	
Smoking initiation	rs10114490	9	11070165	A	G	0.198	-0.0255148	0.0045317	1.81E-08	
Smoking initiation	rs10905461	10	8803551	C	T	0.718	-0.0239554	0.0041451	7.35E-09	
Smoking initiation	rs7921378	10	63674885	C	G	0.463	-0.0254601	0.0035582	8.26E-13	
Smoking initiation	rs12356821	10	104563808	C	G	0.14	0.03937	0.0050491	6.27E-15	
Smoking initiation	rs10159545	10	21766969	G	C	0.375	0.0262501	0.0037273	1.84E-12	Body mass index
Smoking initiation	rs9423279	10	125680419	G	C	0.641	-0.0205132	0.0037083	3.21E-08	
Smoking initiation	rs7938812	11	112911004	G	T	0.424	0.0437914	0.0036367	2.71E-33	
Smoking initiation	rs6265	11	27679916	T	C	0.203	-0.0317863	0.0045784	3.77E-12	Body mass index
Smoking initiation	rs7929518	11	85980958	G	A	0.765	0.0242377	0.0042847	1.56E-08	
Smoking initiation	rs4523689	11	7950797	G	A	0.408	-0.0206091	0.0036432	1.55E-08	
Smoking initiation	rs11057005	12	16748721	G	A	0.43	-0.0209298	0.0035789	4.85E-09	
Smoking initiation	rs4759228	12	56508409	C	G	0.27	-0.0216913	0.0039341	3.58E-08	Body mass index
Smoking initiation	rs7969559	12	69655167	G	A	0.688	-0.0243756	0.0039595	7.31E-10	
Smoking initiation	rs1971318	12	121389500	T	C	0.141	0.0285074	0.0049253	7.06E-09	
Smoking initiation	rs7322872	13	100548329	T	C	0.782	-0.0255713	0.0043347	3.58E-09	
Smoking initiation	rs3904512	13	38357471	A	G	0.429	-0.0211589	0.0035765	3.23E-09	
Smoking initiation	rs9540729	13	66947124	T	A	0.501	-0.0195522	0.0035579	3.82E-08	
Smoking initiation	rs76214862	14	29500130	C	A	0.202	-0.0249903	0.0045475	3.99E-08	
Smoking initiation	rs12441907	15	83922387	A	C	0.186	-0.0292051	0.0045226	1.06E-10	
Smoking initiation	rs1435741	15	47935843	A	G	0.425	0.0294151	0.003591	2.64E-16	
Smoking initiation	rs4785836	16	65604652	C	T	0.398	-0.0204704	0.0036589	2.26E-08	
Smoking initiation	rs7197072	16	717085	T	C	0.238	-0.0247672	0.0041686	2.77E-09	
Smoking initiation	rs1050847	16	87443734	T	C	0.505	-0.0216231	0.0035889	1.67E-09	
Smoking initiation	rs4781977	16	17572674	C	T	0.205	-0.0238668	0.0043647	4.54E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Smoking initiation	rs11078713	17	7795972	G	A	0.454	-0.0201721	0.0036056	2.23E-08	
Smoking initiation	rs7224742	17	30657058	T	C	0.595	-0.0207099	0.0036553	1.43E-08	
Smoking initiation	rs11658881	17	2072949	G	A	0.418	0.0201357	0.0036107	2.43E-08	
Smoking initiation	rs6508144	18	50026142	G	C	0.563	-0.0206935	0.003586	7.97E-09	
Smoking initiation	rs11872397	18	72535282	A	G	0.252	-0.0247725	0.0040948	1.43E-09	
Smoking initiation	rs72896886	18	42632652	C	G	0.144	-0.0268885	0.0048371	2.75E-08	
Smoking initiation	rs76608582	19	4474725	A	C	0.0389	-0.0495575	0.0082596	1.94E-09	
Smoking initiation	rs1555445	20	31175258	T	A	0.337	0.0225548	0.0038234	3.65E-09	
Smoking initiation	rs117143374	21	40555561	C	T	0.12	0.0292897	0.0052691	2.76E-08	
Smoking initiation	rs134529	22	28781758	C	T	0.349	-0.019984	0.0036608	4.85E-08	
Drinks per week	rs3736168	4	39368083	T	C	0.503	0.0181	0.00297	1.27E-09	
Drinks per week	rs1919208	4	99567226	T	C	0.99	0.0748	0.0137	4.30E-08	
Drinks per week	rs114026228	4	99567918	C	T	0.011	-0.137	0.0153	2.59E-19	
Drinks per week	rs2213041	4	100247351	A	C	0.162	0.0215	0.00377	1.17E-08	
Drinks per week	rs55872084	5	155902003	T	G	0.218	0.0199	0.00356	2.20E-08	
Drinks per week	rs151180	16	28487213	T	G	0.432	-0.0209	0.00381	3.84E-08	Body mass index
Drinks per week	rs602662	19	49206985	A	G	0.495	0.0163	0.00297	3.85E-08	
Coffee consumption	rs4950078	1	96257675	T	G	0.267527	-0.00992853	0.0017666	1.91E-08	
Coffee consumption	rs4665972	2	27598097	T	C	0.392708	-0.0123027	0.0016022	1.61E-14	
Coffee consumption	rs2867105	2	601905	T	G	0.178967	-0.0137804	0.0020424	1.51E-11	Body mass index
Coffee consumption	rs1481012	4	89039082	A	G	0.887435	0.0147323	0.0024659	2.31E-09	
Coffee consumption	rs11742322	5	7378191	T	C	0.682301	0.00993241	0.0016811	3.46E-09	
Coffee consumption	rs7721099	5	87936379	T	C	0.866309	-0.0127746	0.0022175	8.37E-09	
Coffee consumption	rs521977	6	31836827	T	G	0.323257	0.00934026	0.0016622	1.92E-08	
Coffee consumption	rs7757951	6	51142761	G	A	0.378368	-0.00904924	0.0016159	2.15E-08	
Coffee consumption	rs1612143	7	17006468	T	G	0.673873	-0.00981639	0.0017075	8.98E-09	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Coffee consumption	rs1404960	7	17141595	A	G	0.694923	0.0128418	0.0017068	5.33E-14	
Coffee consumption	rs17779352	7	17349626	T	C	0.920412	-0.0196732	0.0029201	1.62E-11	
Coffee consumption	rs62444738	7	17569193	A	G	0.691957	0.00956436	0.0017013	1.89E-08	
Coffee consumption	rs4717763	7	72825125	A	G	0.414801	0.00879545	0.001581	2.65E-08	
Coffee consumption	rs41296488	7	75595580	C	T	0.897163	-0.0141592	0.0025806	4.10E-08	
Coffee consumption	rs17687539	7	89662674	A	G	0.791308	0.0104779	0.001918	4.69E-08	
Coffee consumption	rs117810762	10	135315795	G	A	0.982026	-0.0348164	0.0059424	4.66E-09	
Coffee consumption	rs10997940	10	69886950	C	T	0.596495	0.00879895	0.0015894	3.09E-08	
Coffee consumption	rs2251812	11	115467434	G	A	0.655374	0.00922898	0.0016484	2.16E-08	
Coffee consumption	rs597102	11	56240299	T	A	0.686783	0.00967503	0.001675	7.64E-09	
Coffee consumption	rs2110098	12	11016355	A	G	0.158411	0.0116419	0.0021349	4.95E-08	
Coffee consumption	rs11854314	15	74101300	C	T	0.888129	-0.0160979	0.002493	1.07E-10	Body mass index
Coffee consumption	rs74522625	15	74503222	A	G	0.953014	-0.0265258	0.0038814	8.27E-12	
Coffee consumption	rs112511609	15	74519084	G	A	0.980933	-0.0323749	0.0057156	1.48E-08	
Coffee consumption	rs8027450	15	91418394	C	T	0.676087	0.00913285	0.00167	4.53E-08	
Coffee consumption	rs7206790	16	53797908	C	G	0.533517	-0.0102867	0.0015742	6.38E-11	Body mass index
Coffee consumption	rs4924807	17	17564019	G	C	0.479991	-0.00891428	0.0015577	1.05E-08	
Coffee consumption	rs76468620	17	59918091	A	G	0.841603	-0.0116408	0.0021345	4.94E-08	
Coffee consumption	rs4940926	18	57732418	T	C	0.266084	0.00980482	0.0017654	2.80E-08	Body mass index
Coffee consumption	rs75347775	19	18495908	G	A	0.754975	-0.0102908	0.0018102	1.31E-08	
Coffee consumption	rs12459249	19	41339896	T	C	0.333174	-0.0103161	0.0016514	4.19E-10	
Coffee consumption	rs6062678	20	62888802	G	T	0.534922	-0.0101373	0.0015817	1.47E-10	
Coffee consumption	rs114908569	22	24611690	T	C	0.980976	0.0314077	0.0057168	3.93E-08	
3. Physical activity										
Vigorous PA	rs11586916	1	154251514	T	C	0.749442	0.0086868	0.0015198	1.10E-08	
Vigorous PA	rs6767407	3	84955841	T	C	0.799589	0.00904063	0.0016405	3.60E-08	
Vigorous PA	rs35367169	6	26040595	G	A	0.873426	0.0107832	0.0019744	4.70E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Vigorous PA	rs1575676	6	108861264	C	T	0.631107	-0.00829106	0.0013623	1.20E-09	Body mass index
Vigorous PA	rs28576961	7	34941004	C	A	0.671228	-0.00815506	0.0014064	6.70E-09	
Vigorous PA	rs1149555	7	133062665	G	A	0.194286	0.00963857	0.0016684	7.60E-09	
Vigorous PA	rs78694803	10	126688980	T	C	0.909117	0.0131026	0.0023014	1.20E-08	
Moderate-to-vigorous PA	rs2942127	1	204420067	G	A	0.175356	0.016037	0.0029028	3.30E-08	
Moderate-to-vigorous PA	rs1974771	2	54278543	G	A	0.900025	-0.0213389	0.0036784	6.60E-09	
Moderate-to-vigorous PA	rs2114286	3	41194283	A	G	0.465757	-0.0122453	0.0022173	3.30E-08	
Moderate-to-vigorous PA	rs877483	3	53846741	T	C	0.433185	0.0122277	0.0022276	4.00E-08	
Moderate-to-vigorous PA	rs382210	3	84966018	G	A	0.34477	-0.013066	0.0023207	1.80E-08	
Moderate-to-vigorous PA	rs1972763	4	159860563	C	T	0.342372	0.0128383	0.0023237	3.30E-08	
Moderate-to-vigorous PA	rs77742115	5	18330424	T	C	0.861681	-0.018348	0.0031978	9.60E-09	
Moderate-to-vigorous PA	rs72843784	6	26498758	G	T	0.891648	0.019414	0.0035477	4.40E-08	
Moderate-to-vigorous PA	rs1186716	7	34970685	C	G	0.684251	-0.0129704	0.0023727	4.60E-08	
Moderate-to-vigorous PA	rs6961138	7	50228289	G	A	0.412943	-0.0134567	0.0022381	1.80E-09	
Moderate-to-vigorous PA	rs79829700	7	128383555	G	A	0.719961	0.0140103	0.0024603	1.20E-08	
Moderate-to-vigorous PA	rs12707087	7	132954533	T	C	0.195128	0.0160923	0.0027764	6.80E-09	
Moderate-to-vigorous PA	rs2988004	9	37044388	T	G	0.557755	-0.0131708	0.0022398	4.10E-09	
Moderate-to-vigorous PA	rs2053606	13	53987257	T	C	0.612802	0.0127361	0.002282	2.40E-08	
Moderate-to-vigorous PA	rs17698580	14	98546911	T	C	0.749389	-0.0141208	0.0025414	2.80E-08	
Moderate-to-vigorous PA	rs4886868	15	74353561	T	G	0.414138	-0.0124954	0.0022661	3.50E-08	
Moderate-to-vigorous PA	rs12901206	15	95289972	C	T	0.861134	0.0174357	0.003195	4.80E-08	
Moderate-to-vigorous PA	rs6857	19	45392254	C	T	0.829542	-0.0186944	0.002936	1.90E-10	Body mass index
Moderate-to-vigorous PA	rs1921981	21	42422547	G	A	0.674353	0.013037	0.0023714	3.80E-08	
Strenuous sports or other exercises	rs1200154	1	169093101	G	A	0.407133	-0.00628507	0.0011436	3.90E-08	
Strenuous sports or other exercises	rs2994326	1	243651026	T	C	0.186592	-0.00796105	0.0014552	4.50E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Strenuous sports or other exercises	rs288071	2	210408416	A	G	0.901534	-0.0105794	0.0018845	2.00E-08	
Strenuous sports or other exercises	rs3796386	3	49899795	G	A	0.573397	0.00643438	0.001136	1.50E-08	Body mass index
Strenuous sports or other exercises	rs13088311	3	84852305	G	A	0.739203	-0.00789054	0.0012887	9.20E-10	Body mass index
Strenuous sports or other exercises	rs4865656	5	50659788	G	A	0.617501	0.00685995	0.0011559	2.90E-09	
Strenuous sports or other exercises	rs72834694	6	26145158	T	C	0.779804	-0.0079264	0.0013763	8.50E-09	
Strenuous sports or other exercises	rs1265181	6	31155785	G	C	0.762273	0.00730041	0.0013226	3.40E-08	
Strenuous sports or other exercises	rs6569407	6	98770554	T	C	0.377058	0.00636276	0.0011596	4.10E-08	
Strenuous sports or other exercises	rs2281767	13	99099338	C	T	0.506484	0.00626257	0.0011325	3.20E-08	
Strenuous sports or other exercises	rs10135971	14	69517494	G	A	0.660173	0.0065253	0.0011883	4.00E-08	
Strenuous sports or other exercises	rs166840	17	19799698	G	A	0.588023	0.00764832	0.0011513	3.10E-11	
Strenuous sports or other exercises	rs2074300	19	19380996	G	T	0.825348	0.00829185	0.0014831	2.30E-08	
4. Chronic pain										
Multisite chronic pain	rs2653892	1	50892199	T	C	0.527434	-0.0134115	0.0024422	4.00E-08	
Multisite chronic pain	rs127204	1	112277693	A	C	0.599732	-0.0145628	0.0024785	4.20E-09	Body mass index
Multisite chronic pain	rs11205357	1	150267798	T	C	0.389367	-0.0156862	0.0024848	2.70E-10	
Multisite chronic pain	rs3013414	1	243148809	C	A	0.326702	0.0144026	0.0026073	3.30E-08	
Multisite chronic pain	rs6721975	2	5832667	T	C	0.23137	-0.0167025	0.0029452	1.40E-08	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Multisite chronic pain	rs4852567	2	80703379	A	G	0.718765	0.0148524	0.0027109	4.30E-08	
Multisite chronic pain	rs35713889	3	49162583	C	T	0.955318	-0.032398	0.0058784	3.60E-08	
Multisite chronic pain	rs62263343	3	107239783	G	A	0.821228	-0.0179599	0.00319	1.80E-08	Body mass index
Multisite chronic pain	rs9839838	3	135943509	G	A	0.758559	-0.0157619	0.002845	3.00E-08	
Multisite chronic pain	rs56203712	4	25342606	A	G	0.763875	0.0195579	0.0029249	2.30E-11	Body mass index
Multisite chronic pain	rs201081507	4	102681041	A	G	0.943445	-0.0327441	0.005719	1.00E-08	Body mass index
Multisite chronic pain	rs13136239	4	140908755	G	A	0.655021	0.0141059	0.0025609	3.60E-08	Body mass index
Multisite chronic pain	rs6869446	5	65570607	T	C	0.615589	-0.0143645	0.0025026	9.50E-09	
Multisite chronic pain	rs76025409	5	103783801	G	C	0.645017	-0.0144341	0.002552	1.50E-08	
Multisite chronic pain	rs184690436	5	122621471	C	T	0.986722	-0.061687	0.0111409	3.10E-08	
Multisite chronic pain	rs1946247	5	160836620	T	G	0.141109	-0.0190308	0.0034891	4.90E-08	
Multisite chronic pain	rs4713656	6	33648997	G	A	0.338471	0.0145713	0.0025743	1.50E-08	
Multisite chronic pain	rs74618804	6	33799692	C	T	0.616455	0.0148847	0.0025128	3.10E-09	
Multisite chronic pain	rs6907508	6	34592090	A	G	0.883868	-0.0217127	0.0037947	1.10E-08	Body mass index
Multisite chronic pain	rs6926377	6	145105354	A	C	0.707178	-0.0154511	0.0026771	7.90E-09	
Multisite chronic pain	rs10259354	7	3487414	G	A	0.306232	0.0146793	0.0026492	3.00E-08	Ever smoked
Multisite chronic pain	rs2237303	7	21483605	G	A	0.347618	0.0143612	0.0025644	2.10E-08	
Multisite chronic pain	rs6966540	7	95727967	T	C	0.627156	-0.0139057	0.0025164	3.30E-08	
Multisite chronic pain	rs1450833	7	113865735	T	C	0.754023	-0.0160501	0.002835	1.50E-08	
Multisite chronic pain	rs11786084	8	142651709	G	A	0.666422	-0.0144791	0.002591	2.30E-08	
Multisite chronic pain	rs7870079	9	96161300	C	T	0.544435	0.0138424	0.0024503	1.60E-08	
Multisite chronic pain	rs1040851	9	119243634	C	A	0.424317	0.0141766	0.00246	8.30E-09	
Multisite chronic pain	rs2183271	10	21957229	T	C	0.640751	-0.0140394	0.0025369	3.10E-08	Body mass index
Multisite chronic pain	rs11596214	10	106453832	G	A	0.595069	0.0136894	0.0024989	4.30E-08	
Multisite chronic pain	rs117829627	10	134973637	C	T	0.731346	-0.0152286	0.0027586	3.40E-08	
Multisite chronic pain	rs61881739	11	16256349	G	C	0.832512	-0.0204668	0.0032743	4.10E-10	

Suppl. Table 1 (cont.). *Selection of instrumental variables.*

Exposures	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>	Confounders
Multisite chronic pain	rs2806985	13	53677723	C	G	0.357316	0.0141258	0.0025695	3.90E-08	
Multisite chronic pain	rs17126867	14	73791271	T	C	0.820225	-0.0172853	0.0031668	4.80E-08	
Multisite chronic pain	rs2006281	14	104327732	C	T	0.496931	0.0134934	0.0024458	3.40E-08	
Multisite chronic pain	rs2386584	15	91539572	T	G	0.614618	-0.0166445	0.0025001	2.80E-11	
Multisite chronic pain	rs285018	16	77099065	G	A	0.439965	-0.0136507	0.0024493	2.50E-08	
Multisite chronic pain	rs12601574	17	43133627	C	G	0.449763	0.0136493	0.0024434	2.30E-08	
Multisite chronic pain	rs62083314	18	50358109	C	T	0.586443	-0.014054	0.0024859	1.60E-08	
Multisite chronic pain	rs16980973	20	19648493	A	T	0.874386	0.0230008	0.003676	3.90E-10	

SNP, single nucleotide polymorphism. eaf, effect allele frequency. chr, chromosome. pos, position. se, Standard error.

Suppl. Table 2. *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	<i>p</i>
1. Leisure sedentary behavior										
Computer use	Multisite chronic pain	rs2281175	1	1665702	T	C	0.593864	-0.00078008	0.00260258	0.76
Computer use	Multisite chronic pain	rs600806	1	109840629	G	A	0.276645	-0.010986	0.00272149	5.40E-05
Computer use	Multisite chronic pain	rs1923759	1	197414097	G	A	0.554909	0.00189231	0.00244041	0.44
Computer use	Multisite chronic pain	rs12691712	2	146446673	A	G	0.110256	0.00798426	0.00388703	0.04
Computer use	Multisite chronic pain	rs1037091	2	155652357	C	T	0.673077	-0.00232848	0.00264164	0.38
Computer use	Multisite chronic pain	rs17815546	2	215021870	G	A	0.57303	0.00210231	0.0024592	0.39
Computer use	Multisite chronic pain	rs4436942	2	221042140	T	A	0.394022	-0.00083088	0.00248951	0.74
Computer use	Multisite chronic pain	rs16825642	3	116520381	C	T	0.795941	0.00108199	0.00303077	0.72
Computer use	Multisite chronic pain	rs6842066	4	39393801	C	T	0.430341	-0.00133611	0.0024655	0.59
Computer use	Multisite chronic pain	rs4690912	4	159672059	G	T	0.423053	0.00671879	0.00246471	0.0064
Computer use	Multisite chronic pain	rs2220599	5	7378854	C	G	0.633222	-0.00301469	0.00252897	0.23
Computer use	Multisite chronic pain	rs254781	5	88000636	C	T	0.415744	-0.00516331	0.0024729	0.037
Computer use	Multisite chronic pain	rs1469249	5	113837198	G	A	0.788584	-0.008433	0.00299019	0.0048
Computer use	Multisite chronic pain	rs162904	5	131595784	T	C	0.332663	-0.00339128	0.00258111	0.19

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Computer use	Multisite chronic pain	rs56158102	5	144027803	C	T	0.344367	0.00269132	0.00263507	0.31
Computer use	Multisite chronic pain	rs1033956	6	18970793	G	A	0.0979852	-0.00620497	0.00410265	0.13
Computer use	Multisite chronic pain	rs2179517	6	26198845	G	C	0.551258	0.00396627	0.0024402	0.1
Computer use	Multisite chronic pain	rs11153822	6	98214814	C	T	0.502555	0.00159073	0.0024545	0.52
Computer use	Multisite chronic pain	rs17789218	6	100600097	T	C	0.755931	0.00294097	0.00282968	0.3
Computer use	Multisite chronic pain	rs6935828	6	140811367	C	T	0.446406	-0.00466147	0.00244582	0.057
Computer use	Multisite chronic pain	rs12698902	7	69837319	A	G	0.711354	0.00424521	0.00267894	0.11
Computer use	Multisite chronic pain	rs67453484	7	124454524	T	A	0.617176	-0.00019567	0.00251028	0.94
Computer use	Multisite chronic pain	rs11766965	7	126956866	G	C	0.622804	0.00339137	0.00251979	0.18
Computer use	Multisite chronic pain	rs6973256	7	133055603	C	T	0.401456	0.00376581	0.0025018	0.13
Computer use	Multisite chronic pain	rs11777164	8	143297312	C	T	0.633863	-0.00569135	0.00252823	0.024
Computer use	Multisite chronic pain	rs10965780	9	23341715	C	G	0.414972	0.000651529	0.00247467	0.79
Computer use	Multisite chronic pain	rs28520360	9	98283580	T	G	0.892886	0.00971564	0.00393287	0.013
Computer use	Multisite chronic pain	rs7034544	9	116825464	A	G	0.757309	0.00814082	0.00283361	0.0041
Computer use	Multisite chronic pain	rs4836935	9	126345893	T	G	0.632474	-0.00540323	0.00253425	0.033
Computer use	Multisite chronic pain	rs35023999	11	113266411	A	C	0.491185	0.00500866	0.00243211	0.039
Computer use	Multisite chronic pain	rs10894386	11	131278575	G	C	0.383206	0.00837895	0.00250435	0.00082
Computer use	Multisite chronic pain	rs61931384	12	38515006	T	C	0.72042	-0.00213357	0.00274522	0.44
Computer use	Multisite chronic pain	rs2132747	12	40348056	A	C	0.732311	-0.00156756	0.00274085	0.57
Computer use	Multisite chronic pain	rs206960	12	120842051	T	C	0.208552	-0.00400465	0.00299142	0.18
Computer use	Multisite chronic pain	rs9527564	13	57555325	T	C	0.896791	0.00525117	0.00402403	0.19
Computer use	Multisite chronic pain	rs198262	14	57283283	C	T	0.043487	-0.00134245	0.00603269	0.82
Computer use	Multisite chronic pain	rs59815685	15	47714368	C	T	0.481053	0.00550906	0.00251184	0.028
Computer use	Multisite chronic pain	rs4702	15	91426560	G	A	0.443517	0.00389417	0.00244566	0.11
Computer use	Multisite chronic pain	rs6498759	16	18020295	T	C	0.309625	0.000897745	0.00263579	0.73
Computer use	Multisite chronic pain	rs3730399	16	67229019	A	G	0.934769	-0.00312592	0.00492532	0.53

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	P
Computer use	Multisite chronic pain	rs57433322	17	19141582	C	G	0.883084	-0.00726201	0.00379057	0.055
Computer use	Multisite chronic pain	rs3744760	17	43195981	T	C	0.732093	-0.0138978	0.00274668	4.20E-07
Computer use	Multisite chronic pain	rs11652437	17	79338469	C	A	0.676529	0.00493078	0.00263361	0.061
Computer use	Multisite chronic pain	rs613872	18	53210302	G	T	0.174489	-0.015584	0.00320655	1.20E-06
Computer use	Multisite chronic pain	rs6101275	20	59807062	C	T	0.781034	0.000457158	0.00296022	0.88
Computer use	Multisite chronic pain	rs9608249	22	24613952	G	A	0.851412	0.00188776	0.00343445	0.58
Computer use	Multisite chronic pain	rs5757719	22	39945791	T	C	0.442046	-0.00114788	0.00244918	0.64
Television watching	Multisite chronic pain	rs2842189	1	44007648	T	C	0.376829	-0.00526254	0.00251039	0.036
Television watching	Multisite chronic pain	rs7555117	1	61060280	T	C	0.513885	0.00154757	0.00242973	0.52
Television watching	Multisite chronic pain	rs7514549	1	62403507	C	T	0.798959	0.010321	0.00304722	0.00071
Television watching	Multisite chronic pain	rs1547737	1	66983920	G	T	0.347542	-0.00664329	0.0025695	0.0097
Television watching	Multisite chronic pain	rs11210449	1	74785991	A	G	0.288339	-0.0075575	0.00268809	0.0049
Television watching	Multisite chronic pain	rs11162351	1	77944732	C	G	0.602503	-0.00952344	0.00247789	0.00012
Television watching	Multisite chronic pain	rs114328297	1	91190854	T	G	0.777771	0.000380656	0.00295873	0.9
Television watching	Multisite chronic pain	rs631130	1	96043010	T	A	0.369244	-0.00298807	0.0026606	0.26
Television watching	Multisite chronic pain	rs144407312	1	98012151	T	C	0.969127	-0.0220625	0.00708502	0.0018
Television watching	Multisite chronic pain	rs822555	1	98667546	A	G	0.379016	0.000324408	0.0025069	0.9
Television watching	Multisite chronic pain	rs600806	1	109840629	G	A	0.276645	-0.010986	0.00272149	5.40E-05
Television watching	Multisite chronic pain	rs141425667	1	114930465	G	A	0.934981	0.0018925	0.0049346	0.7
Television watching	Multisite chronic pain	rs6690619	1	153765399	C	T	0.49131	0.00742139	0.00244073	0.0024
Television watching	Multisite chronic pain	rs4498770	1	184638266	C	T	0.482786	0.00867113	0.00242542	0.00035
Television watching	Multisite chronic pain	rs72723209	1	187974627	A	T	0.979046	0.00432186	0.00857551	0.61
Television watching	Multisite chronic pain	rs1890660	1	193036952	G	A	0.273634	0.000428643	0.00272257	0.87
Television watching	Multisite chronic pain	rs6721975	2	5832667	T	C	0.23137	-0.0167025	0.00294519	1.40E-08
Television watching	Multisite chronic pain	rs13397144	2	17406100	A	G	0.849054	0.000362494	0.00339422	0.91
Television watching	Multisite chronic pain	rs139677604	2	24366132	C	G	0.746723	-0.00325971	0.00281846	0.25

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Television watching	Multisite chronic pain	rs13018897	2	41707765	G	T	0.640325	-0.00786318	0.00253461	0.0019
Television watching	Multisite chronic pain	rs1217436	2	50562960	T	G	0.661653	0.00471154	0.00256712	0.066
Television watching	Multisite chronic pain	rs12475168	2	58992704	G	T	0.869425	2.77E-05	0.00363538	0.99
Television watching	Multisite chronic pain	rs243034	2	60602892	C	T	0.38127	0.00299983	0.00250154	0.23
Television watching	Multisite chronic pain	rs59210467	2	97097291	C	T	0.693009	0.00121091	0.00264283	0.65
Television watching	Multisite chronic pain	rs79430745	2	100296525	C	T	0.972362	0.018535	0.00746457	0.013
Television watching	Multisite chronic pain	rs6723328	2	105469864	A	G	0.362053	-0.00452624	0.00253099	0.074
Television watching	Multisite chronic pain	rs6738130	2	116327375	C	T	0.28973	-0.00013283	0.00267987	0.96
Television watching	Multisite chronic pain	rs10432338	2	147806785	G	T	0.81777	-0.00684922	0.00314824	0.03
Television watching	Multisite chronic pain	rs3769983	2	161994383	G	A	0.514642	-0.00769633	0.00243059	0.0015
Television watching	Multisite chronic pain	rs2060199	2	166196681	T	A	0.446324	0.0012361	0.00243759	0.61
Television watching	Multisite chronic pain	rs56049830	2	185708081	C	T	0.81977	-0.00859331	0.0031672	0.0067
Television watching	Multisite chronic pain	rs1860170	2	191702719	T	C	0.286558	-0.0046592	0.00270266	0.085
Television watching	Multisite chronic pain	rs13415069	2	193709357	T	C	0.593421	0.00432555	0.00248148	0.081
Television watching	Multisite chronic pain	rs10451583	2	215247022	C	A	0.605171	-0.00565021	0.0025033	0.024
Television watching	Multisite chronic pain	rs4436942	2	221042140	T	A	0.394022	-0.00083088	0.00248951	0.74
Television watching	Multisite chronic pain	rs778365	2	233774828	T	C	0.701774	0.000308205	0.0026645	0.91
Television watching	Multisite chronic pain	rs138256022	3	11603090	C	T	0.958516	-0.00212097	0.00636358	0.74
Television watching	Multisite chronic pain	rs9834970	3	36856030	T	C	0.500809	0.00113973	0.00242569	0.64
Television watching	Multisite chronic pain	rs137920315	3	49220504	A	C	0.948367	-0.00851892	0.00557285	0.13
Television watching	Multisite chronic pain	rs142922893	3	50570449	T	C	0.970668	-0.0127824	0.00731035	0.08
Television watching	Multisite chronic pain	rs11708288	3	60884267	A	G	0.60206	0.00603694	0.00248817	0.015
Television watching	Multisite chronic pain	rs1864896	3	71469845	A	G	0.438789	0.00696672	0.00246195	0.0047
Television watching	Multisite chronic pain	rs112911909	3	85517112	G	A	0.635116	0.00280681	0.00252154	0.27
Television watching	Multisite chronic pain	rs67316928	3	89482234	T	C	0.608101	0.00510974	0.00249134	0.04

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Television watching	Multisite chronic pain	rs12632778	3	106452359	T	G	0.954023	-0.00158452	0.0058306	0.79
Television watching	Multisite chronic pain	rs1707652	3	165478799	C	T	0.631248	-0.00837828	0.00252013	0.00089
Television watching	Multisite chronic pain	rs114600294	3	181419367	G	C	0.789009	0.00211822	0.00297266	0.48
Television watching	Multisite chronic pain	rs363096	4	3180021	T	C	0.424643	0.00932787	0.00246183	0.00015
Television watching	Multisite chronic pain	rs7697614	4	17821177	T	A	0.849146	-0.0113017	0.0033926	0.00086
Television watching	Multisite chronic pain	rs77215114	4	45187658	A	T	0.930626	0.00828201	0.00485127	0.088
Television watching	Multisite chronic pain	rs10009426	4	52710913	A	G	0.707511	-0.00689314	0.00267143	0.0099
Television watching	Multisite chronic pain	rs788857	4	82138551	A	G	0.718444	-0.00589552	0.00271166	0.03
Television watching	Multisite chronic pain	rs13114404	4	118334362	A	G	0.913306	0.00438776	0.00432882	0.31
Television watching	Multisite chronic pain	rs13140619	4	130230742	G	A	0.433829	0.00275682	0.00245251	0.26
Television watching	Multisite chronic pain	rs4455397	4	152256290	T	C	0.437679	-0.00609612	0.00245418	0.013
Television watching	Multisite chronic pain	rs11726096	4	159789000	A	C	0.617806	-0.00926835	0.00250017	0.00021
Television watching	Multisite chronic pain	rs6859476	5	59334302	C	T	0.531779	-0.00200913	0.00247445	0.42
Television watching	Multisite chronic pain	rs549300331	5	60233914	T	A	0.601966	0.0075297	0.00256915	0.0034
Television watching	Multisite chronic pain	rs347661	5	62549141	T	C	0.43527	0.00227167	0.00247469	0.36
Television watching	Multisite chronic pain	rs71639293	5	92995013	A	G	0.797392	0.0098258	0.00302918	0.0012
Television watching	Multisite chronic pain	rs62358087	5	107170148	A	G	0.818809	0.00219544	0.00317487	0.49
Television watching	Multisite chronic pain	rs9326862	5	112054547	A	T	0.468112	0.00456147	0.00243515	0.061
Television watching	Multisite chronic pain	rs6595549	5	124139761	G	C	0.821279	0.00849602	0.00316841	0.0073
Television watching	Multisite chronic pain	rs34846849	5	138360578	T	C	0.668499	-0.00454453	0.00258132	0.078
Television watching	Multisite chronic pain	rs17097461	5	141077992	T	C	0.927887	-0.0101102	0.00473436	0.033
Television watching	Multisite chronic pain	rs6881498	5	147880181	A	G	0.564106	0.00123597	0.0024527	0.61
Television watching	Multisite chronic pain	rs42210	5	166408788	G	C	0.289336	-0.00154181	0.00269595	0.57
Television watching	Multisite chronic pain	rs2336894	5	166990595	T	G	0.359847	0.00219588	0.0025352	0.39
Television watching	Multisite chronic pain	rs2844477	6	31578772	T	C	0.653675	-0.00882816	0.00255837	0.00056
Television watching	Multisite chronic pain	rs12213893	6	67488168	G	C	0.613946	-0.0047962	0.00250114	0.055

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Television watching	Multisite chronic pain	rs34733353	6	89788797	G	C	0.590585	-0.00069567	0.00247431	0.78
Television watching	Multisite chronic pain	rs17789218	6	100600097	T	C	0.755931	0.00294097	0.00282968	0.3
Television watching	Multisite chronic pain	rs6925118	6	143165488	A	G	0.811895	0.00339773	0.00311442	0.28
Television watching	Multisite chronic pain	rs73028181	6	166115539	G	T	0.973791	-0.0067978	0.00760097	0.37
Television watching	Multisite chronic pain	rs37974	7	8010386	A	G	0.518001	0.00592656	0.00244788	0.015
Television watching	Multisite chronic pain	rs10234444	7	41828527	G	A	0.823255	0.00358891	0.00321985	0.27
Television watching	Multisite chronic pain	rs10268139	7	77328100	A	C	0.586146	0.00273462	0.00247166	0.27
Television watching	Multisite chronic pain	rs6951746	7	89364651	C	A	0.151635	-0.00678741	0.00339378	0.046
Television watching	Multisite chronic pain	rs2021738	7	101901641	A	G	0.0544849	0.00953848	0.00536273	0.075
Television watching	Multisite chronic pain	rs13227345	7	112934071	G	A	0.672312	-0.00347849	0.0025914	0.18
Television watching	Multisite chronic pain	rs7783649	7	115515952	C	A	0.111987	0.0038483	0.00394296	0.33
Television watching	Multisite chronic pain	rs57534256	7	126311654	T	C	0.430643	-0.00527374	0.0024549	0.032
Television watching	Multisite chronic pain	rs6984171	8	10734662	A	G	0.609708	0.00546789	0.0025069	0.029
Television watching	Multisite chronic pain	rs13439800	8	30819854	G	T	0.547155	0.0101229	0.00243983	3.30E-05
Television watching	Multisite chronic pain	rs6996198	8	65463442	C	T	0.843352	-0.0042114	0.00334481	0.21
Television watching	Multisite chronic pain	rs2607104	8	92563922	G	A	0.483009	-0.00700159	0.00244527	0.0042
Television watching	Multisite chronic pain	rs11989463	8	118846051	A	C	0.79872	-0.00396224	0.00303338	0.19
Television watching	Multisite chronic pain	rs2717559	8	143882420	A	G	0.559475	0.00108782	0.00246874	0.66
Television watching	Multisite chronic pain	rs4387030	9	1627292	G	A	0.354504	-0.00419973	0.00254926	0.099
Television watching	Multisite chronic pain	rs7865801	9	14745886	G	A	0.367404	0.000688289	0.00254427	0.79
Television watching	Multisite chronic pain	rs34864022	9	22609110	A	G	0.933583	-0.0106172	0.0049023	0.03
Television watching	Multisite chronic pain	rs4977611	9	23303417	A	C	0.376793	0.000864683	0.00251355	0.73
Television watching	Multisite chronic pain	rs2791574	9	82212094	T	G	0.657535	-9.33E-05	0.00256698	0.97
Television watching	Multisite chronic pain	rs1535667	9	102894255	C	T	0.5454	-0.00257098	0.00243752	0.29
Television watching	Multisite chronic pain	rs10739499	9	120514261	C	G	0.337301	0.00682489	0.00257531	0.008
Television watching	Multisite chronic pain	rs62579935	9	126116581	C	A	0.885497	-0.00850731	0.00382253	0.026

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Television watching	Multisite chronic pain	rs7029165	9	134802170	T	C	0.309063	0.0045351	0.0026511	0.087
Television watching	Multisite chronic pain	rs382767	9	135690582	G	A	0.912404	0.00888601	0.00429713	0.039
Television watching	Multisite chronic pain	rs2399630	10	11149643	T	C	0.532679	0.00121673	0.00244455	0.62
Television watching	Multisite chronic pain	rs7915418	10	56630610	C	G	0.426182	0.00376836	0.00246509	0.13
Television watching	Multisite chronic pain	rs4948287	10	63584531	T	A	0.581799	0.0040602	0.00246437	0.099
Television watching	Multisite chronic pain	rs35942198	10	86923036	G	C	0.66949	0.000984151	0.00258655	0.7
Television watching	Multisite chronic pain	rs6584444	10	103455809	C	T	0.321978	0.00316606	0.00261305	0.23
Television watching	Multisite chronic pain	rs7089973	10	116569565	C	A	0.618435	-0.00239815	0.00251507	0.34
Television watching	Multisite chronic pain	rs3781423	10	126704704	G	C	0.630898	-0.00795688	0.0025235	0.0016
Television watching	Multisite chronic pain	rs11599193	10	127153283	A	T	0.809215	-0.00278271	0.00310913	0.37
Television watching	Multisite chronic pain	rs12289262	11	12894758	C	T	0.730988	-0.00648542	0.00275166	0.018
Television watching	Multisite chronic pain	rs10791865	11	66035608	A	C	0.443176	0.00566261	0.00246132	0.021
Television watching	Multisite chronic pain	rs12272012	11	84861286	G	C	0.95569	-0.00671683	0.00591696	0.26
Television watching	Multisite chronic pain	rs1792337	11	92431686	T	C	0.682541	-0.00761844	0.00261958	0.0036
Television watching	Multisite chronic pain	rs10831412	11	95449528	T	A	0.570171	-0.00123504	0.00245646	0.62
Television watching	Multisite chronic pain	rs10791546	11	101830126	C	T	0.589194	-0.0005436	0.00247033	0.83
Television watching	Multisite chronic pain	rs648044	11	114030799	A	G	0.395067	-0.00127989	0.00254967	0.62
Television watching	Multisite chronic pain	rs4936683	11	122167127	C	T	0.55318	-0.00310225	0.00245043	0.21
Television watching	Multisite chronic pain	rs4937842	11	133734542	G	C	0.633656	0.00248553	0.00253873	0.33
Television watching	Multisite chronic pain	rs2417261	12	13414139	T	G	0.107336	-0.00160554	0.00394492	0.68
Television watching	Multisite chronic pain	rs74996610	12	24075007	C	G	0.95409	-0.0158321	0.00584116	0.0067
Television watching	Multisite chronic pain	rs12579616	12	30775978	C	T	0.747903	-0.0055857	0.00279801	0.046
Television watching	Multisite chronic pain	rs11171710	12	56368078	G	A	0.552581	-0.0106637	0.00246254	1.50E-05
Television watching	Multisite chronic pain	rs10878349	12	66327632	A	G	0.489064	-0.00133246	0.00243936	0.58
Television watching	Multisite chronic pain	rs4435081	12	74331820	C	T	0.529446	0.00238813	0.00243857	0.33
Television watching	Multisite chronic pain	rs6606711	12	109849297	A	G	0.658012	-0.00934999	0.00257398	0.00028

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Television watching	Multisite chronic pain	rs73405293	12	117522917	G	A	0.852543	0.00373324	0.00343181	0.28
Television watching	Multisite chronic pain	rs7998862	13	54190736	C	T	0.727787	0.0017661	0.00274062	0.52
Television watching	Multisite chronic pain	rs9547363	13	86322442	T	C	0.510482	-0.0055835	0.00247026	0.024
Television watching	Multisite chronic pain	rs9513410	13	99013541	G	A	0.762944	0.00108643	0.00288708	0.71
Television watching	Multisite chronic pain	rs4772260	13	100645723	T	C	0.594614	-0.00293826	0.00249867	0.24
Television watching	Multisite chronic pain	rs1043675	14	23456315	T	C	0.593257	0.000413924	0.00248954	0.87
Television watching	Multisite chronic pain	rs1245193	14	26918468	T	C	0.218945	-0.0116402	0.00300176	0.00011
Television watching	Multisite chronic pain	rs4981681	14	29539038	C	T	0.142781	0.0160975	0.00350565	4.40E-06
Television watching	Multisite chronic pain	rs2402341	14	94287048	T	C	0.479446	-0.00338097	0.00243852	0.17
Television watching	Multisite chronic pain	rs8043253	15	41503730	C	T	0.572959	-0.00257845	0.00245904	0.29
Television watching	Multisite chronic pain	rs2165990	15	53069747	A	G	0.694472	0.000951099	0.00269143	0.72
Television watching	Multisite chronic pain	rs1437543	15	61468467	G	A	0.765143	-0.00462024	0.00287401	0.11
Television watching	Multisite chronic pain	rs61331678	15	77995949	G	C	0.567932	0.00840165	0.00245895	0.00063
Television watching	Multisite chronic pain	rs4985152	16	15136619	T	A	0.704841	-0.00368037	0.00266482	0.17
Television watching	Multisite chronic pain	rs394502	16	28383026	G	A	0.578995	0.00287431	0.00252058	0.25
Television watching	Multisite chronic pain	rs7500809	16	53428157	T	G	0.667914	0.00127956	0.00261256	0.62
Television watching	Multisite chronic pain	rs55801693	16	72148390	T	C	0.48649	0.00345667	0.00250713	0.17
Television watching	Multisite chronic pain	rs78803754	17	2260020	A	G	0.555664	-0.00430851	0.00246009	0.08
Television watching	Multisite chronic pain	rs9896476	17	61629692	G	C	0.74763	0.00370293	0.00279385	0.19
Television watching	Multisite chronic pain	rs887069	17	65062629	T	G	0.68316	-0.00631893	0.00261714	0.016
Television watching	Multisite chronic pain	rs61745998	17	79354342	T	C	0.629577	0.00501205	0.00251453	0.046
Television watching	Multisite chronic pain	rs303752	18	21074255	G	A	0.590281	-0.00729552	0.00250483	0.0036
Television watching	Multisite chronic pain	rs11081851	18	31783262	G	A	0.437632	0.0011	0.00246284	0.66
Television watching	Multisite chronic pain	rs346456	18	39936781	T	C	0.777041	-0.00045028	0.00292867	0.88
Television watching	Multisite chronic pain	rs17512836	18	53194961	T	C	0.974389	0.00599282	0.00769758	0.44
Television watching	Multisite chronic pain	rs11085735	19	10602180	A	C	0.0762189	-0.00544335	0.0046061	0.24

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Television watching	Multisite chronic pain	rs62129987	19	10744807	C	T	0.374161	0.0119855	0.00252183	2.00E-06
Television watching	Multisite chronic pain	rs803886	20	11845781	G	A	0.590342	0.00382095	0.00247067	0.12
Television watching	Multisite chronic pain	rs750396	20	31218729	T	G	0.736057	-0.0100717	0.0027778	0.00029
Television watching	Multisite chronic pain	rs4810312	20	39968707	C	G	0.578884	0.0015593	0.00246997	0.53
Television watching	Multisite chronic pain	rs6031440	20	42809317	A	T	0.397769	0.00167657	0.00248677	0.5
Television watching	Multisite chronic pain	rs3810496	20	62406886	T	C	0.385963	-0.00935298	0.00251101	2.00E-04
Television watching	Multisite chronic pain	rs12482857	21	40514861	T	C	0.640786	0.00127082	0.00255085	0.62
Television watching	Multisite chronic pain	rs8140848	22	29889650	G	A	0.765997	-0.00065577	0.00287032	0.82
Television watching	Multisite chronic pain	rs150399729	22	42969453	C	G	0.969052	0.00864683	0.00796232	0.28
Driving	Multisite chronic pain	rs75641275	1	98327133	A	C	0.855718	-0.0164143	0.00345848	2.10E-06
Driving	Multisite chronic pain	rs6720846	2	44123073	A	T	0.613361	-0.00087649	0.0024997	0.73
Driving	Multisite chronic pain	rs9840902	3	78369573	G	A	0.781471	-0.00201454	0.00296439	0.5
Driving	Multisite chronic pain	rs12317176	12	124404718	T	C	0.663751	-0.00505667	0.00257199	0.049
Driving	Multisite chronic pain	rs2869688	20	47514881	T	C	0.468684	-0.00226587	0.00245305	0.36
2. Lifestyle habits										
Smoking initiation	Multisite chronic pain	rs3001723	1	44037685	G	A	0.700104	-0.00195073	0.00264637	0.46
Smoking initiation	Multisite chronic pain	rs7555507	1	73766037	C	T	0.485146	0.00559587	0.00243099	0.021
Smoking initiation	Multisite chronic pain	rs6669839	1	50625979	C	T	0.790424	0.00134123	0.00298727	0.65
Smoking initiation	Multisite chronic pain	rs2186122	1	66470206	A	T	0.438592	-0.00685623	0.00246366	0.0054
Smoking initiation	Multisite chronic pain	rs301805	1	8481016	T	G	0.413642	0.00389268	0.00246637	0.11
Smoking initiation	Multisite chronic pain	rs12025237	1	154205120	A	C	0.874247	0.00749161	0.0036625	0.041
Smoking initiation	Multisite chronic pain	rs2050586	1	87905828	G	C	0.63991	0.0070433	0.00254037	0.0056
Smoking initiation	Multisite chronic pain	rs2046850	1	210304319	C	T	0.806136	0.00619745	0.00308101	0.044
Smoking initiation	Multisite chronic pain	rs6433897	2	182034448	T	C	0.263227	0.000310211	0.00275966	0.91
Smoking initiation	Multisite chronic pain	rs266047	2	104088751	G	A	0.466858	0.00626509	0.00243298	0.01
Smoking initiation	Multisite chronic pain	rs4674993	2	226332033	A	G	0.801419	0.0109049	0.00304489	0.00034

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Smoking initiation	Multisite chronic pain	rs578584	2	45143175	A	T	0.442222	-0.00387862	0.00244928	0.11
Smoking initiation	Multisite chronic pain	rs35702515	2	137542847	G	T	0.765453	-0.00384164	0.0028893	0.18
Smoking initiation	Multisite chronic pain	rs13030994	2	146143090	G	A	0.518223	-0.00640582	0.00243047	0.0084
Smoking initiation	Multisite chronic pain	rs12474587	2	162802993	G	T	0.550135	-0.00664693	0.00244526	0.0066
Smoking initiation	Multisite chronic pain	rs2107300	2	200937901	C	G	0.15721	0.00141183	0.00335037	0.67
Smoking initiation	Multisite chronic pain	rs7585579	2	60024857	C	G	0.50926	-0.00532569	0.00245478	0.03
Smoking initiation	Multisite chronic pain	rs1445649	2	155682556	T	C	0.461874	-0.00011251	0.00243734	0.96
Smoking initiation	Multisite chronic pain	rs11712680	3	75009019	A	C	0.814169	0.00728588	0.00312249	0.02
Smoking initiation	Multisite chronic pain	rs1154693	3	117804154	A	G	0.149048	-0.00500223	0.00342828	0.14
Smoking initiation	Multisite chronic pain	rs1869243	3	5724536	T	C	0.529476	-0.00849456	0.00243975	5.00E-04
Smoking initiation	Multisite chronic pain	rs962625	4	28473524	A	G	0.730499	-0.00422919	0.00274993	0.12
Smoking initiation	Multisite chronic pain	rs13145728	4	140927812	G	C	0.617674	0.0128983	0.00250381	2.60E-07
Smoking initiation	Multisite chronic pain	rs10001365	4	147797214	G	A	0.613402	0.00252696	0.00249596	0.31
Smoking initiation	Multisite chronic pain	rs1160685	4	94052854	C	G	0.557805	-0.00262847	0.00244579	0.28
Smoking initiation	Multisite chronic pain	rs6893752	5	60374912	A	G	0.258546	0.00309691	0.00277425	0.26
Smoking initiation	Multisite chronic pain	rs12186738	5	103816655	G	T	0.857093	0.0120677	0.00347373	0.00051
Smoking initiation	Multisite chronic pain	rs1385108	5	154839646	C	T	0.757967	-0.00581612	0.00284588	0.041
Smoking initiation	Multisite chronic pain	rs4044321	5	166989513	A	G	0.359799	0.00231934	0.00253617	0.36
Smoking initiation	Multisite chronic pain	rs4352629	5	87756821	C	T	0.543169	0.00657726	0.00244355	0.0071
Smoking initiation	Multisite chronic pain	rs72789632	5	106834363	C	T	0.869809	0.00527889	0.0036321	0.15
Smoking initiation	Multisite chronic pain	rs9401770	6	98748008	G	A	0.731535	0.00749355	0.0027479	0.0064
Smoking initiation	Multisite chronic pain	rs222449	6	52916062	A	T	0.197327	0.0039154	0.00306115	0.2
Smoking initiation	Multisite chronic pain	rs3800227	6	108994161	A	G	0.255238	-0.00483498	0.00279508	0.084
Smoking initiation	Multisite chronic pain	rs10498846	6	67405337	C	T	0.493379	-0.00520801	0.00243832	0.033
Smoking initiation	Multisite chronic pain	rs240963	6	111644332	T	C	0.159726	0.00740944	0.0033203	0.026
Smoking initiation	Multisite chronic pain	rs10233018	7	117523709	A	G	0.495911	0.00477296	0.00243091	0.05

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Smoking initiation	Multisite chronic pain	rs10279261	7	133589846	G	A	0.381736	0.000985368	0.0025104	0.69
Smoking initiation	Multisite chronic pain	rs10260968	7	1889773	G	A	0.412573	0.00729577	0.00246592	0.0031
Smoking initiation	Multisite chronic pain	rs4236259	7	1708080	T	G	0.509943	0.0064973	0.00245513	0.0081
Smoking initiation	Multisite chronic pain	rs2140114	7	3407568	C	T	0.463821	0.00658616	0.00243838	0.0069
Smoking initiation	Multisite chronic pain	rs3801289	7	96638267	A	C	0.662052	0.00368237	0.00257687	0.15
Smoking initiation	Multisite chronic pain	rs1565735	8	27426077	T	A	0.798534	0.0030995	0.00305091	0.31
Smoking initiation	Multisite chronic pain	rs1899896	8	93201036	C	T	0.701899	-0.0008759	0.00266753	0.74
Smoking initiation	Multisite chronic pain	rs13261666	8	59814666	G	T	0.49588	0.00587731	0.00243206	0.016
Smoking initiation	Multisite chronic pain	rs12545053	8	65073605	A	G	0.597083	0.0028841	0.00248523	0.25
Smoking initiation	Multisite chronic pain	rs2631024	8	91995577	A	G	0.25948	0.00389834	0.0027833	0.16
Smoking initiation	Multisite chronic pain	rs4543592	9	3014254	T	C	0.52075	-0.0025028	0.00243605	0.3
Smoking initiation	Multisite chronic pain	rs2378662	9	86707289	G	A	0.457953	-0.00528751	0.00244938	0.031
Smoking initiation	Multisite chronic pain	rs10114490	9	11070165	G	A	0.814252	0.0038839	0.00312594	0.21
Smoking initiation	Multisite chronic pain	rs10905461	10	8803551	T	C	0.254684	0.00852138	0.00279376	0.0023
Smoking initiation	Multisite chronic pain	rs7921378	10	63674885	G	C	0.519845	-0.00660056	0.00243955	0.0068
Smoking initiation	Multisite chronic pain	rs12356821	10	104563808	G	C	0.851566	0.000980189	0.0034643	0.78
Smoking initiation	Multisite chronic pain	rs9423279	10	125680419	C	G	0.342963	0.000773199	0.0026091	0.77
Smoking initiation	Multisite chronic pain	rs7938812	11	112911004	T	G	0.614073	-0.0123828	0.00249606	7.00E-07
Smoking initiation	Multisite chronic pain	rs7929518	11	85980958	A	G	0.218305	-0.00510789	0.0029459	0.083
Smoking initiation	Multisite chronic pain	rs4523689	11	7950797	A	G	0.607538	-0.0018204	0.00248761	0.46
Smoking initiation	Multisite chronic pain	rs11057005	12	16748721	A	G	0.563686	0.00814509	0.00246599	0.00096
Smoking initiation	Multisite chronic pain	rs7969559	12	69655167	A	G	0.278377	-0.00051025	0.0027113	0.85
Smoking initiation	Multisite chronic pain	rs1971318	12	121389500	C	T	0.841571	-0.00413429	0.00333701	0.22
Smoking initiation	Multisite chronic pain	rs7322872	13	100548329	C	T	0.209432	0.00435125	0.00299744	0.15
Smoking initiation	Multisite chronic pain	rs3904512	13	38357471	G	A	0.550562	-0.00107224	0.00244689	0.66

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Smoking initiation	Multisite chronic pain	rs9540729	13	66947124	A	T	0.478602	0.0117987	0.00243231	1.20E-06
Smoking initiation	Multisite chronic pain	rs76214862	14	29500130	A	C	0.812813	0.0142317	0.00312409	5.20E-06
Smoking initiation	Multisite chronic pain	rs12441907	15	83922387	C	A	0.810704	3.86E-06	0.00310253	1
Smoking initiation	Multisite chronic pain	rs1435741	15	47935843	G	A	0.568806	-9.84E-05	0.00245546	0.97
Smoking initiation	Multisite chronic pain	rs4785836	16	65604652	T	C	0.624171	0.000505147	0.00251599	0.84
Smoking initiation	Multisite chronic pain	rs7197072	16	717085	C	T	0.773188	0.0110678	0.00290699	0.00014
Smoking initiation	Multisite chronic pain	rs1050847	16	87443734	C	T	0.420151	0.00210073	0.0024707	0.4
Smoking initiation	Multisite chronic pain	rs4781977	16	17572674	T	C	0.774085	-0.0022435	0.00293726	0.44
Smoking initiation	Multisite chronic pain	rs11078713	17	7795972	A	G	0.582603	0.00345254	0.00247001	0.16
Smoking initiation	Multisite chronic pain	rs7224742	17	30657058	C	T	0.380378	0.000527663	0.00250716	0.83
Smoking initiation	Multisite chronic pain	rs11658881	17	2072949	A	G	0.580617	0.000484347	0.00246771	0.84
Smoking initiation	Multisite chronic pain	rs6508144	18	50026142	C	G	0.430501	-7.82E-05	0.00246349	0.97
Smoking initiation	Multisite chronic pain	rs11872397	18	72535282	G	A	0.739504	0.00253062	0.00280315	0.37
Smoking initiation	Multisite chronic pain	rs72896886	18	42632652	G	C	0.832353	0.00327162	0.0032654	0.32
Smoking initiation	Multisite chronic pain	rs76608582	19	4474725	C	A	0.95203	0.00213241	0.00596841	0.72
Smoking initiation	Multisite chronic pain	rs1555445	20	31175258	A	T	0.691342	-0.0127477	0.00264189	1.40E-06
Smoking initiation	Multisite chronic pain	rs117143374	21	40555561	T	C	0.858093	0.00391493	0.00349709	0.26
Smoking initiation	Multisite chronic pain	rs134529	22	28781758	T	C	0.618911	0.00298132	0.00250557	0.23
Drinks per week	Multisite chronic pain	rs3736168	4	39368083	C	T	0.487929	-0.00232672	0.00243853	0.34
Drinks per week	Multisite chronic pain	rs2213041	4	100247351	C	A	0.826458	-0.00452209	0.00321036	0.16
Drinks per week	Multisite chronic pain	rs55872084	5	155902003	G	T	0.753446	0.00480863	0.00282937	0.089
Drinks per week	Multisite chronic pain	rs602662	19	49206985	G	A	0.464134	0.00289149	0.00243678	0.24
Coffee consumption	Multisite chronic pain	rs4950078	1	96257675	T	G	0.267221	0.00655066	0.00275707	0.018
Coffee consumption	Multisite chronic pain	rs4665972	2	27598097	T	C	0.392173	0.00341184	0.00250016	0.17
Coffee consumption	Multisite chronic pain	rs1481012	4	89039082	A	G	0.887337	0.0115338	0.00384773	0.0027
Coffee consumption	Multisite chronic pain	rs11742322	5	7378191	T	C	0.682452	-0.00118383	0.00262335	0.65

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Coffee consumption	Multisite chronic pain	rs7721099	5	87936379	T	C	0.866231	0.00198311	0.00346034	0.57
Coffee consumption	Multisite chronic pain	rs521977	6	31836827	T	G	0.323563	-0.00386605	0.00258997	0.14
Coffee consumption	Multisite chronic pain	rs7757951	6	51142761	G	A	0.37801	-0.00229955	0.00252428	0.36
Coffee consumption	Multisite chronic pain	rs1612143	7	17006468	T	G	0.673831	0.000424034	0.00266677	0.87
Coffee consumption	Multisite chronic pain	rs1404960	7	17141595	A	G	0.694529	0.00651296	0.00266293	0.014
Coffee consumption	Multisite chronic pain	rs17779352	7	17349626	T	C	0.920774	0.00169237	0.00457096	0.71
Coffee consumption	Multisite chronic pain	rs62444738	7	17569193	A	G	0.691404	-0.00273629	0.00265256	0.3
Coffee consumption	Multisite chronic pain	rs4717763	7	72825125	A	G	0.414917	0.00347006	0.00246652	0.16
Coffee consumption	Multisite chronic pain	rs41296488	7	75595580	C	T	0.897147	0.0053694	0.00402609	0.18
Coffee consumption	Multisite chronic pain	rs17687539	7	89662674	A	G	0.79124	-0.00368918	0.00299556	0.22
Coffee consumption	Multisite chronic pain	rs117810762	10	135315795	G	A	0.982096	0.00166915	0.00929645	0.86
Coffee consumption	Multisite chronic pain	rs10997940	10	69886950	C	T	0.596351	-0.00340322	0.00247931	0.17
Coffee consumption	Multisite chronic pain	rs2251812	11	115467434	G	A	0.655466	-0.00200353	0.00257298	0.44
Coffee consumption	Multisite chronic pain	rs597102	11	56240299	T	A	0.686845	-0.00047299	0.00261671	0.86
Coffee consumption	Multisite chronic pain	rs2110098	12	11016355	A	G	0.158265	0.00303983	0.0033333	0.36
Coffee consumption	Multisite chronic pain	rs74522625	15	74503222	A	G	0.952953	-0.00583943	0.00605407	0.33
Coffee consumption	Multisite chronic pain	rs112511609	15	74519084	G	A	0.981064	-0.011535	0.00896162	0.2
Coffee consumption	Multisite chronic pain	rs8027450	15	91418394	C	T	0.675985	0.00312921	0.00260544	0.23
Coffee consumption	Multisite chronic pain	rs4924807	17	17564019	G	C	0.480202	0.00603928	0.00243199	0.013
Coffee consumption	Multisite chronic pain	rs76468620	17	59918091	A	G	0.842082	-0.00068903	0.00333944	0.84
Coffee consumption	Multisite chronic pain	rs75347775	19	18495908	G	A	0.755207	0.00352132	0.00282841	0.21
Coffee consumption	Multisite chronic pain	rs12459249	19	41339896	T	C	0.332897	-0.00512382	0.00258155	0.047
Coffee consumption	Multisite chronic pain	rs6062678	20	62888802	G	T	0.534983	-0.00020181	0.00247025	0.93
Coffee consumption	Multisite chronic pain	rs114908569	22	24611690	T	C	0.980979	0.0100503	0.0089348	0.26
3. Physical activity										
Vigorous PA	Multisite chronic pain	rs11586916	1	154251514	T	C	0.748471	0.00308927	0.00280424	0.27

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Vigorous PA	Multisite chronic pain	rs6767407	3	84955841	T	C	0.79981	-0.00444856	0.00303555	0.14
Vigorous PA	Multisite chronic pain	rs35367169	6	26040595	G	A	0.872264	0.00533349	0.00364222	0.14
Vigorous PA	Multisite chronic pain	rs28576961	7	34941004	C	A	0.670513	-0.00224397	0.00259821	0.39
Vigorous PA	Multisite chronic pain	rs1149555	7	133062665	G	A	0.19451	0.004018	0.00308314	0.19
Vigorous PA	Multisite chronic pain	rs78694803	10	126688980	T	C	0.908472	-0.0147185	0.00424291	0.00052
Moderate-to-vigorous PA	Multisite chronic pain	rs2942127	1	204420067	G	A	0.174358	0.00950539	0.00320792	0.003
Moderate-to-vigorous PA	Multisite chronic pain	rs1974771	2	54278543	G	A	0.89996	0.00447609	0.0040496	0.27
Moderate-to-vigorous PA	Multisite chronic pain	rs2114286	3	41194283	A	G	0.468945	0.00321918	0.00244142	0.19
Moderate-to-vigorous PA	Multisite chronic pain	rs877483	3	53846741	T	C	0.434087	0.00137047	0.00245238	0.58
Moderate-to-vigorous PA	Multisite chronic pain	rs382210	3	84966018	G	A	0.34483	0.00922677	0.00255786	0.00031
Moderate-to-vigorous PA	Multisite chronic pain	rs1972763	4	159860563	C	T	0.342923	0.00555393	0.00256246	0.03
Moderate-to-vigorous PA	Multisite chronic pain	rs77742115	5	18330424	T	C	0.860555	0.00185811	0.00351214	0.6
Moderate-to-vigorous PA	Multisite chronic pain	rs72843784	6	26498758	G	T	0.888743	0.00541547	0.00386466	0.16
Moderate-to-vigorous PA	Multisite chronic pain	rs1186716	7	34970685	C	G	0.683763	-0.0016492	0.00261366	0.53
Moderate-to-vigorous PA	Multisite chronic pain	rs6961138	7	50228289	G	A	0.41106	-0.00080039	0.00246899	0.75
Moderate-to-vigorous PA	Multisite chronic pain	rs79829700	7	128383555	G	A	0.71934	0.00503829	0.0027126	0.063
Moderate-to-vigorous PA	Multisite chronic pain	rs12707087	7	132954533	T	C	0.194953	0.00168982	0.0030626	0.58
Moderate-to-vigorous PA	Multisite chronic pain	rs2988004	9	37044388	T	G	0.556289	0.000715739	0.00247062	0.77
Moderate-to-vigorous PA	Multisite chronic pain	rs2053606	13	53987257	T	C	0.612206	-0.013694	0.00251333	5.10E-08
Moderate-to-vigorous PA	Multisite chronic pain	rs17698580	14	98546911	T	C	0.74914	-0.0022629	0.00280091	0.42
Moderate-to-vigorous PA	Multisite chronic pain	rs4886868	15	74353561	T	G	0.413687	0.00599947	0.00250068	0.016
Moderate-to-vigorous PA	Multisite chronic pain	rs12901206	15	95289972	C	T	0.861413	-0.00023028	0.00352629	0.95
Moderate-to-vigorous PA	Multisite chronic pain	rs1921981	21	42422547	G	A	0.672315	0.00029714	0.00261255	0.91
Strenuous sports or other exercises	Multisite chronic pain	rs1200154	1	169093101	G	A	0.407941	0.00251218	0.00247189	0.31

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Strenuous sports or other exercises	Multisite chronic pain	rs2994326	1	243651026	T	C	0.186575	0.00403392	0.00314647	0.2
Strenuous sports or other exercises	Multisite chronic pain	rs288071	2	210408416	A	G	0.9033	0.0118036	0.00410755	0.0041
Strenuous sports or other exercises	Multisite chronic pain	rs4865656	5	50659788	G	A	0.615289	-0.00634794	0.00249649	0.011
Strenuous sports or other exercises	Multisite chronic pain	rs72834694	6	26145158	T	C	0.78061	0.00617014	0.00298015	0.038
Strenuous sports or other exercises	Multisite chronic pain	rs1265181	6	31155785	G	C	0.760265	-0.00086274	0.00284733	0.76
Strenuous sports or other exercises	Multisite chronic pain	rs6569407	6	98770554	T	C	0.375898	-0.0019955	0.00250864	0.43
Strenuous sports or other exercises	Multisite chronic pain	rs2281767	13	99099338	C	T	0.506427	-0.00297626	0.00244727	0.22
Strenuous sports or other exercises	Multisite chronic pain	rs10135971	14	69517494	G	A	0.66093	-0.0100159	0.00257109	9.80E-05
Strenuous sports or other exercises	Multisite chronic pain	rs166840	17	19799698	G	A	0.587062	-0.00164037	0.0024885	0.51
Strenuous sports or other exercises	Multisite chronic pain	rs2074300	19	19380996	G	T	0.824787	-0.013483	0.00320681	2.60E-05
4. Reverse MR analyses										
Multisite chronic pain	Computer use	rs2653892	1	50892199	T	C	0.527436	0.00126077	0.00221133	0.57
Multisite chronic pain	Computer use	rs11205357	1	150267798	T	C	0.389552	-0.00183404	0.00225004	0.42
Multisite chronic pain	Computer use	rs3013414	1	243148809	C	A	0.326654	-0.00548241	0.0023612	0.02
Multisite chronic pain	Computer use	rs6721975	2	5832667	T	C	0.231411	0.00714307	0.00266568	0.0074
Multisite chronic pain	Computer use	rs4852567	2	80703379	A	G	0.718834	0.00470899	0.00245375	0.055
Multisite chronic pain	Computer use	rs35713889	3	49162583	C	T	0.955318	-0.002378	0.00532547	0.66
Multisite chronic pain	Computer use	rs9839838	3	135943509	G	A	0.758582	-0.00333849	0.00257708	0.2

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Computer use	rs6869446	5	65570607	T	C	0.615525	0.00300379	0.00226594	0.18
Multisite chronic pain	Computer use	rs76025409	5	103783801	G	C	0.644794	-0.00598934	0.00231059	0.0095
Multisite chronic pain	Computer use	rs184690436	5	122621471	C	T	0.986759	0.0275749	0.0101052	0.0064
Multisite chronic pain	Computer use	rs1946247	5	160836620	T	G	0.14125	-0.00642116	0.00315823	0.042
Multisite chronic pain	Computer use	rs4713656	6	33648997	G	A	0.338508	-0.00243738	0.00232967	0.3
Multisite chronic pain	Computer use	rs74618804	6	33799692	C	T	0.616232	-0.00078381	0.00227455	0.73
Multisite chronic pain	Computer use	rs6926377	6	145105354	A	C	0.707086	0.000583844	0.00242223	0.81
Multisite chronic pain	Computer use	rs2237303	7	21483605	G	A	0.347735	0.00312931	0.00232116	0.18
Multisite chronic pain	Computer use	rs6966540	7	95727967	T	C	0.627085	0.0047764	0.0022794	0.036
Multisite chronic pain	Computer use	rs1450833	7	113865735	T	C	0.753626	-0.000444	0.00256798	0.86
Multisite chronic pain	Computer use	rs11786084	8	142651709	G	A	0.666573	0.0038138	0.00234532	0.1
Multisite chronic pain	Computer use	rs7870079	9	96161300	C	T	0.5446	-0.0051925	0.00221876	0.019
Multisite chronic pain	Computer use	rs1040851	9	119243634	C	A	0.424308	-0.00279869	0.00222752	0.21
Multisite chronic pain	Computer use	rs11596214	10	106453832	G	A	0.595227	0.00605588	0.00226411	0.0075
Multisite chronic pain	Computer use	rs117829627	10	134973637	C	T	0.731417	0.00326906	0.0024967	0.19
Multisite chronic pain	Computer use	rs61881739	11	16256349	G	C	0.832608	-0.00236695	0.00296551	0.42
Multisite chronic pain	Computer use	rs2806985	13	53677723	C	G	0.35749	0.000424348	0.00232896	0.86
Multisite chronic pain	Computer use	rs17126867	14	73791271	T	C	0.820284	-0.00139967	0.00286704	0.63
Multisite chronic pain	Computer use	rs2006281	14	104327732	C	T	0.497229	0.000343044	0.00221331	0.88
Multisite chronic pain	Computer use	rs2386584	15	91539572	T	G	0.614301	-0.00892348	0.00226308	8.00E-05
Multisite chronic pain	Computer use	rs285018	16	77099065	G	A	0.439953	0.0020643	0.00221759	0.35
Multisite chronic pain	Computer use	rs12601574	17	43133627	C	G	0.449859	-0.0105576	0.00221391	1.90E-06
Multisite chronic pain	Computer use	rs62083314	18	50358109	C	T	0.586476	0.000610452	0.00225792	0.79
Multisite chronic pain	Computer use	rs16980973	20	19648493	A	T	0.874334	-0.0112736	0.00332696	7.00E-04
Multisite chronic pain	Television watching	rs2653892	1	50892199	T	C	0.52749	-0.00345618	0.0021696	0.11
Multisite chronic pain	Television watching	rs11205357	1	150267798	T	C	0.389614	-0.00988764	0.002207	7.50E-06

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Television watching	rs3013414	1	243148809	C	A	0.326598	0.00407455	0.00231616	0.079
Multisite chronic pain	Television watching	rs6721975	2	5832667	T	C	0.231524	-0.0166905	0.00261401	1.70E-10
Multisite chronic pain	Television watching	rs4852567	2	80703379	A	G	0.718753	0.00627735	0.0024062	0.0091
Multisite chronic pain	Television watching	rs35713889	3	49162583	C	T	0.955326	-0.00972963	0.00522508	0.063
Multisite chronic pain	Television watching	rs9839838	3	135943509	G	A	0.758545	-0.00123483	0.00252828	0.63
Multisite chronic pain	Television watching	rs6869446	5	65570607	T	C	0.615471	0.0013649	0.002223	0.54
Multisite chronic pain	Television watching	rs76025409	5	103783801	G	C	0.644897	-0.00624821	0.00226759	0.0059
Multisite chronic pain	Television watching	rs184690436	5	122621471	C	T	0.98673	-0.0143355	0.00990573	0.15
Multisite chronic pain	Television watching	rs1946247	5	160836620	T	G	0.141219	-0.0127928	0.00309962	3.70E-05
Multisite chronic pain	Television watching	rs4713656	6	33648997	G	A	0.338481	0.00270032	0.00228719	0.24
Multisite chronic pain	Television watching	rs74618804	6	33799692	C	T	0.616182	0.00580209	0.00223253	0.0094
Multisite chronic pain	Television watching	rs6926377	6	145105354	A	C	0.707131	-0.00112487	0.00237796	0.64
Multisite chronic pain	Television watching	rs2237303	7	21483605	G	A	0.347792	0.000334043	0.0022787	0.88
Multisite chronic pain	Television watching	rs6966540	7	95727967	T	C	0.627082	-0.00539041	0.00223777	0.016
Multisite chronic pain	Television watching	rs1450833	7	113865735	T	C	0.753564	0.0031648	0.00252108	0.21
Multisite chronic pain	Television watching	rs11786084	8	142651709	G	A	0.666571	-0.00635463	0.00230252	0.0058
Multisite chronic pain	Television watching	rs7870079	9	96161300	C	T	0.544555	0.00659323	0.00217913	0.0025
Multisite chronic pain	Television watching	rs1040851	9	119243634	C	A	0.424239	0.000224349	0.00218765	0.92
Multisite chronic pain	Television watching	rs11596214	10	106453832	G	A	0.595215	0.00743835	0.00222367	0.00082
Multisite chronic pain	Television watching	rs117829627	10	134973637	C	T	0.731386	-0.00904054	0.00245201	0.00023
Multisite chronic pain	Television watching	rs61881739	11	16256349	G	C	0.832632	-0.00330608	0.00291245	0.26
Multisite chronic pain	Television watching	rs2806985	13	53677723	C	G	0.357481	-0.00145126	0.0022889	0.53
Multisite chronic pain	Television watching	rs17126867	14	73791271	T	C	0.820366	-0.00401752	0.00281777	0.15
Multisite chronic pain	Television watching	rs2006281	14	104327732	C	T	0.497089	-0.00186193	0.00217494	0.39
Multisite chronic pain	Television watching	rs2386584	15	91539572	T	G	0.61435	-0.0040926	0.00222362	0.066
Multisite chronic pain	Television watching	rs285018	16	77099065	G	A	0.44001	-0.00121383	0.00217929	0.58

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Television watching	rs12601574	17	43133627	C	G	0.449841	0.00509228	0.00217563	0.019
Multisite chronic pain	Television watching	rs62083314	18	50358109	C	T	0.586535	-0.0032119	0.00221882	0.15
Multisite chronic pain	Television watching	rs16980973	20	19648493	A	T	0.874319	0.0109168	0.00326955	0.00084
Multisite chronic pain	Driving	rs2653892	1	50892199	T	C	0.527436	-0.00101222	0.00223787	0.65
Multisite chronic pain	Driving	rs11205357	1	150267798	T	C	0.389534	-0.00327109	0.00227769	0.15
Multisite chronic pain	Driving	rs3013414	1	243148809	C	A	0.326643	-0.00123997	0.00239019	0.6
Multisite chronic pain	Driving	rs6721975	2	5832667	T	C	0.231509	-0.00174518	0.0026982	0.52
Multisite chronic pain	Driving	rs4852567	2	80703379	A	G	0.718741	0.001015	0.00248401	0.68
Multisite chronic pain	Driving	rs35713889	3	49162583	C	T	0.955249	0.00360129	0.00538335	0.5
Multisite chronic pain	Driving	rs9839838	3	135943509	G	A	0.758464	-0.00301747	0.00260744	0.25
Multisite chronic pain	Driving	rs6869446	5	65570607	T	C	0.615555	7.89E-05	0.0022928	0.97
Multisite chronic pain	Driving	rs76025409	5	103783801	G	C	0.644807	0.00317078	0.00233753	0.17
Multisite chronic pain	Driving	rs184690436	5	122621471	C	T	0.986777	0.00290003	0.0102336	0.78
Multisite chronic pain	Driving	rs1946247	5	160836620	T	G	0.141305	-0.00127183	0.00319579	0.69
Multisite chronic pain	Driving	rs4713656	6	33648997	G	A	0.338463	0.0062547	0.0023573	0.008
Multisite chronic pain	Driving	rs74618804	6	33799692	C	T	0.616312	-0.00114005	0.00230158	0.62
Multisite chronic pain	Driving	rs6926377	6	145105354	A	C	0.70708	-0.00089328	0.00245056	0.72
Multisite chronic pain	Driving	rs2237303	7	21483605	G	A	0.347736	0.00123484	0.00234859	0.6
Multisite chronic pain	Driving	rs6966540	7	95727967	T	C	0.627125	0.00038525	0.00230623	0.87
Multisite chronic pain	Driving	rs1450833	7	113865735	T	C	0.753629	0.000348659	0.00259871	0.89
Multisite chronic pain	Driving	rs11786084	8	142651709	G	A	0.666607	-0.00582713	0.00237303	0.014
Multisite chronic pain	Driving	rs7870079	9	96161300	C	T	0.544451	-0.00267446	0.00224422	0.23
Multisite chronic pain	Driving	rs1040851	9	119243634	C	A	0.424194	-0.00052471	0.00225341	0.82
Multisite chronic pain	Driving	rs11596214	10	106453832	G	A	0.595114	0.00821402	0.00229107	0.00034
Multisite chronic pain	Driving	rs117829627	10	134973637	C	T	0.731468	0.00234316	0.00252592	0.35
Multisite chronic pain	Driving	rs61881739	11	16256349	G	C	0.832623	-0.00289849	0.00300045	0.33

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Driving	rs2806985	13	53677723	C	G	0.357448	-0.00051307	0.00235586	0.83
Multisite chronic pain	Driving	rs17126867	14	73791271	T	C	0.820312	0.00220315	0.0028991	0.45
Multisite chronic pain	Driving	rs2006281	14	104327732	C	T	0.497161	0.00465055	0.0022382	0.038
Multisite chronic pain	Driving	rs2386584	15	91539572	T	G	0.614209	-0.00233619	0.00228886	0.31
Multisite chronic pain	Driving	rs285018	16	77099065	G	A	0.439959	0.000527836	0.00224272	0.81
Multisite chronic pain	Driving	rs12601574	17	43133627	C	G	0.449769	-0.00496585	0.00223916	0.027
Multisite chronic pain	Driving	rs62083314	18	50358109	C	T	0.5865	-0.00151476	0.00228321	0.51
Multisite chronic pain	Driving	rs16980973	20	19648493	A	T	0.874342	-0.00272606	0.00336481	0.42
Multisite chronic pain	Smoking initiation	rs2653892	1	50892199	C	T	0.474	0.000532052	0.00357897	0.882
Multisite chronic pain	Smoking initiation	rs3013414	1	243148809	A	C	0.674	-0.00142301	0.00378965	0.706999
Multisite chronic pain	Smoking initiation	rs11205357	1	150267798	C	T	0.612	0.0053275	0.00365894	0.146
Multisite chronic pain	Smoking initiation	rs4852567	2	80703379	G	A	0.316	-0.0128086	0.00393413	0.00116
Multisite chronic pain	Smoking initiation	rs35713889	3	49162583	T	C	0.0392	0.0268226	0.00885279	0.00245
Multisite chronic pain	Smoking initiation	rs1946247	5	160836620	G	T	0.86	0.0172747	0.00513892	0.00076
Multisite chronic pain	Smoking initiation	rs6869446	5	65570607	C	T	0.409	0.00548981	0.00365177	0.132
Multisite chronic pain	Smoking initiation	rs6926377	6	145105354	C	A	0.328	0.00493526	0.00391392	0.207
Multisite chronic pain	Smoking initiation	rs4713656	6	33648997	A	G	0.698	-0.00257215	0.00380486	0.499001
Multisite chronic pain	Smoking initiation	rs1450833	7	113865735	C	T	0.209	1.46E-05	0.00415673	0.997
Multisite chronic pain	Smoking initiation	rs2237303	7	21483605	A	G	0.654	-0.0128036	0.00372727	0.000605
Multisite chronic pain	Smoking initiation	rs6966540	7	95727967	C	T	0.394	-0.0032069	0.00367615	0.383
Multisite chronic pain	Smoking initiation	rs11786084	8	142651709	A	G	0.309	-0.00629612	0.00376939	0.0949992
Multisite chronic pain	Smoking initiation	rs7870079	9	96161300	T	C	0.411	0.00596193	0.00357573	0.0956005
Multisite chronic pain	Smoking initiation	rs1040851	9	119243634	A	C	0.565	-0.014263	0.00359966	7.29E-05
Multisite chronic pain	Smoking initiation	rs11596214	10	106453832	A	G	0.438	-0.0151067	0.00362155	3.04E-05
Multisite chronic pain	Smoking initiation	rs61881739	11	16256349	C	G	0.173	0.00140484	0.00486166	0.772999
Multisite chronic pain	Smoking initiation	rs2806985	13	53677723	G	C	0.651	-0.0058483	0.00389023	0.133

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Smoking initiation	rs17126867	14	73791271	C	T	0.228	0.00313682	0.00457552	0.493
Multisite chronic pain	Smoking initiation	rs2006281	14	104327732	T	C	0.509	-0.0081667	0.00356085	0.0218998
Multisite chronic pain	Smoking initiation	rs2386584	15	91539572	G	T	0.429	0.0121293	0.00365712	0.000914
Multisite chronic pain	Smoking initiation	rs285018	16	77099065	A	G	0.54	0.00169029	0.0035714	0.636
Multisite chronic pain	Smoking initiation	rs62083314	18	50358109	T	C	0.398	0.00746649	0.00361329	0.0387998
Multisite chronic pain	Smoking initiation	rs16980973	20	19648493	T	A	0.146	-0.00690247	0.00535735	0.197
Multisite chronic pain	Drinks per week	rs2653892	1	50892199	C	T	0.474	-0.00482	0.00303	0.112
Multisite chronic pain	Drinks per week	rs11205357	1	150267798	C	T	0.612	0.00248	0.00309	0.422
Multisite chronic pain	Drinks per week	rs3013414	1	243148809	A	C	0.674	-0.00747	0.00317	0.0186
Multisite chronic pain	Drinks per week	rs4852567	2	80703379	G	A	0.316	-0.00331	0.00327	0.314
Multisite chronic pain	Drinks per week	rs35713889	3	49162583	T	C	0.0392	-0.00313	0.00757	0.679
Multisite chronic pain	Drinks per week	rs6869446	5	65570607	C	T	0.409	0.0038	0.00305	0.213
Multisite chronic pain	Drinks per week	rs1946247	5	160836620	G	T	0.86	0.00214	0.00432	0.621
Multisite chronic pain	Drinks per week	rs4713656	6	33648997	A	G	0.698	0.00144	0.00325	0.657
Multisite chronic pain	Drinks per week	rs6926377	6	145105354	C	A	0.328	0.000407	0.00327	0.901
Multisite chronic pain	Drinks per week	rs2237303	7	21483605	A	G	0.654	-0.00446	0.00312	0.153
Multisite chronic pain	Drinks per week	rs6966540	7	95727967	C	T	0.394	0.00108	0.00307	0.725
Multisite chronic pain	Drinks per week	rs1450833	7	113865735	C	T	0.209	0.00176	0.00353	0.618
Multisite chronic pain	Drinks per week	rs11786084	8	142651709	A	G	0.309	-0.00411	0.00316	0.194
Multisite chronic pain	Drinks per week	rs7870079	9	96161300	T	C	0.411	0.00174	0.003	0.561
Multisite chronic pain	Drinks per week	rs1040851	9	119243634	A	C	0.565	-0.00271	0.00301	0.367
Multisite chronic pain	Drinks per week	rs11596214	10	106453832	A	G	0.438	-0.00179	0.00302	0.554
Multisite chronic pain	Drinks per week	rs61881739	11	16256349	C	G	0.173	0.00044	0.00412	0.915
Multisite chronic pain	Drinks per week	rs2806985	13	53677723	G	C	0.651	-0.00312	0.00311	0.316
Multisite chronic pain	Drinks per week	rs17126867	14	73791271	C	T	0.228	-0.00438	0.00374	0.242
Multisite chronic pain	Drinks per week	rs2006281	14	104327732	T	C	0.509	0.00212	0.00297	0.475

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Drinks per week	rs2386584	15	91539572	G	T	0.429	0.00471	0.00306	0.123
Multisite chronic pain	Drinks per week	rs285018	16	77099065	A	G	0.54	-0.000273	0.00299	0.927
Multisite chronic pain	Drinks per week	rs12601574	17	43133627	G	C	0.519	-0.00133	0.00298	0.656
Multisite chronic pain	Drinks per week	rs62083314	18	50358109	T	C	0.398	-0.00281	0.00302	0.353
Multisite chronic pain	Drinks per week	rs16980973	20	19648493	T	A	0.146	0.00174	0.00441	0.693
Multisite chronic pain	Coffee consumption	rs2653892	1	50892199	T	C	0.527203	0.0012042	0.00156603	0.441923
Multisite chronic pain	Coffee consumption	rs11205357	1	150267798	T	C	0.389411	-0.00116526	0.00159289	0.46445
Multisite chronic pain	Coffee consumption	rs3013414	1	243148809	C	A	0.32638	0.000391574	0.00167136	0.814764
Multisite chronic pain	Coffee consumption	rs4852567	2	80703379	A	G	0.718808	-0.00161349	0.00173831	0.353309
Multisite chronic pain	Coffee consumption	rs35713889	3	49162583	C	T	0.955281	0.0106237	0.00376589	0.0047872
Multisite chronic pain	Coffee consumption	rs6869446	5	65570607	T	C	0.615656	0.00170745	0.00160409	0.287133
Multisite chronic pain	Coffee consumption	rs1946247	5	160836620	T	G	0.141506	0.000154842	0.00223247	0.944704
Multisite chronic pain	Coffee consumption	rs4713656	6	33648997	G	A	0.337859	-0.00067489	0.00164861	0.682271
Multisite chronic pain	Coffee consumption	rs6926377	6	145105354	A	C	0.706989	-0.00085587	0.00171335	0.617405
Multisite chronic pain	Coffee consumption	rs2237303	7	21483605	G	A	0.348128	9.53E-05	0.00164236	0.953706
Multisite chronic pain	Coffee consumption	rs6966540	7	95727967	T	C	0.626789	0.00118733	0.00161143	0.461236
Multisite chronic pain	Coffee consumption	rs1450833	7	113865735	T	C	0.753681	0.00127431	0.00181801	0.483344
Multisite chronic pain	Coffee consumption	rs11786084	8	142651709	G	A	0.666626	0.00178535	0.00165839	0.28168
Multisite chronic pain	Coffee consumption	rs7870079	9	96161300	C	T	0.544196	-0.00360848	0.0015703	0.0215645
Multisite chronic pain	Coffee consumption	rs1040851	9	119243634	C	A	0.424833	0.000910523	0.00157657	0.563578
Multisite chronic pain	Coffee consumption	rs11596214	10	106453832	G	A	0.595345	-0.0014571	0.00160107	0.362782
Multisite chronic pain	Coffee consumption	rs61881739	11	16256349	G	C	0.832788	-0.00658869	0.00209722	0.0016802
Multisite chronic pain	Coffee consumption	rs2806985	13	53677723	C	G	0.357328	-0.00044407	0.00164556	0.787269
Multisite chronic pain	Coffee consumption	rs17126867	14	73791271	T	C	0.820416	-0.00115805	0.0020282	0.568017
Multisite chronic pain	Coffee consumption	rs2006281	14	104327732	C	T	0.497081	-0.00053439	0.00156505	0.732765
Multisite chronic pain	Coffee consumption	rs2386584	15	91539572	T	G	0.614464	-0.00116635	0.0015993	0.465824

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Coffee consumption	rs285018	16	77099065	G	A	0.440105	0.000659015	0.00156802	0.674278
Multisite chronic pain	Coffee consumption	rs12601574	17	43133627	C	G	0.449883	-0.00265651	0.0015654	0.0896954
Multisite chronic pain	Coffee consumption	rs62083314	18	50358109	C	T	0.58638	-0.00034626	0.00159176	0.827794
Multisite chronic pain	Coffee consumption	rs16980973	20	19648493	A	T	0.874224	-0.00039321	0.0023527	0.867266
Multisite chronic pain	Vigorous PA	rs2653892	1	50892199	T	C	0.524054	0.00134622	0.00132131	0.31
Multisite chronic pain	Vigorous PA	rs11205357	1	150267798	T	C	0.390213	0.00253706	0.00134334	0.059
Multisite chronic pain	Vigorous PA	rs3013414	1	243148809	C	A	0.32653	-0.00311942	0.00141272	0.027
Multisite chronic pain	Vigorous PA	rs4852567	2	80703379	A	G	0.716483	0.000873475	0.00146403	0.55
Multisite chronic pain	Vigorous PA	rs35713889	3	49162583	C	T	0.954872	-0.00185263	0.00316252	0.56
Multisite chronic pain	Vigorous PA	rs6869446	5	65570607	T	C	0.614555	-0.00051862	0.00135334	0.7
Multisite chronic pain	Vigorous PA	rs1946247	5	160836620	T	G	0.141035	0.00202129	0.00188656	0.28
Multisite chronic pain	Vigorous PA	rs4713656	6	33648997	G	A	0.337639	-0.00131042	0.00139139	0.35
Multisite chronic pain	Vigorous PA	rs6926377	6	145105354	A	C	0.704768	-0.00153239	0.00144411	0.29
Multisite chronic pain	Vigorous PA	rs2237303	7	21483605	G	A	0.348285	0.00179591	0.0013869	0.2
Multisite chronic pain	Vigorous PA	rs6966540	7	95727967	T	C	0.62615	0.000184241	0.0013595	0.89
Multisite chronic pain	Vigorous PA	rs1450833	7	113865735	T	C	0.755686	-0.00305368	0.00153909	0.047
Multisite chronic pain	Vigorous PA	rs11786084	8	142651709	G	A	0.667494	-0.0011662	0.0014033	0.41
Multisite chronic pain	Vigorous PA	rs7870079	9	96161300	C	T	0.546499	-0.00198169	0.00132538	0.13
Multisite chronic pain	Vigorous PA	rs1040851	9	119243634	C	A	0.425207	-0.00165214	0.00133039	0.21
Multisite chronic pain	Vigorous PA	rs11596214	10	106453832	G	A	0.593072	-0.00036079	0.00135079	0.79
Multisite chronic pain	Vigorous PA	rs61881739	11	16256349	G	C	0.833296	0.00179474	0.0017748	0.31
Multisite chronic pain	Vigorous PA	rs2806985	13	53677723	C	G	0.355184	-0.00334258	0.00139161	0.016
Multisite chronic pain	Vigorous PA	rs17126867	14	73791271	T	C	0.815893	-0.00101612	0.00169764	0.55
Multisite chronic pain	Vigorous PA	rs2006281	14	104327732	C	T	0.4962	-0.00107832	0.00132228	0.41
Multisite chronic pain	Vigorous PA	rs2386584	15	91539572	T	G	0.612524	0.00347895	0.00135059	0.01
Multisite chronic pain	Vigorous PA	rs285018	16	77099065	G	A	0.438408	0.00097701	0.00132558	0.46

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Vigorous PA	rs12601574	17	43133627	C	G	0.451983	-0.00198956	0.00132277	0.13
Multisite chronic pain	Vigorous PA	rs62083314	18	50358109	C	T	0.587417	0.00409465	0.00134509	0.0023
Multisite chronic pain	Vigorous PA	rs16980973	20	19648493	A	T	0.873906	-0.00059822	0.00198654	0.76
Multisite chronic pain	Moderate-to-vigorous PA	rs2653892	1	50892199	T	C	0.52541	0.00354897	0.00221471	0.11
Multisite chronic pain	Moderate-to-vigorous PA	rs11205357	1	150267798	T	C	0.390682	0.00320489	0.00225382	0.16
Multisite chronic pain	Moderate-to-vigorous PA	rs3013414	1	243148809	C	A	0.326497	-0.00456259	0.00236829	0.054
Multisite chronic pain	Moderate-to-vigorous PA	rs4852567	2	80703379	A	G	0.71603	0.00127061	0.0024532	0.6
Multisite chronic pain	Moderate-to-vigorous PA	rs35713889	3	49162583	C	T	0.955282	-0.0057795	0.00532862	0.28
Multisite chronic pain	Moderate-to-vigorous PA	rs6869446	5	65570607	T	C	0.61444	-0.0019969	0.00226907	0.38
Multisite chronic pain	Moderate-to-vigorous PA	rs1946247	5	160836620	T	G	0.141292	0.00778736	0.003163	0.014
Multisite chronic pain	Moderate-to-vigorous PA	rs4713656	6	33648997	G	A	0.336653	-0.00298407	0.00233791	0.2
Multisite chronic pain	Moderate-to-vigorous PA	rs6926377	6	145105354	A	C	0.704504	-0.00395586	0.00242164	0.1
Multisite chronic pain	Moderate-to-vigorous PA	rs2237303	7	21483605	G	A	0.347303	0.00382209	0.00232449	0.1
Multisite chronic pain	Moderate-to-vigorous PA	rs6966540	7	95727967	T	C	0.626809	0.000112723	0.00228173	0.96
Multisite chronic pain	Moderate-to-vigorous PA	rs1450833	7	113865735	T	C	0.755851	-0.00079384	0.00258245	0.76
Multisite chronic pain	Moderate-to-vigorous PA	rs11786084	8	142651709	G	A	0.668542	-0.00164872	0.00235441	0.48
Multisite chronic pain	Moderate-to-vigorous PA	rs7870079	9	96161300	C	T	0.545593	-0.00127177	0.00222295	0.57
Multisite chronic pain	Moderate-to-vigorous PA	rs1040851	9	119243634	C	A	0.424806	-0.00180063	0.00223105	0.42
Multisite chronic pain	Moderate-to-vigorous PA	rs11596214	10	106453832	G	A	0.592573	0.00248808	0.00226684	0.27
Multisite chronic pain	Moderate-to-vigorous PA	rs61881739	11	16256349	G	C	0.832619	0.00172043	0.00296966	0.56
Multisite chronic pain	Moderate-to-vigorous PA	rs2806985	13	53677723	C	G	0.355252	-0.00780077	0.00233383	0.00083
Multisite chronic pain	Moderate-to-vigorous PA	rs17126867	14	73791271	T	C	0.816035	-0.00065205	0.00284943	0.82
Multisite chronic pain	Moderate-to-vigorous PA	rs2006281	14	104327732	C	T	0.495886	-0.00104918	0.00221896	0.64
Multisite chronic pain	Moderate-to-vigorous PA	rs2386584	15	91539572	T	G	0.612265	0.00451899	0.00226601	0.046
Multisite chronic pain	Moderate-to-vigorous PA	rs285018	16	77099065	G	A	0.439611	0.00116599	0.00222229	0.6
Multisite chronic pain	Moderate-to-vigorous PA	rs12601574	17	43133627	C	G	0.450684	-0.00290559	0.00221614	0.19

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Moderate-to-vigorous PA	rs62083314	18	50358109	C	T	0.587631	0.0025063	0.00225607	0.27
Multisite chronic pain	Moderate-to-vigorous PA	rs16980973	20	19648493	A	T	0.873465	-0.00210217	0.00332545	0.53
Multisite chronic pain	Strenuous sports or other exercises	rs2653892	1	50892199	T	C	0.525435	6.95E-05	0.00112891	0.95
Multisite chronic pain	Strenuous sports or other exercises	rs11205357	1	150267798	T	C	0.39051	0.00214573	0.00114846	0.062
Multisite chronic pain	Strenuous sports or other exercises	rs3013414	1	243148809	C	A	0.326794	-0.00496694	0.00120664	3.80E-05
Multisite chronic pain	Strenuous sports or other exercises	rs4852567	2	80703379	A	G	0.71629	-0.00394404	0.00125013	0.0016
Multisite chronic pain	Strenuous sports or other exercises	rs35713889	3	49162583	C	T	0.955294	0.00427061	0.00271733	0.12
Multisite chronic pain	Strenuous sports or other exercises	rs6869446	5	65570607	T	C	0.614492	0.000922517	0.00115718	0.43
Multisite chronic pain	Strenuous sports or other exercises	rs1946247	5	160836620	T	G	0.140645	0.00248147	0.00161664	0.12
Multisite chronic pain	Strenuous sports or other exercises	rs4713656	6	33648997	G	A	0.336756	-0.00299572	0.00119213	0.012
Multisite chronic pain	Strenuous sports or other exercises	rs6926377	6	145105354	A	C	0.704034	-0.00103104	0.00123434	0.4
Multisite chronic pain	Strenuous sports or other exercises	rs2237303	7	21483605	G	A	0.347582	-0.00011336	0.0011854	0.92
Multisite chronic pain	Strenuous sports or other exercises	rs6966540	7	95727967	T	C	0.626902	0.000197861	0.00116342	0.86
Multisite chronic pain	Strenuous sports or other exercises	rs1450833	7	113865735	T	C	0.755843	-0.00235639	0.00131678	0.074
Multisite chronic pain	Strenuous sports or other exercises	rs11786084	8	142651709	G	A	0.667521	0.00293995	0.00119813	0.014

Suppl. Table 2 (cont.). *Extracting SNPs in the GWAS summary statistics of outcome.*

Exposures	Outcome	SNP	chr	pos	effect_allele	other_allele	eaf	beta	se	p
Multisite chronic pain	Strenuous sports or other exercises	rs7870079	9	96161300	C	T	0.546978	-0.00255157	0.00113366	0.024
Multisite chronic pain	Strenuous sports or other exercises	rs1040851	9	119243634	C	A	0.425247	-0.00186287	0.00113697	0.1
Multisite chronic pain	Strenuous sports or other exercises	rs11596214	10	106453832	G	A	0.593266	-0.00199361	0.00115628	0.085
Multisite chronic pain	Strenuous sports or other exercises	rs61881739	11	16256349	G	C	0.83256	0.00141786	0.00151483	0.35
Multisite chronic pain	Strenuous sports or other exercises	rs2806985	13	53677723	C	G	0.354941	0.00153644	0.00119011	0.2
Multisite chronic pain	Strenuous sports or other exercises	rs17126867	14	73791271	T	C	0.816185	8.78E-05	0.00145463	0.95
Multisite chronic pain	Strenuous sports or other exercises	rs2006281	14	104327732	C	T	0.49616	-0.00137764	0.00113076	0.22
Multisite chronic pain	Strenuous sports or other exercises	rs2386584	15	91539572	T	G	0.611886	0.00122548	0.00115402	0.29
Multisite chronic pain	Strenuous sports or other exercises	rs285018	16	77099065	G	A	0.439388	0.00142111	0.00113343	0.21
Multisite chronic pain	Strenuous sports or other exercises	rs12601574	17	43133627	C	G	0.451816	-0.00181097	0.00112985	0.11
Multisite chronic pain	Strenuous sports or other exercises	rs62083314	18	50358109	C	T	0.58712	0.00326478	0.00114998	0.0045
Multisite chronic pain	Strenuous sports or other exercises	rs16980973	20	19648493	A	T	0.873931	-0.00570267	0.00169958	0.00079

GWAS, Genome-wide association study. MR, mendelian randomization. SNP, single nucleotide polymorphism. eaf, effect allele frequency. chr, chromosome. pos, position. se, Standard error.

Suppl. Table 3. *Details of summary statistics after harmonising.*

Exposures		Outcome	SNP	effect_allele.exposure	other_allele.exposure	effect_allele.outcome	other_allele.outcome	beta.exposure	beta.outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue.exposure	pvalue.outcome	mr_keep
1. Leisure sedentary behavior																
Computer use	Multisite chronic pain	rs1923759	G	A	A	G	A	0.0121204	0.00189231	0.00221127	0.00244041	0.55503	0.554909	4.20E-08	0.44	TRUE
Computer use	Multisite chronic pain	rs2281175	T	C	C	T	C	-0.013387	-0.00078008	0.00235632	0.00260258	0.593738	0.593864	1.30E-08	0.76	TRUE
Computer use	Multisite chronic pain	rs600806	G	A	A	G	A	0.0161605	-0.010986	0.002464	0.00272149	0.276897	0.276645	5.40E-11	5.40E-05	TRUE
Computer use	Multisite chronic pain	rs1037091	C	T	T	C	T	0.0154966	-0.00232848	0.00239144	0.00264164	0.67295	0.673077	9.20E-11	0.38	TRUE
Computer use	Multisite chronic pain	rs12691712	A	G	G	A	G	0.0203661	0.00798426	0.00351807	0.00388703	0.110364	0.110256	7.10E-09	0.04	TRUE
Computer use	Multisite chronic pain	rs17815546	G	A	A	G	A	-0.0122195	0.00210231	0.00222687	0.0024592	0.573234	0.57303	4.10E-08	0.39	TRUE
Computer use	Multisite chronic pain	rs4436942	T	A	A	T	A	0.0123617	-0.00083088	0.00225483	0.00248951	0.394172	0.394022	4.20E-08	0.74	TRUE
Computer use	Multisite chronic pain	rs16825642	C	T	T	C	T	-0.0151534	0.00108199	0.00274508	0.00303077	0.796078	0.795941	3.40E-08	0.72	TRUE
Computer use	Multisite chronic pain	rs4690912	G	T	T	G	T	-0.0122167	0.00671879	0.00223187	0.00246471	0.423077	0.423053	4.40E-08	0.0064	TRUE
Computer use	Multisite chronic pain	rs6842066	C	T	T	C	T	0.012588	-0.00133611	0.00223445	0.0024655	0.430421	0.430341	1.80E-08	0.59	TRUE
Computer use	Multisite chronic pain	rs1469249	G	A	A	G	A	0.0155576	-0.008433	0.00271086	0.00299019	0.788564	0.788584	9.50E-09	0.0048	TRUE
Computer use	Multisite chronic pain	rs162904	T	C	C	T	C	0.0130747	-0.00339128	0.00233654	0.00258111	0.332694	0.332663	2.20E-08	0.19	TRUE
Computer use	Multisite chronic pain	rs2220599	C	G	G	C	G	-0.0160514	-0.00301469	0.00229019	0.00252897	0.632986	0.633222	2.40E-12	0.23	TRUE
Computer use	Multisite chronic pain	rs254781	C	T	T	C	T	0.013144	-0.00516331	0.00223907	0.0024729	0.415839	0.415744	4.40E-09	0.037	TRUE
Computer use	Multisite chronic pain	rs56158102	C	T	T	C	T	0.0132096	0.00269132	0.00238511	0.00263507	0.344405	0.344367	3.10E-08	0.31	TRUE
Computer use	Multisite chronic pain	rs1033956	G	A	A	G	A	0.0205563	-0.00620497	0.00371498	0.00410265	0.0980101	0.0979852	3.10E-08	0.13	TRUE
Computer use	Multisite chronic pain	rs11153822	C	T	T	C	T	-0.0132527	0.00159073	0.00222104	0.0024545	0.502398	0.502555	2.40E-09	0.52	TRUE
Computer use	Multisite chronic pain	rs17789218	T	C	C	T	C	-0.0150545	0.00294097	0.00256134	0.00282968	0.756018	0.755931	4.20E-09	0.3	TRUE
Computer use	Multisite chronic pain	rs2179517	G	C	C	G	C	-0.0124261	0.00396627	0.00220913	0.0024402	0.551298	0.551258	1.90E-08	0.1	FALSE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_ allele. exposure	other_ allele. exposure	effect_ allele. outcome	other_ allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Computer use	Multisite chronic pain	rs6935828	C	T	C	T	-0.0121206	-0.00466147	0.00221282	0.00244582	0.446483	0.446406	4.30E-08	0.057	TRUE
Computer use	Multisite chronic pain	rs11766965	G	C	G	C	0.0124757	0.00339137	0.00228164	0.00251979	0.623046	0.622804	4.60E-08	0.18	TRUE
Computer use	Multisite chronic pain	rs12698902	A	G	A	G	0.0150725	0.00424521	0.00242638	0.00267894	0.71129	0.711354	5.20E-10	0.11	TRUE
Computer use	Multisite chronic pain	rs67453484	T	A	T	A	-0.0124605	-0.00019567	0.0022727	0.00251028	0.616938	0.617176	4.20E-08	0.94	TRUE
Computer use	Multisite chronic pain	rs6973256	C	T	C	T	-0.0124671	0.00376581	0.00226473	0.0025018	0.401474	0.401456	3.70E-08	0.13	TRUE
Computer use	Multisite chronic pain	rs11777164	C	T	C	T	0.0133623	-0.00569135	0.00228871	0.00252823	0.633775	0.633863	5.30E-09	0.024	TRUE
Computer use	Multisite chronic pain	rs10965780	C	G	C	G	-0.0138038	0.000651529	0.00224012	0.00247467	0.415161	0.414972	7.20E-10	0.79	TRUE
Computer use	Multisite chronic pain	rs28520360	T	G	T	G	-0.0201613	0.00971564	0.00356254	0.00393287	0.893083	0.892886	1.50E-08	0.013	TRUE
Computer use	Multisite chronic pain	rs4836935	T	G	T	G	0.0127341	-0.00540323	0.00229497	0.00253425	0.632362	0.632474	2.90E-08	0.033	TRUE
Computer use	Multisite chronic pain	rs7034544	A	G	A	G	0.0144108	0.00814082	0.00256441	0.00283361	0.757223	0.757309	1.90E-08	0.0041	TRUE
Computer use	Multisite chronic pain	rs10894386	G	C	G	C	-0.0142716	0.00837895	0.00226597	0.00250435	0.38315	0.383206	3.00E-10	0.00082	TRUE
Computer use	Multisite chronic pain	rs35023999	A	C	A	C	-0.0133101	0.00500866	0.00220173	0.00243211	0.491252	0.491185	1.50E-09	0.039	TRUE
Computer use	Multisite chronic pain	rs206960	T	C	T	C	0.0150714	-0.00400465	0.00270922	0.00299142	0.208485	0.208552	2.70E-08	0.18	TRUE
Computer use	Multisite chronic pain	rs2132747	A	C	A	C	0.0136702	-0.00156756	0.00248115	0.00274085	0.732264	0.732311	3.60E-08	0.57	TRUE
Computer use	Multisite chronic pain	rs61931384	T	C	T	C	-0.013873	-0.00213357	0.00248534	0.00274522	0.720434	0.72042	2.40E-08	0.44	TRUE
Computer use	Multisite chronic pain	rs9527564	T	C	T	C	-0.0201729	0.00525117	0.00364987	0.00402403	0.896865	0.896791	3.30E-08	0.19	TRUE
Computer use	Multisite chronic pain	rs198262	C	T	C	T	0.0300048	-0.00134245	0.00546001	0.00603269	0.0435078	0.043487	3.90E-08	0.82	TRUE
Computer use	Multisite chronic pain	rs4702	G	A	G	A	0.0121782	0.00389417	0.00221469	0.00244566	0.443547	0.443517	3.80E-08	0.11	TRUE
Computer use	Multisite chronic pain	rs59815685	C	T	C	T	0.0133546	0.00550906	0.00227435	0.00251184	0.480901	0.481053	4.30E-09	0.028	TRUE
Computer use	Multisite chronic pain	rs3730399	A	G	A	G	0.0246511	-0.00312592	0.00446121	0.00492532	0.934805	0.934769	3.30E-08	0.53	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf. outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Computer use	Multisite chronic pain	rs6498759	T	C	T	C	0.0132648	0.000897745	0.0023861	0.00263579	0.309602	0.309625	2.70E-08	0.73	TRUE
Computer use	Multisite chronic pain	rs11652437	C	A	C	A	-0.0152959	0.00493078	0.00238526	0.00263361	0.676602	0.676529	1.40E-10	0.061	TRUE
Computer use	Multisite chronic pain	rs3744760	T	C	T	C	0.0137348	-0.0138978	0.00248686	0.00274668	0.731947	0.732093	3.30E-08	4.20E-07	TRUE
Computer use	Multisite chronic pain	rs7433322	C	G	C	G	0.0202734	-0.00726201	0.00343292	0.00379057	0.88314	0.883084	3.50E-09	0.055	TRUE
Computer use	Multisite chronic pain	rs613872	G	T	G	T	0.0181819	-0.015584	0.00290312	0.00320655	0.174492	0.174489	3.80E-10	1.20E-06	TRUE
Computer use	Multisite chronic pain	rs6101275	C	T	C	T	0.0150559	0.000457158	0.00267739	0.00296022	0.780869	0.781034	1.90E-08	0.88	TRUE
Computer use	Multisite chronic pain	rs7577719	T	C	T	C	0.0123921	-0.00114788	0.0022195	0.00244918	0.441935	0.442046	2.40E-08	0.64	TRUE
Computer use	Multisite chronic pain	rs9608249	G	A	G	A	0.0173846	0.00188776	0.00310761	0.00343445	0.851351	0.851412	2.20E-08	0.58	TRUE
Television watching	Multisite chronic pain	rs11162351	C	G	C	G	-0.0123268	-0.00952344	0.00220427	0.00247789	0.602486	0.602503	2.20E-08	0.00012	TRUE
Television watching	Multisite chronic pain	rs11210449	A	G	A	G	-0.0131107	-0.0075575	0.00238809	0.00268809	0.288479	0.288339	4.00E-08	0.0049	TRUE
Television watching	Multisite chronic pain	rs114328297	T	G	T	G	0.0143839	0.000380656	0.00262854	0.00295873	0.777756	0.777771	4.40E-08	0.9	TRUE
Television watching	Multisite chronic pain	rs141425667	G	A	G	A	-0.0240563	0.0018925	0.00438104	0.0049346	0.934868	0.934981	4.00E-08	0.7	TRUE
Television watching	Multisite chronic pain	rs144407312	T	C	T	C	-0.0375809	-0.0220625	0.00629239	0.00708502	0.969134	0.969127	2.30E-09	0.0018	TRUE
Television watching	Multisite chronic pain	rs1547737	G	T	G	T	-0.0128072	-0.00664329	0.00228206	0.0025695	0.347704	0.347542	2.00E-08	0.0097	TRUE
Television watching	Multisite chronic pain	rs1890660	G	A	G	A	0.0142821	0.000428643	0.00241804	0.00272257	0.273677	0.273634	3.50E-09	0.87	TRUE
Television watching	Multisite chronic pain	rs2842189	T	C	T	C	-0.0121628	-0.00526254	0.00223036	0.00251039	0.376934	0.376829	4.90E-08	0.036	TRUE
Television watching	Multisite chronic pain	rs4498770	C	T	C	T	0.0125713	0.00867113	0.00215456	0.00242542	0.483118	0.482786	5.40E-09	0.00035	TRUE
Television watching	Multisite chronic pain	rs600806	G	A	G	A	-0.0142629	-0.010986	0.00241735	0.00272149	0.276828	0.276645	3.60E-09	5.40E-05	TRUE
Television watching	Multisite chronic pain	rs631130	T	A	T	A	-0.0138158	-0.00298807	0.00236338	0.0026606	0.369158	0.369244	5.00E-09	0.26	TRUE
Television watching	Multisite chronic pain	rs6690619	C	T	C	T	0.0128488	0.00742139	0.00216795	0.00244073	0.491113	0.49131	3.10E-09	0.0024	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf. outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Television watching	Multisite chronic pain	rs72723209	A	T	A	T	-0.0446583	0.00432186	0.00761849	0.00857551	0.979039	0.979046	4.60E-09	0.61	TRUE
Television watching	Multisite chronic pain	rs7514549	C	T	C	T	0.0147821	0.010321	0.00270887	0.00304722	0.798975	0.798959	4.80E-08	0.00071	TRUE
Television watching	Multisite chronic pain	rs7555117	T	C	T	C	0.0119805	0.00154757	0.00215982	0.00242973	0.513858	0.513885	2.90E-08	0.52	TRUE
Television watching	Multisite chronic pain	rs822555	A	G	A	G	-0.0124942	0.000324408	0.00222602	0.0025069	0.379129	0.379016	2.00E-08	0.9	TRUE
Television watching	Multisite chronic pain	rs10432338	G	T	G	T	-0.0194503	-0.00684922	0.00279305	0.00314824	0.817643	0.81777	3.30E-12	0.03	TRUE
Television watching	Multisite chronic pain	rs10451583	C	A	C	A	-0.0137792	-0.00565021	0.00222258	0.0025033	0.605205	0.605171	5.70E-10	0.024	TRUE
Television watching	Multisite chronic pain	rs1217436	T	G	T	G	0.0131333	0.00471154	0.00228741	0.00256712	0.661753	0.661653	9.40E-09	0.066	TRUE
Television watching	Multisite chronic pain	rs12475168	G	T	G	T	-0.018196	2.77E-05	0.00322661	0.00363538	0.869409	0.869425	1.70E-08	0.99	TRUE
Television watching	Multisite chronic pain	rs13018897	G	T	G	T	-0.0123059	-0.00786318	0.0022495	0.00253461	0.640324	0.640325	4.50E-08	0.0019	TRUE
Television watching	Multisite chronic pain	rs13397144	A	G	A	G	0.0166372	0.000362494	0.00301337	0.00339422	0.849038	0.849054	3.40E-08	0.91	TRUE
Television watching	Multisite chronic pain	rs13415069	T	C	T	C	0.0127352	0.00432555	0.00220288	0.00248148	0.593498	0.593421	7.40E-09	0.081	TRUE
Television watching	Multisite chronic pain	rs139677604	C	G	C	G	-0.0143056	-0.00325971	0.00250051	0.00281846	0.746509	0.746723	1.10E-08	0.25	TRUE
Television watching	Multisite chronic pain	rs1860170	T	C	T	C	0.0135204	-0.0046592	0.00239781	0.00270266	0.286686	0.286558	1.70E-08	0.085	TRUE
Television watching	Multisite chronic pain	rs2060199	T	A	T	A	0.012079	0.0012361	0.00216372	0.00243759	0.446311	0.446324	2.40E-08	0.61	FALSE
Television watching	Multisite chronic pain	rs243034	C	T	C	T	0.0150926	0.00299983	0.00222092	0.00250154	0.381197	0.38127	1.10E-11	0.23	TRUE
Television watching	Multisite chronic pain	rs3769983	G	A	G	A	-0.0142159	-0.00769633	0.00215827	0.00243059	0.514651	0.514642	4.50E-11	0.0015	TRUE
Television watching	Multisite chronic pain	rs4436942	T	A	T	A	-0.0120799	-0.00083088	0.00221065	0.00248951	0.394033	0.394022	4.60E-08	0.74	TRUE
Television watching	Multisite chronic pain	rs56049830	C	T	C	T	-0.016105	-0.00859331	0.00281217	0.0031672	0.819721	0.81977	1.00E-08	0.0067	TRUE
Television watching	Multisite chronic pain	rs59210467	C	T	C	T	-0.0134192	0.00121091	0.00234497	0.00264283	0.69262	0.693009	1.00E-08	0.65	TRUE
Television watching	Multisite chronic pain	rs6721975	T	C	T	C	-0.0166905	-0.0167025	0.00261401	0.00294519	0.231524	0.23137	1.70E-10	1.40E-08	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_kee
Television watching	Multisite chronic pain	rs6723328	A	G	A	G	-0.0124654	-0.00452624	0.00224643	0.00253099	0.362079	0.362053	2.90E-08	0.074	TRUE
Television watching	Multisite chronic pain	rs6738130	C	T	C	T	-0.0130392	-0.00013283	0.00237845	0.00267987	0.289725	0.28973	4.20E-08	0.96	TRUE
Television watching	Multisite chronic pain	rs778365	T	C	T	C	0.0139956	0.000308205	0.00236499	0.0026645	0.701765	0.701774	3.30E-09	0.91	TRUE
Television watching	Multisite chronic pain	rs79430745	C	T	C	T	0.0362106	0.018535	0.00662682	0.00746457	0.972372	0.972362	4.60E-08	0.013	TRUE
Television watching	Multisite chronic pain	rs112911909	G	A	G	A	0.0136503	0.00280681	0.00223963	0.00252154	0.635037	0.635116	1.10E-09	0.27	TRUE
Television watching	Multisite chronic pain	rs114600294	G	C	G	C	-0.0162426	0.00211822	0.00264223	0.00297266	0.788982	0.789009	7.90E-10	0.48	TRUE
Television watching	Multisite chronic pain	rs11708288	A	G	A	G	0.0129066	0.00603694	0.002211	0.00248817	0.601768	0.60206	5.30E-09	0.015	TRUE
Television watching	Multisite chronic pain	rs12632778	T	G	T	G	-0.028473	-0.00158452	0.00518053	0.0058306	0.954031	0.954023	3.90E-08	0.79	TRUE
Television watching	Multisite chronic pain	rs137920315	A	C	A	C	-0.0359994	-0.00851892	0.00495186	0.00557285	0.948399	0.948367	3.60E-13	0.13	TRUE
Television watching	Multisite chronic pain	rs138256022	C	T	C	T	-0.0313469	-0.00212097	0.00565322	0.00636358	0.958546	0.958516	2.90E-08	0.74	TRUE
Television watching	Multisite chronic pain	rs142922893	T	C	T	C	-0.0400785	-0.0127824	0.00650186	0.00731035	0.970694	0.970668	7.10E-10	0.08	TRUE
Television watching	Multisite chronic pain	rs1707652	C	T	C	T	-0.0124026	-0.00837828	0.00223918	0.00252013	0.631082	0.631248	3.00E-08	0.00089	TRUE
Television watching	Multisite chronic pain	rs1864896	A	G	A	G	0.0123983	0.00696672	0.00218806	0.00246195	0.438721	0.438789	1.50E-08	0.0047	TRUE
Television watching	Multisite chronic pain	rs67316928	T	C	T	C	-0.0123545	0.00510974	0.0022134	0.00249134	0.60799	0.608101	2.40E-08	0.04	TRUE
Television watching	Multisite chronic pain	rs9834970	T	C	T	C	0.0127684	0.00113973	0.00215775	0.00242569	0.501031	0.500809	3.30E-09	0.64	TRUE
Television watching	Multisite chronic pain	rs10009426	A	G	A	G	-0.0130528	-0.00689314	0.00237892	0.00267143	0.707433	0.707511	4.10E-08	0.0099	TRUE
Television watching	Multisite chronic pain	rs11726096	A	C	A	C	-0.0122038	-0.00926835	0.00222303	0.00250017	0.617891	0.617806	4.00E-08	0.00021	TRUE
Television watching	Multisite chronic pain	rs13114404	A	G	A	G	0.0212707	0.00438776	0.00386593	0.00432882	0.913412	0.913306	3.80E-08	0.31	TRUE
Television watching	Multisite chronic pain	rs13140619	G	A	G	A	0.0119145	0.00275682	0.0021802	0.00245251	0.433569	0.433829	4.60E-08	0.26	TRUE
Television watching	Multisite chronic pain	rs363096	T	C	T	C	0.0123786	0.00932787	0.00218771	0.00246183	0.424891	0.424643	1.50E-08	0.00015	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Television watching	Multisite chronic pain	rs4455397	T	C	T	C	-0.0128466	-0.00609612	0.00218144	0.00245418	0.437483	0.437679	3.90E-09	0.013	TRUE
Television watching	Multisite chronic pain	rs7697614	T	A	T	A	-0.0167006	-0.0113017	0.00301488	0.0033926	0.849136	0.849146	3.00E-08	0.00086	TRUE
Television watching	Multisite chronic pain	rs77215114	A	T	A	T	0.024415	0.00828201	0.00430915	0.00485127	0.930462	0.930626	1.50E-08	0.088	TRUE
Television watching	Multisite chronic pain	rs788857	A	G	A	G	-0.0132963	-0.00589552	0.0024099	0.00271166	0.718481	0.718444	3.40E-08	0.03	TRUE
Television watching	Multisite chronic pain	rs17097461	T	C	T	C	-0.025698	-0.0101102	0.00420489	0.00473436	0.927892	0.927887	9.90E-10	0.033	TRUE
Television watching	Multisite chronic pain	rs2336894	T	G	T	G	0.0122961	0.00219588	0.00225249	0.0025352	0.359908	0.359847	4.80E-08	0.39	TRUE
Television watching	Multisite chronic pain	rs347661	T	C	T	C	0.0130859	0.00227167	0.00220038	0.00247469	0.435345	0.43527	2.70E-09	0.36	TRUE
Television watching	Multisite chronic pain	rs34846849	T	C	T	C	-0.0133936	-0.00454453	0.00229318	0.00258132	0.668557	0.668499	5.20E-09	0.078	TRUE
Television watching	Multisite chronic pain	rs42210	G	C	G	C	-0.0138517	-0.00154181	0.00239536	0.00269595	0.289169	0.289336	7.30E-09	0.57	TRUE
Television watching	Multisite chronic pain	rs549300331	T	A	T	A	0.0129051	0.0075297	0.00228264	0.00256915	0.601899	0.601966	1.60E-08	0.0034	TRUE
Television watching	Multisite chronic pain	rs62358087	A	G	A	G	-0.0160521	0.00219544	0.00282176	0.00317487	0.818927	0.818809	1.30E-08	0.49	TRUE
Television watching	Multisite chronic pain	rs6595549	G	C	G	C	0.0174453	0.00849602	0.0028145	0.00316841	0.821204	0.821279	5.70E-10	0.0073	TRUE
Television watching	Multisite chronic pain	rs6859476	C	T	C	T	-0.012091	-0.00200913	0.0022008	0.00247445	0.531667	0.531779	3.90E-08	0.42	TRUE
Television watching	Multisite chronic pain	rs6881498	A	G	A	G	0.0161652	0.00123597	0.00217875	0.0024527	0.564177	0.564106	1.20E-13	0.61	TRUE
Television watching	Multisite chronic pain	rs71639293	A	G	A	G	0.016731	0.0098258	0.00269162	0.00302918	0.797367	0.797392	5.10E-10	0.0012	TRUE
Television watching	Multisite chronic pain	rs9326862	A	T	A	T	0.0120385	0.00456147	0.00216285	0.00243515	0.467982	0.468112	2.60E-08	0.061	FALSE
Television watching	Multisite chronic pain	rs12213893	G	C	G	C	-0.0133075	-0.0047962	0.00222476	0.00250114	0.613831	0.613946	2.20E-09	0.055	TRUE
Television watching	Multisite chronic pain	rs17789218	T	C	T	C	0.0185965	0.00294097	0.00251401	0.00282968	0.75605	0.755931	1.40E-13	0.3	TRUE
Television watching	Multisite chronic pain	rs2844477	T	C	T	C	-0.0143312	-0.00882816	0.00227416	0.00255837	0.653839	0.653675	2.90E-10	0.00056	TRUE
Television watching	Multisite chronic pain	rs34733353	G	C	G	C	0.0119877	-0.00069567	0.00219775	0.00247431	0.590727	0.590585	4.90E-08	0.78	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_kee
Television watching	Multisite chronic pain	rs6925118	A	G	A	G	0.0157402	0.00339773	0.00276734	0.00311442	0.811879	0.811895	1.30E-08	0.28	TRUE
Television watching	Multisite chronic pain	rs73028181	G	T	G	T	-0.0472356	-0.0067978	0.00674431	0.00760097	0.97372	0.973791	2.50E-12	0.37	TRUE
Television watching	Multisite chronic pain	rs10234444	G	A	G	A	0.0158909	0.00358891	0.00286457	0.00321985	0.823392	0.823255	2.90E-08	0.27	TRUE
Television watching	Multisite chronic pain	rs10268139	A	C	A	C	-0.0125292	0.00273462	0.00219723	0.00247166	0.586067	0.586146	1.20E-08	0.27	TRUE
Television watching	Multisite chronic pain	rs13227345	G	A	G	A	-0.0129636	-0.00347849	0.00230369	0.0025914	0.672243	0.672312	1.80E-08	0.18	TRUE
Television watching	Multisite chronic pain	rs2021738	A	G	A	G	0.0266082	0.00953848	0.00476971	0.00536273	0.0544593	0.0544849	2.40E-08	0.075	TRUE
Television watching	Multisite chronic pain	rs37974	A	G	A	G	0.0120648	0.00592656	0.00217598	0.00244788	0.517757	0.518001	2.90E-08	0.015	TRUE
Television watching	Multisite chronic pain	rs57534256	T	C	T	C	-0.0125669	-0.00527374	0.00218177	0.0024549	0.430662	0.430643	8.40E-09	0.032	TRUE
Television watching	Multisite chronic pain	rs6951746	C	A	C	A	0.0164726	-0.00678741	0.00301625	0.00339378	0.151725	0.151635	4.70E-08	0.046	TRUE
Television watching	Multisite chronic pain	rs7783649	C	A	C	A	0.0195135	0.0038483	0.00350609	0.00394296	0.111925	0.111987	2.60E-08	0.33	TRUE
Television watching	Multisite chronic pain	rs11989463	A	C	A	C	-0.0154062	-0.00396224	0.00269667	0.00303338	0.79881	0.79872	1.10E-08	0.19	TRUE
Television watching	Multisite chronic pain	rs13439800	G	T	G	T	0.0140864	0.0101229	0.00216923	0.00243983	0.547231	0.547155	8.40E-11	3.30E-05	TRUE
Television watching	Multisite chronic pain	rs2607104	G	A	G	A	-0.0121294	-0.00700159	0.00217437	0.00244527	0.483088	0.483009	2.40E-08	0.0042	TRUE
Television watching	Multisite chronic pain	rs2717559	A	G	A	G	0.0124298	0.00108782	0.00219436	0.00246874	0.55928	0.559475	1.50E-08	0.66	TRUE
Television watching	Multisite chronic pain	rs6984171	A	G	A	G	-0.0127934	0.00546789	0.00222737	0.0025069	0.609548	0.609708	9.30E-09	0.029	TRUE
Television watching	Multisite chronic pain	rs6996198	C	T	C	T	-0.0163982	-0.0042114	0.00297381	0.00334481	0.84333	0.843352	3.50E-08	0.21	TRUE
Television watching	Multisite chronic pain	rs10739499	C	G	C	G	0.0138371	0.00682489	0.00229003	0.00257531	0.33716	0.337301	1.50E-09	0.008	TRUE
Television watching	Multisite chronic pain	rs1535667	C	T	C	T	-0.0120318	-0.00257098	0.00216789	0.00243752	0.545367	0.5454	2.90E-08	0.29	TRUE
Television watching	Multisite chronic pain	rs2791574	T	G	T	G	-0.0126402	-9.33E-05	0.00228208	0.00256698	0.657382	0.657535	3.00E-08	0.97	TRUE
Television watching	Multisite chronic pain	rs34864022	A	G	A	G	-0.0263815	-0.0106172	0.00435706	0.0049023	0.933558	0.933583	1.40E-09	0.03	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele_exposure	other_allele_exposure	effect_allele_outcome	other_allele_outcome	beta_exposure	beta_outcome	se_exposure	se_outcome	eaf_exposure	eaf_outcome	pvalue_exposure	pvalue_outcome	mr_keep
Television watching	Multisite chronic pain	rs382767	G	A	G	A	0.0225316	0.00888601	0.00382072	0.00429713	0.912449	0.912404	3.70E-09	0.039	TRUE
Television watching	Multisite chronic pain	rs4387030	G	A	G	A	0.0125957	-0.00419973	0.00226607	0.00254926	0.354551	0.354504	2.70E-08	0.099	TRUE
Television watching	Multisite chronic pain	rs4977611	A	C	A	C	0.0123088	0.000864683	0.00223411	0.00251355	0.376863	0.376793	3.60E-08	0.73	TRUE
Television watching	Multisite chronic pain	rs62579935	C	A	C	A	-0.0187988	-0.00850731	0.00339546	0.00382253	0.885382	0.885497	3.10E-08	0.026	TRUE
Television watching	Multisite chronic pain	rs7029165	T	C	T	C	0.0133658	0.0045351	0.00235658	0.0026511	0.309181	0.309063	1.40E-08	0.087	TRUE
Television watching	Multisite chronic pain	rs7865801	G	A	G	A	0.0127451	0.000688289	0.00226247	0.00254427	0.367473	0.367404	1.80E-08	0.79	TRUE
Television watching	Multisite chronic pain	rs11599193	A	T	A	T	0.0151287	-0.00278271	0.00276285	0.00310913	0.80911	0.809215	4.40E-08	0.37	TRUE
Television watching	Multisite chronic pain	rs2399630	T	C	T	C	-0.0122336	0.00121673	0.00217357	0.00244455	0.532514	0.532679	1.80E-08	0.62	TRUE
Television watching	Multisite chronic pain	rs35942198	G	C	G	C	0.0126668	0.000984151	0.00230023	0.00258655	0.669564	0.66949	3.70E-08	0.7	TRUE
Television watching	Multisite chronic pain	rs3781423	G	C	G	C	-0.0124343	-0.00795688	0.00224266	0.0025235	0.630584	0.630898	2.90E-08	0.0016	TRUE
Television watching	Multisite chronic pain	rs4948287	T	A	T	A	0.0129088	0.0040602	0.00219189	0.00246437	0.581513	0.581799	3.90E-09	0.099	TRUE
Television watching	Multisite chronic pain	rs6584444	C	T	C	T	0.0128688	0.00316606	0.00232361	0.00261305	0.321908	0.321978	3.10E-08	0.23	TRUE
Television watching	Multisite chronic pain	rs7089973	C	A	C	A	-0.013355	-0.00239815	0.00223661	0.00251507	0.6186	0.618435	2.40E-09	0.34	TRUE
Television watching	Multisite chronic pain	rs7915418	C	G	C	G	0.0120745	0.00376836	0.00219237	0.00246509	0.426331	0.426182	3.60E-08	0.13	FALSE
Television watching	Multisite chronic pain	rs10791546	C	T	C	T	0.0120455	-0.0005436	0.00219515	0.00247033	0.589106	0.589194	4.10E-08	0.83	TRUE
Television watching	Multisite chronic pain	rs10791865	A	C	A	C	0.0127248	0.00566261	0.0021871	0.00246132	0.443042	0.443176	6.00E-09	0.021	TRUE
Television watching	Multisite chronic pain	rs10831412	T	A	T	A	0.0121553	-0.00123504	0.00218258	0.00245646	0.570049	0.570171	2.60E-08	0.62	FALSE
Television watching	Multisite chronic pain	rs12272012	G	C	G	C	-0.0295782	-0.00671683	0.00525808	0.00591696	0.955687	0.95569	1.90E-08	0.26	TRUE
Television watching	Multisite chronic pain	rs12289262	C	T	C	T	-0.0137276	-0.00648542	0.00244533	0.00275166	0.730942	0.730988	2.00E-08	0.018	TRUE
Television watching	Multisite chronic pain	rs1792337	T	C	T	C	-0.0130208	-0.00761844	0.00232832	0.00261958	0.682611	0.682541	2.20E-08	0.0036	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele, exposure	other_allele, exposure	effect_allele, outcome	other_allele, outcome	beta, exposure	beta, outcome	sc.exposure	sc.outcome	eaf.exposure	eaf. outcome	pvalue, exposure	pvalue, outcome	mr_keep
Television watching	Multisite chronic pain	rs4936683	C	T	C	T	-0.0120749	-0.00310225	0.00217713	0.00245043	0.553209	0.55318	2.90E-08	0.21	TRUE
Television watching	Multisite chronic pain	rs4937842	G	C	G	C	-0.0128044	0.00248553	0.00225644	0.00253873	0.633634	0.633656	1.40E-08	0.33	TRUE
Television watching	Multisite chronic pain	rs648044	A	G	A	G	-0.013834	-0.00127989	0.00226591	0.00254967	0.395242	0.395067	1.00E-09	0.62	TRUE
Television watching	Multisite chronic pain	rs10878349	A	G	A	G	-0.0123509	-0.00133246	0.00216914	0.00243936	0.489295	0.489064	1.20E-08	0.58	TRUE
Television watching	Multisite chronic pain	rs11171710	G	A	G	A	-0.0125994	-0.0106637	0.00219015	0.00246254	0.552587	0.552581	8.80E-09	1.50E-05	TRUE
Television watching	Multisite chronic pain	rs12579616	C	T	C	T	-0.0139253	-0.0055857	0.00248835	0.00279801	0.748112	0.747903	2.20E-08	0.046	TRUE
Television watching	Multisite chronic pain	rs2417261	T	G	T	G	0.0245714	-0.00160554	0.00350834	0.00394492	0.107191	0.107336	2.50E-12	0.68	TRUE
Television watching	Multisite chronic pain	rs4435081	C	T	C	T	0.0121101	0.00238813	0.00216745	0.00243857	0.529508	0.529446	2.30E-08	0.33	TRUE
Television watching	Multisite chronic pain	rs6606711	A	G	A	G	-0.012613	-0.00934999	0.00228799	0.00257398	0.657805	0.658012	3.50E-08	0.00028	TRUE
Television watching	Multisite chronic pain	rs73405293	G	A	G	A	0.0178118	0.00373324	0.0030505	0.00343181	0.852472	0.852543	5.30E-09	0.28	TRUE
Television watching	Multisite chronic pain	rs74996610	C	G	C	G	-0.0305519	-0.0158321	0.00519585	0.00584116	0.954131	0.95409	4.10E-09	0.0067	TRUE
Television watching	Multisite chronic pain	rs4772260	T	C	T	C	-0.0139762	-0.00293826	0.0022223	0.00249867	0.594634	0.594614	3.20E-10	0.24	TRUE
Television watching	Multisite chronic pain	rs7998862	C	T	C	T	0.0148586	0.0017661	0.00243707	0.00274062	0.727611	0.727787	1.10E-09	0.52	TRUE
Television watching	Multisite chronic pain	rs9513410	G	A	G	A	0.0142356	0.00108643	0.00256766	0.00288708	0.762838	0.762944	3.00E-08	0.71	TRUE
Television watching	Multisite chronic pain	rs9547363	T	C	T	C	-0.0121164	-0.0055835	0.00219802	0.00247026	0.510581	0.510482	3.50E-08	0.024	TRUE
Television watching	Multisite chronic pain	rs1043675	T	C	T	C	-0.0122781	0.000413924	0.00221401	0.00248954	0.593398	0.593257	2.90E-08	0.87	TRUE
Television watching	Multisite chronic pain	rs1245193	T	C	T	C	-0.0154607	-0.0116402	0.00267088	0.00300176	0.218957	0.218945	7.10E-09	0.00011	TRUE
Television watching	Multisite chronic pain	rs2402341	T	C	T	C	-0.0120616	-0.00338097	0.00216986	0.00243852	0.479155	0.479446	2.70E-08	0.17	TRUE
Television watching	Multisite chronic pain	rs4981681	C	T	C	T	0.0172045	0.0160975	0.00311619	0.00350565	0.142841	0.142781	3.40E-08	4.40E-06	TRUE
Television watching	Multisite chronic pain	rs1437543	G	A	G	A	-0.0139416	-0.00462024	0.00255623	0.00287401	0.765013	0.765143	4.90E-08	0.11	TRUE
Television watching	Multisite chronic pain	rs2165990	A	G	A	G	-0.0137722	0.000951099	0.00239436	0.00269143	0.694477	0.694472	8.80E-09	0.72	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_kee
Television watching	Multisite chronic pain	rs61331678	G	C	G	C	0.0150461	0.00840165	0.00218746	0.00245895	0.567932	0.567932	6.10E-12	0.00063	FALSE
Television watching	Multisite chronic pain	rs8043253	C	T	C	T	-0.0120657	-0.00257845	0.00218665	0.00245904	0.572917	0.572959	3.40E-08	0.29	TRUE
Television watching	Multisite chronic pain	rs394502	G	A	G	A	-0.0125182	0.00287431	0.00224338	0.00252058	0.578933	0.578995	2.40E-08	0.25	TRUE
Television watching	Multisite chronic pain	rs4985152	T	A	T	A	-0.0129977	-0.00368037	0.00237083	0.00266482	0.704761	0.704841	4.20E-08	0.17	TRUE
Television watching	Multisite chronic pain	rs55801693	T	C	T	C	0.0122527	0.00345667	0.00223206	0.00250713	0.486678	0.48649	4.00E-08	0.17	TRUE
Television watching	Multisite chronic pain	rs7500809	T	G	T	G	0.0157278	0.00127956	0.00232439	0.00261256	0.667847	0.667914	1.30E-11	0.62	TRUE
Television watching	Multisite chronic pain	rs61745998	T	C	T	C	0.012283	0.00501205	0.00223752	0.00251453	0.629695	0.629577	4.00E-08	0.046	TRUE
Television watching	Multisite chronic pain	rs78803754	A	G	A	G	-0.0125555	-0.00430851	0.00218789	0.00246009	0.555705	0.555664	9.50E-09	0.08	TRUE
Television watching	Multisite chronic pain	rs887069	T	G	T	G	0.0152211	-0.00631893	0.00232785	0.00261714	0.683079	0.68316	6.20E-11	0.016	TRUE
Television watching	Multisite chronic pain	rs9896476	G	C	G	C	0.0146621	0.00370293	0.00248453	0.00279385	0.747573	0.74763	3.60E-09	0.19	TRUE
Television watching	Multisite chronic pain	rs11081851	G	A	G	A	-0.0125498	0.0011	0.00219056	0.00246284	0.437533	0.437632	1.00E-08	0.66	TRUE
Television watching	Multisite chronic pain	rs17512836	T	C	T	C	0.0422142	0.00599282	0.00684643	0.00769758	0.974385	0.974389	7.00E-10	0.44	TRUE
Television watching	Multisite chronic pain	rs303752	G	A	G	A	-0.0127143	-0.00729552	0.00222933	0.00250483	0.59039	0.590281	1.20E-08	0.0036	TRUE
Television watching	Multisite chronic pain	rs346456	T	C	T	C	-0.0142066	-0.00045028	0.0026038	0.00292867	0.776951	0.777041	4.90E-08	0.88	TRUE
Television watching	Multisite chronic pain	rs11085735	A	C	A	C	0.0226232	-0.00544335	0.00409829	0.0046061	0.076238	0.0762189	3.40E-08	0.24	TRUE
Television watching	Multisite chronic pain	rs62129987	C	T	C	T	0.012283	0.0119855	0.0022447	0.00252183	0.374198	0.374161	4.40E-08	2.00E-06	TRUE
Television watching	Multisite chronic pain	rs3810496	T	C	T	C	-0.012666	-0.00935298	0.00223448	0.00251101	0.385833	0.385963	1.40E-08	2.00E-04	TRUE
Television watching	Multisite chronic pain	rs4810312	C	G	C	G	-0.0125284	0.0015593	0.00219881	0.00246997	0.578878	0.578884	1.20E-08	0.53	FALSE
Television watching	Multisite chronic pain	rs6031440	A	T	A	T	0.0124464	0.00167657	0.00221242	0.00248677	0.397797	0.397769	1.80E-08	0.5	TRUE
Television watching	Multisite chronic pain	rs750396	T	G	T	G	-0.0137061	-0.0100717	0.00247099	0.0027778	0.735963	0.736057	2.90E-08	0.00029	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_kee p
Television watching	Multisite chronic pain	rs803886	G	A	G	A	0.013637	0.00382095	0.00219816	0.00247067	0.590152	0.590342	5.50E-10	0.12	TRUE
Television watching	Multisite chronic pain	rs12482857	T	C	T	C	0.012413	0.00127082	0.00227708	0.00255085	0.640696	0.640786	4.60E-08	0.62	TRUE
Television watching	Multisite chronic pain	rs150399729	C	G	C	G	0.0389574	0.00864683	0.00707312	0.00796232	0.968958	0.969052	3.60E-08	0.28	TRUE
Television watching	Multisite chronic pain	rs8140848	G	A	G	A	-0.0142695	-0.00065577	0.00255348	0.00287032	0.765904	0.765997	2.30E-08	0.82	TRUE
Driving	Multisite chronic pain	rs75641275	A	C	A	C	-0.0179629	-0.0164143	0.00317078	0.00345848	0.855772	0.855718	1.50E-08	2.10E-06	TRUE
Driving	Multisite chronic pain	rs6720846	A	T	A	T	-0.0132879	-0.00087649	0.00230059	0.0024997	0.613229	0.613361	7.70E-09	0.73	TRUE
Driving	Multisite chronic pain	rs9840902	G	A	G	A	-0.0148575	-0.00201454	0.00271642	0.00296439	0.781431	0.781471	4.50E-08	0.5	TRUE
Driving	Multisite chronic pain	rs12317176	T	C	T	C	0.0131141	-0.00505667	0.00235634	0.00257199	0.663663	0.663751	2.60E-08	0.049	TRUE
Driving	Multisite chronic pain	rs2869688	T	C	T	C	0.0124886	-0.00226587	0.00224638	0.00245305	0.468382	0.468684	2.70E-08	0.36	TRUE
2. Lifestyle habits															
Smoking initiation	Multisite chronic pain	rs12025237	C	A	C	A	-0.0329992	-0.00749161	0.00533915	0.0036625	0.124	0.125753	6.52E-10	0.041	TRUE
Smoking initiation	Multisite chronic pain	rs2046850	T	C	T	C	-0.0248139	-0.00619745	0.00447842	0.00308101	0.187	0.193864	3.03E-08	0.044	TRUE
Smoking initiation	Multisite chronic pain	rs2050586	C	G	C	G	-0.0205467	-0.0070433	0.00370828	0.00254037	0.355	0.36009	3.00E-08	0.0056	TRUE
Smoking initiation	Multisite chronic pain	rs2186122	T	A	T	A	0.0260573	0.00685623	0.00358602	0.00246366	0.561	0.561408	3.61E-13	0.0054	FALSE
Smoking initiation	Multisite chronic pain	rs3001723	A	G	A	G	0.0335118	0.00195073	0.0038983	0.00264637	0.321	0.299896	8.12E-18	0.46	TRUE
Smoking initiation	Multisite chronic pain	rs301805	G	T	G	T	0.0214679	-0.00389268	0.00361329	0.00246637	0.559	0.586358	2.80E-09	0.11	TRUE
Smoking initiation	Multisite chronic pain	rs6669839	T	C	T	C	0.0260041	-0.00134123	0.0043955	0.00298727	0.204	0.209576	3.36E-09	0.65	TRUE
Smoking initiation	Multisite chronic pain	rs7555507	T	C	T	C	-0.0241444	-0.00559587	0.00355604	0.00243099	0.496	0.514854	1.14E-11	0.021	TRUE
Smoking initiation	Multisite chronic pain	rs12474587	T	G	T	G	0.0276329	0.00664693	0.00358234	0.00244526	0.404	0.449865	1.25E-14	0.0066	TRUE
Smoking initiation	Multisite chronic pain	rs13030994	A	G	A	G	0.0360925	0.00640582	0.0035563	0.00243047	0.485	0.481777	3.56E-24	0.0084	TRUE
Smoking initiation	Multisite chronic pain	rs1445649	C	T	C	T	0.0239932	0.000112509	0.00356484	0.00243734	0.525	0.538126	1.68E-11	0.96	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele_exposure	other_allele_exposure	effect_allele_outcome	other_allele_outcome	beta_exposure	beta_outcome	se-exposure	se-outcome	eaf.exposure	eaf.outcome	pvalue.exposure	pvalue.outcome	mr_keep
Smoking initiation	Multisite chronic pain	rs2107300	G	C	G	C	-0.027201	-0.00141183	0.00492533	0.00335037	0.845	0.84279	3.27E-08	0.67	TRUE
Smoking initiation	Multisite chronic pain	rs266047	A	G	A	G	-0.0305098	-0.00626509	0.00373855	0.00243298	0.529	0.533142	3.36E-16	0.01	TRUE
Smoking initiation	Multisite chronic pain	rs35702515	T	G	T	G	0.0252442	0.00384164	0.00423093	0.0028893	0.162	0.234547	2.43E-09	0.18	TRUE
Smoking initiation	Multisite chronic pain	rs4674993	G	A	G	A	-0.0252122	-0.0109049	0.00443619	0.00304489	0.207	0.198581	1.32E-08	0.00034	TRUE
Smoking initiation	Multisite chronic pain	rs578584	T	A	T	A	0.0286801	0.00387862	0.00359627	0.00244928	0.605	0.557778	1.50E-15	0.11	FALSE
Smoking initiation	Multisite chronic pain	rs6433897	C	T	C	T	0.0224483	-0.00031021	0.00405809	0.00275966	0.754	0.736773	3.16E-08	0.91	TRUE
Smoking initiation	Multisite chronic pain	rs7585579	G	C	G	C	0.0223996	-0.00532569	0.0037281	0.00245478	0.505	0.50926	1.88E-09	0.03	FALSE
Smoking initiation	Multisite chronic pain	rs1154693	G	A	G	A	0.0326217	0.00500223	0.00491232	0.00342828	0.856	0.850952	3.12E-11	0.14	TRUE
Smoking initiation	Multisite chronic pain	rs11712680	C	A	C	A	-0.0270476	-0.00728588	0.00457843	0.00312249	0.174	0.185831	3.51E-09	0.02	TRUE
Smoking initiation	Multisite chronic pain	rs1869243	C	T	C	T	0.0197411	0.00849456	0.00356289	0.00243975	0.481	0.470524	2.97E-08	5.00E-04	TRUE
Smoking initiation	Multisite chronic pain	rs10001365	A	G	A	G	-0.0249918	-0.00252696	0.00364155	0.00249596	0.405	0.386598	6.65E-12	0.31	TRUE
Smoking initiation	Multisite chronic pain	rs1160685	G	C	G	C	0.0207724	0.00262847	0.00358893	0.00244579	0.478	0.442195	7.20E-09	0.28	FALSE
Smoking initiation	Multisite chronic pain	rs13145728	C	G	C	G	-0.0232512	-0.0128983	0.00366263	0.00250381	0.358	0.382326	2.14E-10	2.60E-07	TRUE
Smoking initiation	Multisite chronic pain	rs962625	G	A	G	A	0.0237181	0.00422919	0.00403803	0.00274993	0.24	0.269501	4.37E-09	0.12	TRUE
Smoking initiation	Multisite chronic pain	rs12186738	T	G	T	G	-0.0332644	-0.0120677	0.00502051	0.00347373	0.154	0.142907	3.42E-11	0.00051	TRUE
Smoking initiation	Multisite chronic pain	rs1385108	T	C	T	C	0.0246617	0.00581612	0.00415673	0.00284588	0.239	0.242033	3.00E-09	0.041	TRUE
Smoking initiation	Multisite chronic pain	rs4044321	G	A	G	A	-0.0278417	-0.00231934	0.00371058	0.00253617	0.642	0.640201	6.08E-14	0.36	TRUE
Smoking initiation	Multisite chronic pain	rs4352629	T	C	T	C	-0.0275284	-0.00657726	0.00356881	0.00244355	0.492	0.456831	1.22E-14	0.00071	TRUE
Smoking initiation	Multisite chronic pain	rs6893752	G	A	G	A	-0.0240995	-0.00309691	0.00407356	0.00277425	0.766	0.741454	3.25E-09	0.26	TRUE
Smoking initiation	Multisite chronic pain	rs72789632	T	C	T	C	-0.0328856	-0.00527889	0.00528628	0.0036321	0.12	0.130191	5.02E-10	0.15	TRUE
Smoking initiation	Multisite chronic pain	rs10498846	T	C	T	C	0.0206103	0.00520801	0.00355561	0.00243832	0.473	0.506621	6.62E-09	0.033	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele.exposure	other_allele.exposure	effect_allele.outcome	other_allele.outcome	beta.exposure	beta.outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue.exposure	pvalue.outcome	mr_keep
Smoking initiation	Multisite chronic pain	rs222449	T	A	T	A	-0.0253208	-0.0039154	0.00442796	0.00306115	0.793	0.802673	1.08E-08	0.2	TRUE
Smoking initiation	Multisite chronic pain	rs240963	C	T	C	T	-0.0410444	-0.00740944	0.00483712	0.0033203	0.836	0.840274	2.16E-17	0.026	TRUE
Smoking initiation	Multisite chronic pain	rs3800227	G	A	G	A	0.0228121	0.00483498	0.00405809	0.00279508	0.701	0.744762	1.93E-08	0.084	TRUE
Smoking initiation	Multisite chronic pain	rs9401770	A	G	A	G	0.0277307	-0.00749355	0.003986	0.0027479	0.273	0.268465	3.47E-12	0.0064	TRUE
Smoking initiation	Multisite chronic pain	rs10233018	G	A	G	A	0.027069	-0.00477296	0.00355741	0.00243091	0.503	0.504089	2.75E-14	0.05	TRUE
Smoking initiation	Multisite chronic pain	rs10260968	A	G	A	G	-0.0203218	-0.00729577	0.00360938	0.00246592	0.597	0.587427	1.75E-08	0.0031	TRUE
Smoking initiation	Multisite chronic pain	rs10279261	A	G	A	G	-0.0214194	-0.00098537	0.00366263	0.0025104	0.619	0.618264	5.00E-09	0.69	TRUE
Smoking initiation	Multisite chronic pain	rs2140114	T	C	T	C	-0.0232591	-0.00658616	0.00373402	0.00243838	0.518	0.536179	4.70E-10	0.0069	TRUE
Smoking initiation	Multisite chronic pain	rs3801289	C	A	C	A	-0.0220618	-0.00368237	0.00373982	0.00257687	0.351	0.337948	3.74E-09	0.15	TRUE
Smoking initiation	Multisite chronic pain	rs4236259	G	T	G	T	-0.0247689	-0.0064973	0.00355661	0.00245513	0.499	0.490057	3.35E-12	0.0081	TRUE
Smoking initiation	Multisite chronic pain	rs12545053	G	A	G	A	0.0202808	-0.0028841	0.00363668	0.00248523	0.397	0.402917	2.43E-08	0.25	TRUE
Smoking initiation	Multisite chronic pain	rs13261666	T	G	T	G	-0.0268946	-0.00587731	0.00355604	0.00243206	0.522	0.50412	3.90E-14	0.016	TRUE
Smoking initiation	Multisite chronic pain	rs1565735	A	T	A	T	-0.037618	-0.0030995	0.0044613	0.00305091	0.212	0.201466	3.42E-17	0.31	TRUE
Smoking initiation	Multisite chronic pain	rs1899896	T	C	T	C	0.0264481	0.000875902	0.00388691	0.00266753	0.286	0.298101	1.04E-11	0.74	TRUE
Smoking initiation	Multisite chronic pain	rs2631024	G	A	G	A	-0.0229645	-0.00389834	0.00402823	0.0027833	0.737	0.74052	1.18E-08	0.16	TRUE
Smoking initiation	Multisite chronic pain	rs10114490	A	G	A	G	-0.0255148	-0.0038839	0.00453171	0.00312594	0.198	0.185748	1.81E-08	0.21	TRUE
Smoking initiation	Multisite chronic pain	rs2378662	A	G	A	G	0.0209482	0.00528751	0.00356645	0.00244938	0.556	0.542047	4.16E-09	0.031	TRUE
Smoking initiation	Multisite chronic pain	rs4543592	C	T	C	T	0.0219314	0.0025028	0.00356244	0.00243605	0.468	0.47925	7.46E-10	0.3	TRUE
Smoking initiation	Multisite chronic pain	rs10905461	C	T	C	T	-0.0239554	-0.00852138	0.00414505	0.00279376	0.718	0.745316	7.35E-09	0.0023	TRUE
Smoking initiation	Multisite chronic pain	rs12356821	C	G	C	G	0.03937	-0.00098019	0.0050491	0.0034643	0.14	0.148434	6.27E-15	0.78	TRUE
Smoking initiation	Multisite chronic pain	rs7921378	C	G	C	G	-0.0254601	0.00660056	0.00355815	0.00243955	0.463	0.480155	8.26E-13	0.0068	FALSE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele_exposure	other_allele_exposure	effect_allele_outcome	other_allele_outcome	beta_exposure	beta_outcome	se_exposure	se_outcome	eaf_exposure	eaf_outcome	pvalue_exposure	pvalue_outcome	mr_keep
Smoking initiation	Multisite chronic pain	rs9423279	G	C	G	C	-0.0205132	-0.0007732	0.00370828	0.0026091	0.641	0.657037	3.21E-08	0.77	TRUE
Smoking initiation	Multisite chronic pain	rs4523689	G	A	G	A	-0.0206091	0.0018204	0.00364321	0.00248761	0.408	0.392462	1.55E-08	0.46	TRUE
Smoking initiation	Multisite chronic pain	rs7929518	G	A	G	A	0.0242377	0.00510789	0.00428466	0.0029459	0.765	0.781695	1.56E-08	0.083	TRUE
Smoking initiation	Multisite chronic pain	rs7938812	G	T	G	T	0.0437914	0.0123828	0.00363668	0.00249606	0.424	0.385927	2.71E-33	7.00E-07	TRUE
Smoking initiation	Multisite chronic pain	rs11057005	G	A	G	A	-0.0209298	-0.00814509	0.00357892	0.00246599	0.43	0.436314	4.85E-09	0.00096	TRUE
Smoking initiation	Multisite chronic pain	rs1971318	T	C	T	C	0.0285074	0.00413429	0.00492533	0.00333701	0.141	0.158429	7.06E-09	0.22	TRUE
Smoking initiation	Multisite chronic pain	rs7969559	G	A	G	A	-0.0243756	0.00051025	0.00395946	0.0027113	0.688	0.721623	7.31E-10	0.85	TRUE
Smoking initiation	Multisite chronic pain	rs3904512	A	G	A	G	-0.0211589	0.00107224	0.0035765	0.00244689	0.429	0.449438	3.23E-09	0.66	TRUE
Smoking initiation	Multisite chronic pain	rs7322872	T	C	T	C	-0.0255713	-0.00435125	0.00433474	0.00299744	0.782	0.790568	3.58E-09	0.15	TRUE
Smoking initiation	Multisite chronic pain	rs9540729	T	A	T	A	-0.0195522	-0.0117987	0.00355789	0.00243231	0.501	0.521398	3.82E-08	1.20E-06	FALSE
Smoking initiation	Multisite chronic pain	rs76214862	C	A	C	A	-0.0249903	-0.0142317	0.00454745	0.00312409	0.202	0.187187	3.99E-08	5.20E-06	TRUE
Smoking initiation	Multisite chronic pain	rs12441907	A	C	A	C	-0.0292051	-3.86E-06	0.00452262	0.00310253	0.186	0.189296	1.06E-10	1	TRUE
Smoking initiation	Multisite chronic pain	rs1435741	A	G	A	G	0.0294151	9.84E-05	0.00359095	0.00245546	0.425	0.431194	2.64E-16	0.97	TRUE
Smoking initiation	Multisite chronic pain	rs1050847	T	C	T	C	-0.0216231	-0.00210073	0.00358893	0.0024707	0.505	0.579849	1.67E-09	0.4	TRUE
Smoking initiation	Multisite chronic pain	rs4781977	C	T	C	T	-0.0238668	0.0022435	0.00436473	0.00293726	0.205	0.225915	4.54E-08	0.44	TRUE
Smoking initiation	Multisite chronic pain	rs4785836	C	T	C	T	-0.0204704	-0.00050515	0.00365894	0.00251599	0.398	0.375829	2.26E-08	0.84	TRUE
Smoking initiation	Multisite chronic pain	rs7197072	T	C	T	C	-0.0247672	-0.0110678	0.0041686	0.00290699	0.238	0.226812	2.77E-09	0.00014	TRUE
Smoking initiation	Multisite chronic pain	rs11078713	G	A	G	A	-0.0201721	-0.00345254	0.00360561	0.00247001	0.454	0.417397	2.23E-08	0.16	TRUE
Smoking initiation	Multisite chronic pain	rs11658881	G	A	G	A	0.0201357	-0.00048435	0.00361066	0.00246771	0.418	0.419383	2.43E-08	0.84	TRUE
Smoking initiation	Multisite chronic pain	rs7224742	T	C	T	C	-0.0207099	-0.00052766	0.00365532	0.00250716	0.595	0.619622	1.43E-08	0.83	TRUE
Smoking initiation	Multisite chronic pain	rs11872397	A	G	A	G	-0.0247725	-0.00253062	0.00409477	0.00280315	0.252	0.260496	1.43E-09	0.37	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele_exposure	other_allele_exposure	effect_allele_outcome	other_allele_outcome	beta_exposure	beta_outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue_exposure	pvalue_outcome	mr_keep
Smoking initiation	Multisite chronic pain	rs6508144	G	C	G	C	-0.0206935	7.82E-05	0.00358602	0.00246349	0.563	0.569499	7.97E-09	0.97	FALSE
Smoking initiation	Multisite chronic pain	rs72896886	C	G	C	G	-0.0268885	-0.003227162	0.00483712	0.0032654	0.144	0.167647	2.75E-08	0.32	TRUE
Smoking initiation	Multisite chronic pain	rs76608582	A	C	A	C	-0.0495575	-0.00213241	0.00825958	0.00596841	0.0389	0.04797	1.94E-09	0.72	TRUE
Smoking initiation	Multisite chronic pain	rs1555445	T	A	T	A	0.0225548	0.0127477	0.0038234	0.00264189	0.337	0.308658	3.65E-09	1.40E-06	TRUE
Smoking initiation	Multisite chronic pain	rs117143374	C	T	C	T	0.0292897	-0.00391493	0.00526909	0.00349709	0.12	0.141907	2.76E-08	0.26	TRUE
Smoking initiation	Multisite chronic pain	rs134529	C	T	C	T	-0.019984	-0.00298132	0.00366078	0.00250557	0.349	0.381089	4.85E-08	0.23	TRUE
Drinks per week	Multisite chronic pain	rs2213041	A	C	A	C	0.0215	0.00452209	0.00377	0.00321036	0.162	0.173542	1.17E-08	0.16	TRUE
Drinks per week	Multisite chronic pain	rs3736168	T	C	T	C	0.0181	0.00232672	0.00297	0.00243853	0.503	0.512071	1.27E-09	0.34	TRUE
Drinks per week	Multisite chronic pain	rs55872084	T	G	T	G	0.0199	-0.00480863	0.00356	0.00282937	0.218	0.246554	2.20E-08	0.089	TRUE
Drinks per week	Multisite chronic pain	rs602662	A	G	A	G	0.0163	-0.00289149	0.00297	0.00243678	0.495	0.535866	3.85E-08	0.24	TRUE
Coffee consumption	Multisite chronic pain	rs4950078	T	G	T	G	-0.00992853	0.00655066	0.00176661	0.00275707	0.267527	0.267221	1.91E-08	0.018	TRUE
Coffee consumption	Multisite chronic pain	rs4665972	T	C	T	C	-0.0123027	0.00341184	0.0016022	0.00250016	0.392708	0.392173	1.61E-14	0.17	TRUE
Coffee consumption	Multisite chronic pain	rs1481012	A	G	A	G	0.0147323	0.0115338	0.0024659	0.00384773	0.887435	0.887337	2.31E-09	0.0027	TRUE
Coffee consumption	Multisite chronic pain	rs11742322	T	C	T	C	0.00993241	-0.00118383	0.00168105	0.00262335	0.682301	0.682452	3.46E-09	0.65	TRUE
Coffee consumption	Multisite chronic pain	rs7721099	T	C	T	C	-0.0127746	0.00198311	0.00221746	0.00346034	0.866309	0.866231	8.37E-09	0.57	TRUE
Coffee consumption	Multisite chronic pain	rs521977	T	G	T	G	0.00934026	-0.00386605	0.00166221	0.00258997	0.323257	0.323563	1.92E-08	0.14	TRUE
Coffee consumption	Multisite chronic pain	rs7757951	G	A	G	A	-0.00904924	-0.00229955	0.00161593	0.00252428	0.378368	0.37801	2.15E-08	0.36	TRUE
Coffee consumption	Multisite chronic pain	rs1404960	A	G	A	G	0.0128418	0.00651296	0.00170679	0.00266293	0.694923	0.694529	5.33E-14	0.014	TRUE
Coffee consumption	Multisite chronic pain	rs1612143	T	G	T	G	-0.00981639	0.000424034	0.00170746	0.00266677	0.673873	0.673831	8.98E-09	0.87	TRUE
Coffee consumption	Multisite chronic pain	rs17687539	A	G	A	G	0.0104779	-0.00368918	0.00191804	0.00299556	0.791308	0.79124	4.69E-08	0.22	TRUE
Coffee consumption	Multisite chronic pain	rs17779352	T	C	T	C	-0.0196732	0.00169237	0.00292014	0.00457096	0.920412	0.920774	1.62E-11	0.71	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf. outcome	pvalue. exposure	pvalue. outcome	mr_keepp
Coffee consumption	Multisite chronic pain	rs41296488	C	T	C	T	-0.0141592	0.0053694	0.00258064	0.00402609	0.897163	0.897147	4.10E-08	0.18	TRUE
Coffee consumption	Multisite chronic pain	rs4717763	A	G	A	G	0.00879545	0.00347006	0.00158095	0.00246652	0.414801	0.414917	2.65E-08	0.16	TRUE
Coffee consumption	Multisite chronic pain	rs62444738	A	G	A	G	0.00956436	-0.00273629	0.0017013	0.00265256	0.691957	0.691404	1.89E-08	0.3	TRUE
Coffee consumption	Multisite chronic pain	rs10997940	C	T	C	T	0.00879895	-0.00340322	0.00158936	0.00247931	0.596495	0.596351	3.09E-08	0.17	TRUE
Coffee consumption	Multisite chronic pain	rs117810762	G	A	G	A	-0.0348164	0.00166915	0.00594239	0.00929645	0.982026	0.982096	4.66E-09	0.86	TRUE
Coffee consumption	Multisite chronic pain	rs2251812	G	A	G	A	0.00922898	-0.00200353	0.00164839	0.00257298	0.655374	0.655466	2.16E-08	0.44	TRUE
Coffee consumption	Multisite chronic pain	rs597102	T	A	T	A	0.00967503	-0.00047299	0.00167496	0.00261671	0.686783	0.686845	7.64E-09	0.86	TRUE
Coffee consumption	Multisite chronic pain	rs2110098	A	G	A	G	0.0116419	0.00303983	0.00213486	0.00333333	0.158411	0.158265	4.95E-08	0.36	TRUE
Coffee consumption	Multisite chronic pain	rs112511609	G	A	G	A	-0.0323749	-0.011535	0.00571557	0.00896162	0.980933	0.981064	1.48E-08	0.2	TRUE
Coffee consumption	Multisite chronic pain	rs764522625	A	G	A	G	-0.0265258	-0.00583943	0.00388143	0.00605407	0.953014	0.952953	8.27E-12	0.33	TRUE
Coffee consumption	Multisite chronic pain	rs8027450	C	T	C	T	0.00913285	0.00312921	0.00166998	0.00260544	0.676087	0.675985	4.53E-08	0.23	TRUE
Coffee consumption	Multisite chronic pain	rs4924807	G	C	G	C	-0.00891428	0.00603928	0.0015577	0.00243199	0.479991	0.480202	1.05E-08	0.013	FALSE
Coffee consumption	Multisite chronic pain	rs76468620	A	G	A	G	-0.0116408	-0.00068903	0.00213453	0.00333944	0.841603	0.842082	4.94E-08	0.84	TRUE
Coffee consumption	Multisite chronic pain	rs12459249	T	C	T	C	-0.0103161	-0.00512382	0.00165137	0.00258155	0.333174	0.332897	4.19E-10	0.047	TRUE
Coffee consumption	Multisite chronic pain	rs75347775	G	A	G	A	-0.0102908	0.00352132	0.00181021	0.00282841	0.754975	0.755207	1.31E-08	0.21	TRUE
Coffee consumption	Multisite chronic pain	rs6062678	G	T	G	T	-0.0101373	-0.00020181	0.00158169	0.00247025	0.534922	0.534983	1.47E-10	0.93	TRUE
Coffee consumption	Multisite chronic pain	rs114908569	T	C	T	C	0.0314077	0.0100503	0.00571678	0.0089348	0.980976	0.980979	3.93E-08	0.26	TRUE
3. Physical activity															
Vigorous PA	Multisite chronic pain	rs11586916	T	C	T	C	0.0086868	0.00308927	0.00151981	0.00280424	0.749442	0.748471	1.10E-08	0.27	TRUE
Vigorous PA	Multisite chronic pain	rs6767407	T	C	T	C	0.00904063	-0.00444856	0.00164054	0.00303555	0.799589	0.79981	3.60E-08	0.14	TRUE
Vigorous PA	Multisite chronic pain	rs35367169	G	A	G	A	0.0107832	0.00533349	0.00197436	0.00364222	0.873426	0.872264	4.70E-08	0.14	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf. outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Vigorous PA	Multisite chronic pain	rs1149555	G	A	G	A	0.00963857	0.004018	0.00166836	0.00308314	0.194286	0.19451	7.60E-09	0.19	TRUE
Vigorous PA	Multisite chronic pain	rs28576961	C	A	C	A	-0.00815506	-0.00224397	0.0014064	0.00259821	0.671228	0.670513	6.70E-09	0.39	TRUE
Vigorous PA	Multisite chronic pain	rs78694803	T	C	T	C	0.0131026	-0.0147185	0.00230141	0.00424291	0.909117	0.908472	1.20E-08	0.00052	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs2942127	G	A	G	A	0.016037	0.00950539	0.00290278	0.00320792	0.175356	0.174358	3.30E-08	0.003	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs1974771	G	A	G	A	-0.0213389	0.00447609	0.00367836	0.0040496	0.900025	0.89996	6.60E-09	0.27	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs2114286	A	G	A	G	-0.0122453	0.00321918	0.00221725	0.00244142	0.465757	0.468945	3.30E-08	0.19	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs382210	G	A	G	A	-0.013066	0.00922677	0.00232073	0.00255786	0.34477	0.34483	1.80E-08	0.00031	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs877483	T	C	T	C	0.0122277	0.00137047	0.00222756	0.00245238	0.433185	0.434087	4.00E-08	0.58	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs1972763	C	T	C	T	0.0128383	0.00555393	0.00232366	0.00256246	0.342372	0.342923	3.30E-08	0.03	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs77742115	T	C	T	C	-0.018348	0.00185811	0.00319777	0.00351214	0.861681	0.860555	9.60E-09	0.6	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs72843784	G	T	G	T	0.019414	0.00541547	0.00354773	0.00386466	0.891648	0.888743	4.40E-08	0.16	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs1186716	C	G	C	G	-0.0129704	-0.0016492	0.00237266	0.00261366	0.684251	0.683763	4.60E-08	0.53	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs12707087	T	C	T	C	0.0160923	0.00168982	0.00277636	0.0030626	0.195128	0.194953	6.80E-09	0.58	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs6961138	G	A	G	A	-0.0134567	-0.00080039	0.0022381	0.00246899	0.412943	0.41106	1.80E-09	0.75	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs79829700	G	A	G	A	0.0140103	0.00503829	0.0024603	0.0027126	0.719961	0.71934	1.20E-08	0.063	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs2988004	T	G	T	G	-0.0131708	0.000715739	0.00223979	0.00247062	0.557755	0.556289	4.10E-09	0.77	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs2053606	T	C	T	C	0.0127361	-0.013694	0.00228201	0.00251333	0.612802	0.612206	2.40E-08	5.10E-08	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs17698580	T	C	T	C	-0.0141208	-0.0022629	0.00254139	0.00280091	0.749389	0.74914	2.80E-08	0.42	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs12901206	C	T	C	T	0.0174357	-0.00023028	0.00319499	0.00352629	0.861134	0.861413	4.80E-08	0.95	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs4886868	T	G	T	G	-0.0124954	0.00599947	0.00226611	0.00250068	0.414138	0.413687	3.50E-08	0.016	TRUE
Moderate-to-vigorous PA	Multisite chronic pain	rs1921981	G	A	G	A	0.013037	0.00029714	0.00237139	0.00261255	0.674353	0.672315	3.80E-08	0.91	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

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Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Multisite chronic pain	Computer use	rs11205357	T	C	T	C	-0.0156862	-0.00183404	0.00248483	0.00225004	0.389367	0.389552	2.70E-10	0.42	TRUE
Multisite chronic pain	Computer use	rs2653892	T	C	T	C	-0.0134115	0.00126077	0.00244216	0.00221133	0.527434	0.527436	4.00E-08	0.57	TRUE
Multisite chronic pain	Computer use	rs3013414	C	A	C	A	0.0144026	-0.00548241	0.0026073	0.0023612	0.326702	0.326654	3.30E-08	0.02	TRUE
Multisite chronic pain	Computer use	rs4852567	A	G	A	G	0.0148524	0.00470899	0.00271087	0.00245375	0.718765	0.718834	4.30E-08	0.055	TRUE
Multisite chronic pain	Computer use	rs6721975	T	C	T	C	-0.0167025	0.00714307	0.00294519	0.00266568	0.23137	0.231411	1.40E-08	0.0074	TRUE
Multisite chronic pain	Computer use	rs35713889	C	T	C	T	-0.032398	-0.002378	0.00587841	0.00532547	0.955318	0.955318	3.60E-08	0.66	TRUE
Multisite chronic pain	Computer use	rs9839838	G	A	G	A	-0.0157619	-0.00333849	0.00284498	0.00257708	0.758559	0.758582	3.00E-08	0.2	TRUE
Multisite chronic pain	Computer use	rs184690436	C	T	C	T	-0.061687	0.0275749	0.01111409	0.0101052	0.986722	0.986759	3.10E-08	0.0064	TRUE
Multisite chronic pain	Computer use	rs1946247	T	G	T	G	-0.0190308	-0.00642116	0.00348908	0.00315823	0.141109	0.14125	4.90E-08	0.042	TRUE
Multisite chronic pain	Computer use	rs6869446	T	C	T	C	-0.0143645	0.00300379	0.00250261	0.00226594	0.615589	0.615525	9.50E-09	0.18	TRUE
Multisite chronic pain	Computer use	rs76025409	G	C	G	C	-0.0144341	-0.00598934	0.00255202	0.00231059	0.645017	0.644794	1.50E-08	0.0095	TRUE
Multisite chronic pain	Computer use	rs4713656	G	A	G	A	0.0145713	-0.00243738	0.00257429	0.00232967	0.338471	0.338508	1.50E-08	0.3	TRUE
Multisite chronic pain	Computer use	rs6926377	A	C	A	C	-0.0154511	0.000583844	0.00267711	0.00242223	0.707178	0.707086	7.90E-09	0.81	TRUE
Multisite chronic pain	Computer use	rs74618804	C	T	C	T	0.0148847	-0.00078381	0.00251278	0.00227455	0.616455	0.616232	3.10E-09	0.73	TRUE
Multisite chronic pain	Computer use	rs1450833	T	C	T	C	-0.0160501	-0.000444	0.00283496	0.00256798	0.754023	0.753626	1.50E-08	0.86	TRUE
Multisite chronic pain	Computer use	rs2237303	G	A	G	A	0.0143612	0.00312931	0.00256441	0.00232116	0.347618	0.347735	2.10E-08	0.18	TRUE
Multisite chronic pain	Computer use	rs6966540	T	C	T	C	-0.0139057	0.0047764	0.00251636	0.0022794	0.627156	0.627085	3.30E-08	0.036	TRUE
Multisite chronic pain	Computer use	rs11786084	G	A	G	A	-0.0144791	0.0038138	0.00259101	0.00234532	0.666422	0.666573	2.30E-08	0.1	TRUE
Multisite chronic pain	Computer use	rs1040851	C	A	C	A	0.0141766	-0.00279869	0.00245999	0.00222752	0.424317	0.424308	8.30E-09	0.21	TRUE
Multisite chronic pain	Computer use	rs7870079	C	T	C	T	0.0138424	-0.0051925	0.0024503	0.00221876	0.544435	0.5446	1.60E-08	0.019	TRUE
Multisite chronic pain	Computer use	rs11596214	G	A	G	A	0.0136894	0.00605588	0.00249889	0.00226411	0.595069	0.595227	4.30E-08	0.0075	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele.exposure	other_allele.exposure	effect_allele.outcome	other_allele.outcome	beta.exposure	beta.outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue.exposure	pvalue.outcome	mr_keep
Multisite chronic pain	Computer use	rs117829627	C	T	C	T	-0.0152286	0.00326906	0.00275862	0.0024967	0.731346	0.731417	3.40E-08	0.19	TRUE
Multisite chronic pain	Computer use	rs61881739	G	C	G	C	-0.0204668	-0.00236695	0.00327432	0.00296551	0.832512	0.832608	4.10E-10	0.42	TRUE
Multisite chronic pain	Computer use	rs2806985	C	G	C	G	0.0141258	0.000424348	0.00256947	0.00232896	0.357316	0.35749	3.90E-08	0.86	TRUE
Multisite chronic pain	Computer use	rs17126867	T	C	T	C	-0.0172853	-0.00139967	0.0031668	0.00286704	0.820225	0.820284	4.80E-08	0.63	TRUE
Multisite chronic pain	Computer use	rs2006281	C	T	C	T	0.0134934	0.000343044	0.0024458	0.00221331	0.496931	0.497229	3.40E-08	0.88	TRUE
Multisite chronic pain	Computer use	rs2386584	T	G	T	G	-0.0166445	-0.00892348	0.00250006	0.00226308	0.614618	0.614301	2.80E-11	8.00E-05	TRUE
Multisite chronic pain	Computer use	rs285018	G	A	G	A	-0.0136507	0.0020643	0.00244932	0.00221759	0.439965	0.439953	2.50E-08	0.35	TRUE
Multisite chronic pain	Computer use	rs12601574	C	G	C	G	0.0136493	-0.0105576	0.00244337	0.00221391	0.449763	0.449859	2.30E-08	1.90E-06	FALSE
Multisite chronic pain	Computer use	rs62083314	C	T	C	T	-0.014054	0.000610452	0.00248585	0.00225792	0.586443	0.586476	1.60E-08	0.79	TRUE
Multisite chronic pain	Computer use	rs16980973	A	T	A	T	0.0230008	-0.0112736	0.00367599	0.00332696	0.874386	0.874334	3.90E-10	7.00E-04	TRUE
Multisite chronic pain	Television watching	rs11205357	T	C	T	C	-0.0156862	-0.00988764	0.00248483	0.002207	0.389367	0.389614	2.70E-10	7.50E-06	TRUE
Multisite chronic pain	Television watching	rs2653892	T	C	T	C	-0.0134115	-0.00345618	0.00244216	0.0021696	0.527434	0.52749	4.00E-08	0.11	TRUE
Multisite chronic pain	Television watching	rs3013414	C	A	C	A	0.0144026	0.00407455	0.0026073	0.00231616	0.326702	0.326598	3.30E-08	0.079	TRUE
Multisite chronic pain	Television watching	rs4852567	A	G	A	G	0.0148524	0.00627735	0.00271087	0.0024062	0.718765	0.718753	4.30E-08	0.0091	TRUE
Multisite chronic pain	Television watching	rs6721975	T	C	T	C	-0.0167025	-0.0166905	0.00294519	0.00261401	0.23137	0.231524	1.40E-08	1.70E-10	TRUE
Multisite chronic pain	Television watching	rs35713889	C	T	C	T	-0.032398	-0.00972963	0.00587841	0.00522508	0.955318	0.955326	3.60E-08	0.063	TRUE
Multisite chronic pain	Television watching	rs9839838	G	A	G	A	-0.0157619	-0.00123483	0.00284498	0.00252828	0.758559	0.758545	3.00E-08	0.63	TRUE
Multisite chronic pain	Television watching	rs184690436	C	T	C	T	-0.061687	-0.0143355	0.0111409	0.00990573	0.986722	0.98673	3.10E-08	0.15	TRUE
Multisite chronic pain	Television watching	rs1946247	T	G	T	G	-0.0190308	-0.0127928	0.00348908	0.00309962	0.141109	0.141219	4.90E-08	3.70E-05	TRUE
Multisite chronic pain	Television watching	rs6869446	T	C	T	C	-0.0143645	0.0013649	0.00250261	0.002223	0.615589	0.615471	9.50E-09	0.54	TRUE
Multisite chronic pain	Television watching	rs76025409	G	C	G	C	-0.0144341	-0.00624821	0.00255202	0.00226759	0.645017	0.644897	1.50E-08	0.0059	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele.exposure	other_allele.exposure	effect_allele.outcome	other_allele.outcome	beta.exposure	beta.outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue.exposure	pvalue.outcome	mr_keep
Multisite chronic pain	Television watching	rs4713656	G	A	G	A	0.0145713	0.00270032	0.00257429	0.00228719	0.338471	0.338481	1.50E-08	0.24	TRUE
Multisite chronic pain	Television watching	rs6926377	A	C	A	C	-0.0154511	-0.00112487	0.00267711	0.00237796	0.707178	0.707131	7.90E-09	0.64	TRUE
Multisite chronic pain	Television watching	rs74618804	C	T	C	T	0.0148847	0.00580209	0.00251278	0.00223253	0.616455	0.616182	3.10E-09	0.0094	TRUE
Multisite chronic pain	Television watching	rs1450833	T	C	T	C	-0.0160501	0.0031648	0.00283496	0.00252108	0.754023	0.753564	1.50E-08	0.21	TRUE
Multisite chronic pain	Television watching	rs2237303	G	A	G	A	0.0143612	0.000334043	0.00256441	0.0022787	0.347618	0.347792	2.10E-08	0.88	TRUE
Multisite chronic pain	Television watching	rs6966540	T	C	T	C	-0.0139057	-0.00539041	0.00251636	0.00223777	0.627156	0.627082	3.30E-08	0.016	TRUE
Multisite chronic pain	Television watching	rs11786084	G	A	G	A	-0.0144791	-0.00635463	0.00259101	0.00230252	0.666422	0.666571	2.30E-08	0.0058	TRUE
Multisite chronic pain	Television watching	rs1040851	C	A	C	A	0.0141766	0.000224349	0.00245999	0.00218765	0.424317	0.424239	8.30E-09	0.92	TRUE
Multisite chronic pain	Television watching	rs7870079	C	T	C	T	0.0138424	0.00659323	0.0024503	0.00217913	0.544435	0.544555	1.60E-08	0.0025	TRUE
Multisite chronic pain	Television watching	rs11596214	G	A	G	A	0.0136894	0.00743835	0.00249889	0.00222367	0.595069	0.595215	4.30E-08	0.00082	TRUE
Multisite chronic pain	Television watching	rs117829627	C	T	C	T	-0.0152286	-0.00904054	0.00275862	0.00245201	0.731346	0.731386	3.40E-08	0.00023	TRUE
Multisite chronic pain	Television watching	rs61881739	G	C	G	C	-0.0204668	-0.00330608	0.00327432	0.00291245	0.832512	0.832632	4.10E-10	0.26	TRUE
Multisite chronic pain	Television watching	rs2806985	C	G	C	G	0.0141258	-0.00145126	0.00256947	0.0022889	0.357316	0.357481	3.90E-08	0.53	TRUE
Multisite chronic pain	Television watching	rs17126867	T	C	T	C	-0.0172853	-0.00401752	0.0031668	0.00281777	0.820225	0.820366	4.80E-08	0.15	TRUE
Multisite chronic pain	Television watching	rs2006281	C	T	C	T	0.0134934	-0.00186193	0.0024458	0.00217494	0.496931	0.497089	3.40E-08	0.39	TRUE
Multisite chronic pain	Television watching	rs2386584	T	G	T	G	-0.0166445	-0.0040926	0.00250006	0.00222362	0.614618	0.61435	2.80E-11	0.066	TRUE
Multisite chronic pain	Television watching	rs285018	G	A	G	A	-0.0136507	-0.00121383	0.00244932	0.00217929	0.439965	0.44001	2.50E-08	0.58	TRUE
Multisite chronic pain	Television watching	rs12601574	C	G	C	G	0.0136493	0.00509228	0.00244337	0.00217563	0.449763	0.449841	2.30E-08	0.019	FALSE
Multisite chronic pain	Television watching	rs62083314	C	T	C	T	-0.014054	-0.0032119	0.00248585	0.00221882	0.586443	0.586535	1.60E-08	0.15	TRUE
Multisite chronic pain	Television watching	rs16980973	A	T	A	T	0.0230008	0.0109168	0.00367599	0.00326955	0.874386	0.874319	3.90E-10	0.00084	TRUE
Multisite chronic pain	Driving	rs11205357	T	C	T	C	-0.0156862	-0.00327109	0.00248483	0.00227769	0.389367	0.389534	2.70E-10	0.15	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_kee
Multisite chronic pain	Driving	rs2653892	T	C	T	C	-0.0134115	-0.00101222	0.00244216	0.00223787	0.527434	0.527436	4.00E-08	0.65	TRUE
Multisite chronic pain	Driving	rs3013414	C	A	C	A	0.0144026	-0.00123997	0.0026073	0.00239019	0.326702	0.326643	3.30E-08	0.6	TRUE
Multisite chronic pain	Driving	rs4852567	A	G	A	G	0.0148524	0.001015	0.00271087	0.00248401	0.718765	0.718741	4.30E-08	0.68	TRUE
Multisite chronic pain	Driving	rs6721975	T	C	T	C	-0.0167025	-0.00174518	0.00294519	0.0026982	0.23137	0.231509	1.40E-08	0.52	TRUE
Multisite chronic pain	Driving	rs35713889	C	T	C	T	-0.032398	0.00360129	0.00587841	0.00538335	0.955318	0.955249	3.60E-08	0.5	TRUE
Multisite chronic pain	Driving	rs9839838	G	A	G	A	-0.0157619	-0.00301747	0.00284498	0.00260744	0.758559	0.758464	3.00E-08	0.25	TRUE
Multisite chronic pain	Driving	rs184690436	C	T	C	T	-0.061687	0.00290003	0.0111409	0.0102336	0.986722	0.986777	3.10E-08	0.78	TRUE
Multisite chronic pain	Driving	rs1946247	T	G	T	G	-0.0190308	-0.00127183	0.00348908	0.00319579	0.141109	0.141305	4.90E-08	0.69	TRUE
Multisite chronic pain	Driving	rs6869446	T	C	T	C	-0.0143645	7.89E-05	0.00250261	0.0022928	0.615589	0.615555	9.50E-09	0.97	TRUE
Multisite chronic pain	Driving	rs76025409	G	C	G	C	-0.0144341	0.00317078	0.00255202	0.00233753	0.645017	0.644807	1.50E-08	0.17	TRUE
Multisite chronic pain	Driving	rs4713656	G	A	G	A	0.0145713	0.0062547	0.00257429	0.0023573	0.338471	0.338463	1.50E-08	0.008	TRUE
Multisite chronic pain	Driving	rs6926377	A	C	A	C	-0.0154511	-0.00089328	0.00267711	0.00245056	0.707178	0.70708	7.90E-09	0.72	TRUE
Multisite chronic pain	Driving	rs74618804	C	T	C	T	0.0148847	-0.00114005	0.00251278	0.00230158	0.616455	0.616312	3.10E-09	0.62	TRUE
Multisite chronic pain	Driving	rs1450833	T	C	T	C	-0.0160501	0.000348659	0.00283496	0.00259871	0.754023	0.753629	1.50E-08	0.89	TRUE
Multisite chronic pain	Driving	rs2237303	G	A	G	A	0.0143612	0.00123484	0.00256441	0.00234859	0.347618	0.347736	2.10E-08	0.6	TRUE
Multisite chronic pain	Driving	rs6966540	T	C	T	C	-0.0139057	0.00038525	0.00251636	0.00230623	0.627156	0.627125	3.30E-08	0.87	TRUE
Multisite chronic pain	Driving	rs11786084	G	A	G	A	-0.0144791	-0.00582713	0.00259101	0.00237303	0.666422	0.666607	2.30E-08	0.014	TRUE
Multisite chronic pain	Driving	rs1040851	C	A	C	A	0.0141766	-0.00052471	0.00245999	0.00225341	0.424317	0.424194	8.30E-09	0.82	TRUE
Multisite chronic pain	Driving	rs7870079	C	T	C	T	0.0138424	-0.00267446	0.0024503	0.00224422	0.544435	0.544451	1.60E-08	0.23	TRUE
Multisite chronic pain	Driving	rs11596214	G	A	G	A	0.0136894	0.00821402	0.00249889	0.00229107	0.595069	0.595114	4.30E-08	0.00034	TRUE
Multisite chronic pain	Driving	rs117829627	C	T	C	T	-0.0152286	0.00234316	0.00275862	0.00252592	0.731346	0.731468	3.40E-08	0.35	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Multisite chronic pain	Driving	rs61881739	G	C	G	C	-0.0204668	-0.00289849	0.00327432	0.00300045	0.832512	0.832623	4.10E-10	0.33	TRUE
Multisite chronic pain	Driving	rs2806985	C	G	C	G	0.0141258	-0.00051307	0.00256947	0.00235586	0.357316	0.357448	3.90E-08	0.83	TRUE
Multisite chronic pain	Driving	rs17126867	T	C	T	C	-0.0172853	0.00220315	0.0031668	0.0028991	0.820225	0.820312	4.80E-08	0.45	TRUE
Multisite chronic pain	Driving	rs2006281	C	T	C	T	0.0134934	0.00465055	0.0024458	0.0022382	0.496931	0.497161	3.40E-08	0.038	TRUE
Multisite chronic pain	Driving	rs2386584	T	G	T	G	-0.0166445	-0.00233619	0.00250006	0.00228886	0.614618	0.614209	2.80E-11	0.31	TRUE
Multisite chronic pain	Driving	rs285018	G	A	G	A	-0.0136507	0.000527836	0.00244932	0.00224272	0.439965	0.439959	2.50E-08	0.81	TRUE
Multisite chronic pain	Driving	rs12601574	C	G	C	G	0.0136493	-0.00496585	0.00244337	0.00223916	0.449763	0.449769	2.30E-08	0.027	FALSE
Multisite chronic pain	Driving	rs62083314	C	T	C	T	-0.014054	-0.00151476	0.00248585	0.00228321	0.586443	0.5865	1.60E-08	0.51	TRUE
Multisite chronic pain	Driving	rs16980973	A	T	A	T	0.0230008	-0.00272606	0.00367599	0.00336481	0.874386	0.874342	3.90E-10	0.42	TRUE
Multisite chronic pain	Smoking initiation	rs11205357	T	C	T	C	-0.0156862	-0.0053275	0.00248483	0.00365894	0.389367	0.388	2.70E-10	0.146	TRUE
Multisite chronic pain	Smoking initiation	rs2653892	T	C	T	C	-0.0134115	-0.00053205	0.00244216	0.00357897	0.527434	0.526	4.00E-08	0.882	TRUE
Multisite chronic pain	Smoking initiation	rs3013414	C	A	C	A	0.0144026	0.00142301	0.0026073	0.00378965	0.326702	0.326	3.30E-08	0.706999	TRUE
Multisite chronic pain	Smoking initiation	rs4852567	A	G	A	G	0.0148524	0.0128086	0.00271087	0.00393413	0.718765	0.684	4.30E-08	0.00116001	TRUE
Multisite chronic pain	Smoking initiation	rs35713889	C	T	C	T	-0.032398	-0.0268226	0.00587841	0.00885279	0.955318	0.9608	3.60E-08	0.00245002	TRUE
Multisite chronic pain	Smoking initiation	rs1946247	T	G	T	G	-0.0190308	-0.0172747	0.00348908	0.00513892	0.141109	0.14	4.90E-08	0.000759994	TRUE
Multisite chronic pain	Smoking initiation	rs6869446	T	C	T	C	-0.0143645	-0.00548981	0.00250261	0.00365177	0.615589	0.591	9.50E-09	0.132	TRUE
Multisite chronic pain	Smoking initiation	rs4713656	G	A	G	A	0.0145713	0.00257215	0.00257429	0.00380486	0.338471	0.302	1.50E-08	0.499001	TRUE
Multisite chronic pain	Smoking initiation	rs6926377	A	C	A	C	-0.0154511	-0.00493526	0.00267711	0.00391392	0.707178	0.672	7.90E-09	0.207	TRUE
Multisite chronic pain	Smoking initiation	rs1450833	T	C	T	C	-0.0160501	-1.46E-05	0.00283496	0.00415673	0.754023	0.791	1.50E-08	0.997	TRUE
Multisite chronic pain	Smoking initiation	rs2237303	G	A	G	A	0.0143612	0.0128036	0.00256441	0.00372727	0.347618	0.346	2.10E-08	0.000605006	TRUE
Multisite chronic pain	Smoking initiation	rs6966540	T	C	T	C	-0.0139057	0.0032069	0.00251636	0.00367615	0.627156	0.606	3.30E-08	0.383	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele.exposure	other_allele.exposure	effect_allele.outcome	other_allele.outcome	beta.exposure	beta.outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue.exposure	pvalue.outcome	mr_keep
Multisite chronic pain	Smoking initiation	rs11786084	G	A	G	A	-0.0144791	0.00629612	0.00259101	0.00376939	0.666422	0.691	2.30E-08	0.0949992	TRUE
Multisite chronic pain	Smoking initiation	rs1040851	C	A	C	A	0.0141766	0.014263	0.00245999	0.00359966	0.424317	0.435	8.30E-09	7.29E-05	TRUE
Multisite chronic pain	Smoking initiation	rs7870079	C	T	C	T	0.0138424	-0.00596193	0.0024503	0.00357573	0.544435	0.589	1.60E-08	0.0956005	TRUE
Multisite chronic pain	Smoking initiation	rs11596214	G	A	G	A	0.0136894	0.0151067	0.00249889	0.00362155	0.595069	0.562	4.30E-08	3.04E-05	TRUE
Multisite chronic pain	Smoking initiation	rs61881739	G	C	G	C	-0.0204668	-0.00140484	0.00327432	0.00486166	0.832512	0.827	4.10E-10	0.772999	TRUE
Multisite chronic pain	Smoking initiation	rs2806985	C	G	C	G	0.0141258	0.0058483	0.00256947	0.00389023	0.357316	0.349	3.90E-08	0.133	TRUE
Multisite chronic pain	Smoking initiation	rs17126867	T	C	T	C	-0.0172853	-0.00313682	0.0031668	0.00457552	0.820225	0.772	4.80E-08	0.493	TRUE
Multisite chronic pain	Smoking initiation	rs2006281	C	T	C	T	0.0134934	0.0081667	0.0024458	0.00356085	0.496931	0.491	3.40E-08	0.0218998	TRUE
Multisite chronic pain	Smoking initiation	rs2386584	T	G	T	G	-0.0166445	-0.0121293	0.00250006	0.00365712	0.614618	0.571	2.80E-11	0.000914008	TRUE
Multisite chronic pain	Smoking initiation	rs285018	G	A	G	A	-0.0136507	-0.00169029	0.00244932	0.0035714	0.439965	0.46	2.50E-08	0.636	TRUE
Multisite chronic pain	Smoking initiation	rs62083314	C	T	C	T	-0.014054	-0.00746649	0.00248585	0.00361329	0.586443	0.602	1.60E-08	0.0387998	TRUE
Multisite chronic pain	Smoking initiation	rs16980973	A	T	A	T	0.0230008	0.00690247	0.00367599	0.00535735	0.874386	0.854	3.90E-10	0.197	TRUE
Multisite chronic pain	Drinks per week	rs11205357	T	C	T	C	-0.0156862	-0.00248	0.00248483	0.00309	0.389367	0.388	2.70E-10	0.422	TRUE
Multisite chronic pain	Drinks per week	rs2653892	T	C	T	C	-0.0134115	0.00482	0.00244216	0.00303	0.527434	0.526	4.00E-08	0.112	TRUE
Multisite chronic pain	Drinks per week	rs3013414	C	A	C	A	0.0144026	0.00747	0.0026073	0.00317	0.326702	0.326	3.30E-08	0.0186	TRUE
Multisite chronic pain	Drinks per week	rs4852567	A	G	A	G	0.0148524	0.00331	0.00271087	0.00327	0.718765	0.684	4.30E-08	0.314	TRUE
Multisite chronic pain	Drinks per week	rs35713889	C	T	C	T	-0.032398	0.00313	0.00587841	0.00757	0.955318	0.9608	3.60E-08	0.679	TRUE
Multisite chronic pain	Drinks per week	rs1946247	T	G	T	G	-0.0190308	-0.00214	0.00348908	0.00432	0.141109	0.14	4.90E-08	0.621	TRUE
Multisite chronic pain	Drinks per week	rs6869446	T	C	T	C	-0.0143645	-0.0038	0.00250261	0.00305	0.615589	0.591	9.50E-09	0.213	TRUE
Multisite chronic pain	Drinks per week	rs4713656	G	A	G	A	0.0145713	-0.00144	0.00257429	0.00325	0.338471	0.302	1.50E-08	0.657	TRUE
Multisite chronic pain	Drinks per week	rs6926377	A	C	A	C	-0.0154511	-0.000407	0.00267711	0.00327	0.707178	0.672	7.90E-09	0.901	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf. outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Multisite chronic pain	Drinks per week	rs1450833	T	C	T	C	-0.0160501	-0.00176	0.00283496	0.00353	0.754023	0.791	1.50E-08	0.618	TRUE
Multisite chronic pain	Drinks per week	rs2237303	G	A	G	A	0.0143612	0.00446	0.00256441	0.00312	0.347618	0.346	2.10E-08	0.153	TRUE
Multisite chronic pain	Drinks per week	rs6966540	T	C	T	C	-0.0139057	-0.00108	0.00251636	0.00307	0.627156	0.606	3.30E-08	0.725	TRUE
Multisite chronic pain	Drinks per week	rs11786084	G	A	G	A	-0.0144791	0.00411	0.00259101	0.00316	0.666422	0.691	2.30E-08	0.194	TRUE
Multisite chronic pain	Drinks per week	rs1040851	C	A	C	A	0.0141766	0.00271	0.00245999	0.00301	0.424317	0.435	8.30E-09	0.367	TRUE
Multisite chronic pain	Drinks per week	rs7870079	C	T	C	T	0.0138424	-0.00174	0.0024503	0.003	0.544435	0.589	1.60E-08	0.561	TRUE
Multisite chronic pain	Drinks per week	rs11596214	G	A	G	A	0.0136894	0.00179	0.00249889	0.00302	0.595069	0.562	4.30E-08	0.554	TRUE
Multisite chronic pain	Drinks per week	rs61881739	G	C	G	C	-0.0204668	-0.00044	0.00327432	0.00412	0.832512	0.827	4.10E-10	0.915	TRUE
Multisite chronic pain	Drinks per week	rs2806985	C	G	C	G	0.0141258	0.00312	0.00256947	0.00311	0.357316	0.349	3.90E-08	0.316	TRUE
Multisite chronic pain	Drinks per week	rs17126867	T	C	T	C	-0.0172853	0.00438	0.0031668	0.00374	0.820225	0.772	4.80E-08	0.242	TRUE
Multisite chronic pain	Drinks per week	rs2006281	C	T	C	T	0.0134934	-0.00212	0.0024458	0.00297	0.496931	0.491	3.40E-08	0.475	TRUE
Multisite chronic pain	Drinks per week	rs2386584	T	G	T	G	-0.0166445	-0.00471	0.00250006	0.00306	0.614618	0.571	2.80E-11	0.123	TRUE
Multisite chronic pain	Drinks per week	rs285018	G	A	G	A	-0.0136507	0.000273	0.00244932	0.00299	0.439965	0.46	2.50E-08	0.927	TRUE
Multisite chronic pain	Drinks per week	rs12601574	C	G	C	G	0.0136493	0.00133	0.00244337	0.00298	0.449763	0.481	2.30E-08	0.656	FALSE
Multisite chronic pain	Drinks per week	rs62083314	C	T	C	T	-0.014054	0.00281	0.00248585	0.00302	0.586443	0.602	1.60E-08	0.353	TRUE
Multisite chronic pain	Drinks per week	rs16980973	A	T	A	T	0.0230008	-0.00174	0.00367599	0.00441	0.874386	0.854	3.90E-10	0.693	TRUE
Multisite chronic pain	Coffee consumption	rs11205357	T	C	T	C	-0.0156862	-0.00116526	0.00248483	0.00159289	0.389367	0.389411	2.70E-10	0.46445	TRUE
Multisite chronic pain	Coffee consumption	rs2653892	T	C	T	C	-0.0134115	0.0012042	0.00244216	0.00156603	0.527434	0.527203	4.00E-08	0.441923	TRUE
Multisite chronic pain	Coffee consumption	rs3013414	C	A	C	A	0.0144026	0.000391574	0.0026073	0.00167136	0.326702	0.32638	3.30E-08	0.814764	TRUE
Multisite chronic pain	Coffee consumption	rs4852567	A	G	A	G	0.0148524	-0.00161349	0.00271087	0.00173831	0.718765	0.718808	4.30E-08	0.353309	TRUE
Multisite chronic pain	Coffee consumption	rs35713889	C	T	C	T	-0.032398	0.0106237	0.00587841	0.00376589	0.955318	0.955281	3.60E-08	0.00478718	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_kee
Multisite chronic pain	Coffee consumption	rs1946247	T	G	T	G	-0.0190308	0.000154842	0.00348908	0.00223247	0.141109	0.141506	4.90E-08	0.944704	TRUE
Multisite chronic pain	Coffee consumption	rs6869446	T	C	T	C	-0.0143645	0.001170745	0.00250261	0.00160409	0.615589	0.615656	9.50E-09	0.287133	TRUE
Multisite chronic pain	Coffee consumption	rs4713656	G	A	G	A	0.0145713	-0.00067489	0.00257429	0.00164861	0.338471	0.337859	1.50E-08	0.682271	TRUE
Multisite chronic pain	Coffee consumption	rs6926377	A	C	A	C	-0.0154511	-0.00085587	0.00267711	0.00171335	0.707178	0.706989	7.90E-09	0.617405	TRUE
Multisite chronic pain	Coffee consumption	rs1450833	T	C	T	C	-0.0160501	0.00127431	0.00283496	0.00181801	0.754023	0.753681	1.50E-08	0.483344	TRUE
Multisite chronic pain	Coffee consumption	rs2237303	G	A	G	A	0.0143612	9.53E-05	0.00256441	0.00164236	0.347618	0.348128	2.10E-08	0.953706	TRUE
Multisite chronic pain	Coffee consumption	rs6966540	T	C	T	C	-0.0139057	0.00118733	0.00251636	0.00161143	0.627156	0.626789	3.30E-08	0.461236	TRUE
Multisite chronic pain	Coffee consumption	rs11786084	G	A	G	A	-0.0144791	0.00178535	0.00259101	0.00165839	0.666422	0.666626	2.30E-08	0.28168	TRUE
Multisite chronic pain	Coffee consumption	rs1040851	C	A	C	A	0.0141766	0.000910523	0.00245999	0.00157657	0.424317	0.424833	8.30E-09	0.563578	TRUE
Multisite chronic pain	Coffee consumption	rs7870079	C	T	C	T	0.0138424	-0.00360848	0.0024503	0.0015703	0.544435	0.544196	1.60E-08	0.0215645	TRUE
Multisite chronic pain	Coffee consumption	rs11596214	G	A	G	A	0.0136894	-0.0014571	0.00249889	0.00160107	0.595069	0.595345	4.30E-08	0.362782	TRUE
Multisite chronic pain	Coffee consumption	rs61881739	G	C	G	C	-0.0204668	-0.00658869	0.00327432	0.00209722	0.832512	0.832788	4.10E-10	0.00168022	TRUE
Multisite chronic pain	Coffee consumption	rs2806985	C	G	C	G	0.0141258	-0.00044407	0.00256947	0.00164556	0.357316	0.357328	3.90E-08	0.787269	TRUE
Multisite chronic pain	Coffee consumption	rs17126867	T	C	T	C	-0.0172853	-0.00115805	0.0031668	0.0020282	0.820225	0.820416	4.80E-08	0.568017	TRUE
Multisite chronic pain	Coffee consumption	rs2006281	C	T	C	T	0.0134934	-0.00053439	0.0024458	0.00156505	0.496931	0.497081	3.40E-08	0.732765	TRUE
Multisite chronic pain	Coffee consumption	rs2386584	T	G	T	G	-0.0166445	-0.00116635	0.00250006	0.0015993	0.614618	0.614464	2.80E-11	0.465824	TRUE
Multisite chronic pain	Coffee consumption	rs285018	G	A	G	A	-0.0136507	0.000659015	0.00244932	0.00156802	0.439965	0.440105	2.50E-08	0.674278	TRUE
Multisite chronic pain	Coffee consumption	rs12601574	C	G	C	G	0.0136493	-0.00265651	0.00244337	0.0015654	0.449763	0.449883	2.30E-08	0.0896954	FALSE
Multisite chronic pain	Coffee consumption	rs62083314	C	T	C	T	-0.014054	-0.00034626	0.00248585	0.00159176	0.586443	0.58638	1.60E-08	0.827794	TRUE
Multisite chronic pain	Coffee consumption	rs16980973	A	T	A	T	0.0230008	-0.00039321	0.00367599	0.0023527	0.874386	0.874224	3.90E-10	0.867266	TRUE
Multisite chronic pain	Vigorous PA	rs11205357	T	C	T	C	-0.0156862	0.00253706	0.00248483	0.00134334	0.389367	0.390213	2.70E-10	0.059	TRUE

Suppl. Table 3 cont. Details of summary statistics after harmonising.

Exposures	Outcome	SNP	effect_allele_exposure	other_allele_exposure	effect_allele_outcome	other_allele_outcome	beta_exposure	beta_outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue_exposure	pvalue_outcome	mr_keep
Multisite chronic pain	Vigorous PA	rs2653892	T	C	T	C	-0.0134115	0.00134622	0.00244216	0.00132131	0.527434	0.524054	4.00E-08	0.31	TRUE
Multisite chronic pain	Vigorous PA	rs3013414	C	A	C	A	0.0144026	-0.00311942	0.0026073	0.00141272	0.326702	0.32653	3.30E-08	0.027	TRUE
Multisite chronic pain	Vigorous PA	rs4852567	A	G	A	G	0.0148524	0.000873475	0.00271087	0.00146403	0.718765	0.716483	4.30E-08	0.55	TRUE
Multisite chronic pain	Vigorous PA	rs35713889	C	T	C	T	-0.032398	-0.00185263	0.00587841	0.00316252	0.955318	0.954872	3.60E-08	0.56	TRUE
Multisite chronic pain	Vigorous PA	rs1946247	T	G	T	G	-0.0190308	0.00202129	0.00348908	0.00188656	0.141109	0.141035	4.90E-08	0.28	TRUE
Multisite chronic pain	Vigorous PA	rs6869446	T	C	T	C	-0.0143645	-0.00051862	0.00250261	0.00135334	0.615589	0.614555	9.50E-09	0.7	TRUE
Multisite chronic pain	Vigorous PA	rs4713656	G	A	G	A	0.0145713	-0.00131042	0.00257429	0.00139139	0.338471	0.337639	1.50E-08	0.35	TRUE
Multisite chronic pain	Vigorous PA	rs6926377	A	C	A	C	-0.0154511	-0.00153239	0.00267711	0.00144411	0.707178	0.704768	7.90E-09	0.29	TRUE
Multisite chronic pain	Vigorous PA	rs1450833	T	C	T	C	-0.0160501	-0.00305368	0.00283496	0.00153909	0.754023	0.755686	1.50E-08	0.047	TRUE
Multisite chronic pain	Vigorous PA	rs2327303	G	A	G	A	0.0143612	0.00179591	0.00256441	0.0013869	0.347618	0.348285	2.10E-08	0.2	TRUE
Multisite chronic pain	Vigorous PA	rs6966540	T	C	T	C	-0.0139057	0.000184241	0.00251636	0.0013595	0.627156	0.62615	3.30E-08	0.89	TRUE
Multisite chronic pain	Vigorous PA	rs11786084	G	A	G	A	-0.0144791	-0.0011662	0.00259101	0.0014033	0.666422	0.667494	2.30E-08	0.41	TRUE
Multisite chronic pain	Vigorous PA	rs1040851	C	A	C	A	0.0141766	-0.00165214	0.00245999	0.00133039	0.424317	0.425207	8.30E-09	0.21	TRUE
Multisite chronic pain	Vigorous PA	rs7870079	C	T	C	T	0.0138424	-0.00198169	0.0024503	0.00132538	0.544435	0.546499	1.60E-08	0.13	TRUE
Multisite chronic pain	Vigorous PA	rs11596214	G	A	G	A	0.0136894	-0.00036079	0.00249889	0.00135079	0.595069	0.593072	4.30E-08	0.79	TRUE
Multisite chronic pain	Vigorous PA	rs61881739	G	C	G	C	-0.0204668	0.00179474	0.00327432	0.0017748	0.832512	0.833296	4.10E-10	0.31	TRUE
Multisite chronic pain	Vigorous PA	rs2806985	C	G	C	G	0.0141258	-0.00334258	0.00256947	0.00139161	0.357316	0.355184	3.90E-08	0.016	TRUE
Multisite chronic pain	Vigorous PA	rs17126867	T	C	T	C	-0.0172853	-0.00101612	0.0031668	0.00169764	0.820225	0.815893	4.80E-08	0.55	TRUE
Multisite chronic pain	Vigorous PA	rs2006281	C	T	C	T	0.0134934	-0.00107832	0.0024458	0.00132228	0.496931	0.4962	3.40E-08	0.41	TRUE
Multisite chronic pain	Vigorous PA	rs2386584	T	G	T	G	-0.0166445	0.00347895	0.00250006	0.00135059	0.614618	0.612524	2.80E-11	0.01	TRUE
Multisite chronic pain	Vigorous PA	rs285018	G	A	G	A	-0.0136507	0.00097701	0.00244932	0.00132558	0.439965	0.438408	2.50E-08	0.46	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele_exposure	other_allele_exposure	effect_allele_outcome	other_allele_outcome	beta_exposure	beta_outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue_exposure	pvalue_outcome	mr_keep
Multisite chronic pain	Vigorous PA	rs12601574	C	G	C	G	0.0136493	-0.00198956	0.00244337	0.00132277	0.449763	0.451983	2.30E-08	0.13	FALSE
Multisite chronic pain	Vigorous PA	rs62083314	C	T	C	T	-0.014054	0.00409465	0.00248585	0.00134509	0.586443	0.587417	1.60E-08	0.0023	TRUE
Multisite chronic pain	Vigorous PA	rs16980973	A	T	A	T	0.0230008	-0.00059822	0.00367599	0.00198654	0.874386	0.873906	3.90E-10	0.76	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs11205357	T	C	T	C	-0.0156862	0.00320489	0.00248483	0.00225382	0.389367	0.390682	2.70E-10	0.16	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs2653892	T	C	T	C	-0.0134115	0.00354897	0.00244216	0.00221471	0.527434	0.52541	4.00E-08	0.11	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs3013414	C	A	C	A	0.0144026	-0.00456259	0.0026073	0.00236829	0.326702	0.326497	3.30E-08	0.054	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs4852567	A	G	A	G	0.0148524	0.00127061	0.00271087	0.0024532	0.718765	0.71603	4.30E-08	0.6	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs35713889	C	T	C	T	-0.032398	-0.0057795	0.00587841	0.00532862	0.955318	0.955282	3.60E-08	0.28	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs1946247	T	G	T	G	-0.0190308	0.00778736	0.00348908	0.003163	0.141109	0.141292	4.90E-08	0.014	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs6869446	T	C	T	C	-0.0143645	-0.0019969	0.00250261	0.00226907	0.615589	0.61444	9.50E-09	0.38	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs4713656	G	A	G	A	0.0145713	-0.00298407	0.00257429	0.00233791	0.338471	0.336653	1.50E-08	0.2	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs6926377	A	C	A	C	-0.0154511	-0.00395586	0.00267711	0.00242164	0.707178	0.704504	7.90E-09	0.1	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs1450833	T	C	T	C	-0.0160501	-0.00079384	0.00283496	0.00258245	0.754023	0.755851	1.50E-08	0.76	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs2237303	G	A	G	A	0.0143612	0.00382209	0.00256441	0.00232449	0.347618	0.347303	2.10E-08	0.1	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs6966540	T	C	T	C	-0.0139057	0.000112723	0.00251636	0.00228173	0.627156	0.626809	3.30E-08	0.96	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs11786084	G	A	G	A	-0.0144791	-0.00164872	0.00259101	0.00235441	0.666422	0.668542	2.30E-08	0.48	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs1040851	C	A	C	A	0.0141766	-0.00180063	0.00245999	0.00223105	0.424317	0.424806	8.30E-09	0.42	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs7870079	C	T	C	T	0.0138424	-0.00127177	0.0024503	0.00222295	0.544435	0.545593	1.60E-08	0.57	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs11596214	G	A	G	A	0.0136894	0.00248808	0.00249889	0.00226684	0.595069	0.592573	4.30E-08	0.27	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs61881739	G	C	G	C	-0.0204668	0.00172043	0.00327432	0.00296966	0.832512	0.832619	4.10E-10	0.56	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs2806985	C	G	C	G	0.0141258	-0.00780077	0.00256947	0.00233383	0.357316	0.355252	3.90E-08	0.00083	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Multisite chronic pain	Moderate-to-vigorous PA	rs17126867	T	C	T	C	-0.0172853	-0.00065205	0.0031668	0.00284943	0.820225	0.816035	4.80E-08	0.82	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs2006281	C	T	C	T	0.0134934	-0.00104918	0.0024458	0.00221896	0.496931	0.495886	3.40E-08	0.64	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs2386584	T	G	T	G	-0.0166445	0.00451899	0.00250006	0.00226601	0.614618	0.612265	2.80E-11	0.046	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs285018	G	A	G	A	-0.0136507	0.00116599	0.00244932	0.00222229	0.439965	0.439611	2.50E-08	0.6	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs12601574	C	G	C	G	0.0136493	-0.00290559	0.00244337	0.00221614	0.449763	0.450684	2.30E-08	0.19	FALSE
Multisite chronic pain	Moderate-to-vigorous PA	rs62083314	C	T	C	T	-0.014054	0.0025063	0.00248585	0.00225607	0.586443	0.587631	1.60E-08	0.27	TRUE
Multisite chronic pain	Moderate-to-vigorous PA	rs16980973	A	T	A	T	0.0230008	-0.00210217	0.00367599	0.00332545	0.874386	0.873465	3.90E-10	0.53	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs11205357	T	C	T	C	-0.0156862	0.00214573	0.00248483	0.00114846	0.389367	0.39051	2.70E-10	0.062	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs2653892	T	C	T	C	-0.0134115	6.95E-05	0.00244216	0.00112891	0.527434	0.525435	4.00E-08	0.95	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs3013414	C	A	C	A	0.0144026	-0.00496694	0.0026073	0.00120664	0.326702	0.326794	3.30E-08	3.80E-05	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs4852567	A	G	A	G	0.0148524	-0.00394404	0.00271087	0.00125013	0.718765	0.71629	4.30E-08	0.0016	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs35713889	C	T	C	T	-0.032398	0.00427061	0.00587841	0.00271733	0.955318	0.955294	3.60E-08	0.12	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs1946247	T	G	T	G	-0.0190308	0.00248147	0.00348908	0.00161664	0.141109	0.140645	4.90E-08	0.12	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs6869446	T	C	T	C	-0.0143645	0.000922517	0.00250261	0.00115718	0.615589	0.614492	9.50E-09	0.43	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs4713656	G	A	G	A	0.0145713	-0.00299572	0.00257429	0.00119213	0.338471	0.336756	1.50E-08	0.012	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_kee
Multisite chronic pain	Strenuous sports or other exercises	rs6926377	A	C	A	C	-0.0154511	-0.00103104	0.00267711	0.00123434	0.707178	0.704034	7.90E-09	0.4	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs1450833	T	C	T	C	-0.0160501	-0.00235639	0.00283496	0.00131678	0.754023	0.755843	1.50E-08	0.074	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs2237303	G	A	G	A	0.0143612	-0.00011336	0.00256441	0.0011854	0.347618	0.347582	2.10E-08	0.92	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs6966540	T	C	T	C	-0.0139057	0.000197861	0.00251636	0.00116342	0.627156	0.626902	3.30E-08	0.86	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs11786084	G	A	G	A	-0.0144791	0.00293995	0.00259101	0.00119813	0.666422	0.667521	2.30E-08	0.014	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs1040851	C	A	C	A	0.0141766	-0.00186287	0.00245999	0.00113697	0.424317	0.425247	8.30E-09	0.1	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs7870079	C	T	C	T	0.0138424	-0.00255157	0.0024503	0.00113366	0.544435	0.546978	1.60E-08	0.024	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs11596214	G	A	G	A	0.0136894	-0.00199361	0.00249889	0.00115628	0.595069	0.593266	4.30E-08	0.085	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs61881739	G	C	G	C	-0.0204668	0.00141786	0.00327432	0.00151483	0.832512	0.83256	4.10E-10	0.35	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs2806985	C	G	C	G	0.0141258	0.00153644	0.00256947	0.00119011	0.357316	0.354941	3.90E-08	0.2	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs17126867	T	C	T	C	-0.0172853	8.78E-05	0.0031668	0.00145463	0.820225	0.816185	4.80E-08	0.95	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs2006281	C	T	C	T	0.0134934	-0.00137764	0.0024458	0.00113076	0.496931	0.49616	3.40E-08	0.22	TRUE

Suppl. Table 3 cont. *Details of summary statistics after harmonising.*

Exposures	Outcome	SNP	effect_allele. exposure	other_allele. exposure	effect_allele. outcome	other_allele. outcome	beta. exposure	beta. outcome	se.exposure	se.outcome	eaf.exposure	eaf.outcome	pvalue. exposure	pvalue. outcome	mr_ keep
Multisite chronic pain	Strenuous sports or other exercises	rs2386584	T	G	T	G	-0.0166445	0.00122548	0.00250006	0.00115402	0.614618	0.611886	2.80E-11	0.29	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs285018	G	A	G	A	-0.0136507	0.00142111	0.00244932	0.00113343	0.439965	0.439388	2.50E-08	0.21	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs12601574	C	G	C	G	0.0136493	-0.00181097	0.00244337	0.00112985	0.449763	0.451816	2.30E-08	0.11	FALSE
Multisite chronic pain	Strenuous sports or other exercises	rs62083314	C	T	C	T	-0.014054	0.00326478	0.00248585	0.00114998	0.586443	0.58712	1.60E-08	0.0045	TRUE
Multisite chronic pain	Strenuous sports or other exercises	rs16980973	A	T	A	T	0.0230008	-0.00570267	0.00367599	0.00169958	0.874386	0.873931	3.90E-10	0.00079	TRUE

Supplemental Table 4. *MR-PRESSO analysis*.

Exposures	Outcome	MR analysis	Causal estimate	se	T-stat	P	Outliers
Computer use	Multisite chronic pain	Raw	-0.144	0.050	-2.884	5.961E-03	rs3744760, rs600806, rs613872, rs7034544
		Outlier-corrected	-0.105	0.042	-2.495	1.660E-02	
Television watching	Multisite chronic pain	Raw	0.267	0.024	11.274	6.125E-22	rs6721975, rs67316928, rs6951746, rs887069
		Outlier-corrected	0.275	0.022	12.274	1.691E-24	
Driving	Multisite chronic pain	Raw	0.115	0.222	0.517	6.322E-01	rs12317176, rs75641275
		Outlier-corrected	0.007	0.095	0.075	9.469E-01	
Smoking initiation	Multisite chronic pain	Raw	0.141	0.020	7.072	5.445E-10	rs10233018, rs13145728, rs76214862, rs7921378, rs9401770, rs9540729
		Outlier-corrected	0.146	0.017	8.616	9.792E-13	
Drinks per week	Multisite chronic pain	Raw	-0.017	0.111	-0.157	8.851E-01	None
		Outlier-corrected	NA	NA	NA	NA	
Coffee consumption	Multisite chronic pain	Raw	-0.003	0.070	-0.044	9.651E-01	rs1481012
		Outlier-corrected	-0.033	0.065	-0.497	6.230E-01	
Vigorous PA	Multisite chronic pain	Raw	-0.010	0.266	-0.036	9.725E-01	rs78694803
		Outlier-corrected	0.217	0.175	1.240	2.828E-01	
Moderate-to-vigorous PA	Multisite chronic pain	Raw	-0.037	0.095	-0.395	6.980E-01	rs2053606, rs2942127, rs382210
		Outlier-corrected	0.035	0.061	0.570	5.778E-01	
Srenuous sports or other exercises	Multisite chronic pain	Raw	-0.714	0.155	-4.600	9.798E-04	None
		Outlier-corrected	NA	NA	NA	NA	
Multisite chronic pain	Computer use	Raw	-0.050	0.056	-0.908	3.712E-01	rs12601574, rs16980973, rs2386584
		Outlier-corrected	-0.035	0.047	-0.741	4.653E-01	
Multisite chronic pain	Television watching	Raw	0.283	0.047	5.959	1.562E-06	rs6721975
		Outlier-corrected	0.259	0.042	6.103	1.202E-06	
Multisite chronic pain	Driving	Raw	0.045	0.036	1.255	2.192E-01	rs11596214
		Outlier-corrected	0.028	0.032	0.870	3.912E-01	
Multisite chronic pain	Smoking initiation	Raw	0.367	0.088	4.187	3.531E-04	rs11786084, rs7870079
		Outlier-corrected	0.438	0.079	5.546	1.670E-05	
Multisite chronic pain	Drinks per week	Raw	0.048	0.042	1.144	2.640E-01	None
		Outlier-corrected	NA	NA	NA	NA	
Multisite chronic pain	Coffee consumption	Raw	-0.032	0.026	-1.226	2.319E-01	None
		Outlier-corrected	NA	NA	NA	NA	
Multisite chronic pain	Vigorous PA	Raw	-0.060	0.025	-2.435	2.271E-02	None
		Outlier-corrected	NA	NA	NA	NA	
Multisite chronic pain	Moderate-to-vigorous PA	Raw	-0.078	0.041	-1.907	6.862E-02	rs2806985
		Outlier-corrected	-0.060	0.038	-1.585	1.266E-01	
Multisite chronic pain	Srenuous sports or other exercises	Raw	-0.105	0.023	-4.537	1.347E-04	rs1450833, rs3013414
		Outlier-corrected	-0.106	0.020	-5.257	2.835E-05	

MR, mendelian randomization. se, Standard error. PA, physical activity.

Supplemental Table 5. Results of MR analysis.

Exposures	Outcomes	Methods	nSNPs	beta	se	P	95%_LCI	95%_UCI	OR	OR_95%_LCI	OR_95%_UCI	F statistics
Computer use	Multisite chronic pain	MR Egger	42	-0.256	0.249	3.102E-01	-0.745	0.232	0.774	0.475	1.262	13.238
		IVW (random effects)	42	-0.100	0.043	1.925E-02	-0.183	-0.016	0.905	0.832	0.984	
		Weighted median	42	-0.108	0.048	2.372E-02	-0.201	-0.014	0.898	0.818	0.986	
		Maximum likelihood	42	-0.098	0.031	1.340E-03	-0.158	-0.038	0.907	0.854	0.963	
		Penalised weighted median	42	-0.115	0.047	1.375E-02	-0.206	-0.023	0.892	0.814	0.977	
		IVW (fixed effects)	42	-0.100	0.030	7.598E-04	-0.158	-0.042	0.905	0.854	0.959	
Television watching	Multisite chronic pain	MR Egger	147	0.189	0.096	5.047E-02	0.001	0.376	1.208	1.001	1.456	12.795
		IVW (random effects)	147	0.278	0.023	7.749E-34	0.233	0.322	1.320	1.262	1.380	
		Weighted median	147	0.225	0.027	3.182E-17	0.172	0.277	1.252	1.188	1.319	
		Maximum likelihood	147	0.290	0.017	1.249E-64	0.257	0.324	1.337	1.293	1.383	
		Penalised weighted median	147	0.223	0.026	2.192E-17	0.172	0.275	1.250	1.187	1.316	
		IVW (fixed effects)	147	0.278	0.016	3.038E-67	0.246	0.309	1.320	1.279	1.362	
Driving	Multisite chronic pain	MR Egger	3	1.733	1.618	4.783E-01	-1.439	4.905	5.657	0.237	134.969	13.813
		IVW (random effects)	3	0.007	0.112	9.492E-01	-0.213	0.227	1.007	0.808	1.255	
		Weighted median	3	0.064	0.141	6.520E-01	-0.213	0.341	1.066	0.808	1.406	
		Maximum likelihood	3	0.007	0.113	9.488E-01	-0.215	0.229	1.007	0.807	1.257	
		Penalised weighted median	3	0.064	0.143	6.569E-01	-0.217	0.345	1.066	0.805	1.412	
		IVW (fixed effects)	3	0.007	0.112	9.492E-01	-0.213	0.227	1.007	0.808	1.255	
Smoking initiation	Multisite chronic pain	MR Egger	70	0.181	0.092	5.371E-02	0.000	0.362	1.198	1.000	1.436	16.837
		IVW (random effects)	70	0.151	0.019	3.009E-16	0.115	0.188	1.164	1.122	1.207	
		Weighted median	70	0.154	0.021	2.019E-13	0.113	0.195	1.167	1.120	1.215	
		Maximum likelihood	70	0.159	0.013	2.941E-32	0.133	0.185	1.172	1.142	1.204	
		Penalised weighted median	70	0.158	0.020	9.831E-15	0.118	0.197	1.171	1.125	1.218	
		IVW (fixed effects)	70	0.151	0.013	6.696E-33	0.127	0.176	1.164	1.135	1.193	
Drinks per week	Multisite chronic pain	MR Egger	4	0.716	1.244	6.230E-01	-1.723	3.156	2.047	0.179	23.467	13.279
		IVW (random effects)	4	-0.017	0.111	8.752E-01	-0.234	0.200	0.983	0.791	1.221	
		Weighted median	4	-0.016	0.089	8.530E-01	-0.191	0.158	0.984	0.826	1.171	
		Maximum likelihood	4	-0.018	0.074	8.033E-01	-0.163	0.126	0.982	0.850	1.135	
		Penalised weighted median	4	-0.016	0.089	8.536E-01	-0.192	0.159	0.984	0.826	1.172	
		IVW (fixed effects)	4	-0.017	0.072	8.086E-01	-0.158	0.123	0.983	0.854	1.131	
Coffee consumption	Multisite chronic pain	MR Egger	26	0.243	0.208	2.535E-01	-0.164	0.650	1.275	0.849	1.915	11.958
		IVW (random effects)	26	-0.010	0.063	8.794E-01	-0.134	0.114	0.990	0.875	1.121	
		Weighted median	26	-0.048	0.078	5.354E-01	-0.201	0.104	0.953	0.818	1.110	
		Maximum likelihood	26	-0.010	0.053	8.493E-01	-0.113	0.093	0.990	0.893	1.098	
		Penalised weighted median	26	-0.050	0.077	5.174E-01	-0.201	0.101	0.951	0.818	1.107	
		IVW (fixed effects)	26	-0.010	0.051	8.521E-01	-0.111	0.091	0.990	0.895	1.096	

Supplemental Table 5 cont. *Results of MR analysis.*

Exposures	Outcomes	Methods	nSNPs	beta	se	P	95%_LCI	95%_UCI	OR	OR_95%_LCI	OR_95%_UCI	F statistics
Vigorous PA	Multisite chronic pain	MR Egger	5	1.220	2.115	6.043E-01	-2.924	5.365	3.389	0.054	213.781	10.779
		IVW (random effects)	5	0.217	0.175	2.151E-01	-0.126	0.560	1.242	0.882	1.751	
		Weighted median	5	0.354	0.202	7.950E-02	-0.042	0.749	1.424	0.959	2.115	
		Maximum likelihood	5	0.225	0.150	1.333E-01	-0.069	0.519	1.252	0.934	1.680	
		Penalised weighted median	5	0.373	0.188	4.700E-02	0.005	0.742	1.453	1.005	2.100	
		IVW (fixed effects)	5	0.217	0.146	1.374E-01	-0.069	0.503	1.242	0.933	1.654	
Moderate-to-vigorous PA	Multisite chronic pain	MR Egger	15	0.032	0.392	9.370E-01	-0.737	0.801	1.032	0.478	2.227	12.680
		IVW (random effects)	15	0.035	0.061	5.687E-01	-0.085	0.155	1.035	0.919	1.167	
		Weighted median	15	0.056	0.074	4.487E-01	-0.088	0.200	1.057	0.915	1.221	
		Maximum likelihood	15	0.036	0.052	4.865E-01	-0.065	0.137	1.037	0.937	1.147	
		Penalised weighted median	15	0.067	0.072	3.519E-01	-0.074	0.208	1.069	0.929	1.231	
		IVW (fixed effects)	15	0.035	0.050	4.904E-01	-0.064	0.134	1.035	0.938	1.143	
Strenuous sports or other exercises	Multisite chronic pain	MR Egger	11	-1.749	1.144	1.608E-01	-3.991	0.494	0.174	0.018	1.638	12.886
		IVW (random effects)	11	-0.714	0.155	4.221E-06	-1.018	-0.410	0.490	0.361	0.664	
		Weighted median	11	-0.486	0.176	5.779E-03	-0.830	-0.141	0.615	0.436	0.869	
		Maximum likelihood	11	-0.723	0.124	6.376E-09	-0.967	-0.479	0.485	0.380	0.619	
		Penalised weighted median	11	-0.473	0.174	6.401E-03	-0.813	-0.133	0.623	0.443	0.875	
		IVW (fixed effects)	11	-0.714	0.115	4.626E-10	-0.938	-0.489	0.490	0.391	0.613	
Multisite chronic pain	Computer use	MR Egger	28	-0.126	0.246	6.124E-01	-0.609	0.357	0.881	0.544	1.428	12.874
		IVW (random effects)	28	-0.035	0.047	4.589E-01	-0.128	0.058	0.966	0.880	1.059	
		Weighted median	28	-0.039	0.049	4.220E-01	-0.135	0.057	0.961	0.874	1.058	
		Maximum likelihood	28	-0.034	0.032	2.843E-01	-0.096	0.028	0.967	0.909	1.028	
		Penalised weighted median	28	-0.042	0.048	3.841E-01	-0.136	0.052	0.959	0.873	1.054	
		IVW (fixed effects)	28	-0.035	0.030	2.476E-01	-0.094	0.024	0.966	0.910	1.025	
Multisite chronic pain	Television watching	MR Egger	29	0.407	0.218	7.313E-02	-0.021	0.834	1.502	0.979	2.303	13.058
		IVW (random effects)	29	0.256	0.044	5.259E-09	0.170	0.341	1.291	1.185	1.407	
		Weighted median	29	0.232	0.048	1.194E-06	0.139	0.326	1.262	1.149	1.386	
		Maximum likelihood	29	0.262	0.031	4.396E-17	0.201	0.324	1.300	1.223	1.382	
		Penalised weighted median	29	0.237	0.048	9.460E-07	0.142	0.332	1.268	1.153	1.394	
		IVW (fixed effects)	29	0.256	0.029	1.035E-18	0.199	0.312	1.291	1.220	1.366	
Multisite chronic pain	Driving	MR Egger	29	-0.103	0.151	5.009E-01	-0.400	0.193	0.902	0.671	1.213	12.953
		IVW (random effects)	29	0.041	0.030	1.781E-01	-0.019	0.101	1.042	0.981	1.106	
		Weighted median	29	-0.001	0.043	9.725E-01	-0.086	0.083	0.999	0.917	1.087	
		Maximum likelihood	29	0.043	0.030	1.582E-01	-0.017	0.102	1.044	0.984	1.108	
		Penalised weighted median	29	-0.012	0.042	7.717E-01	-0.096	0.071	0.988	0.909	1.073	
		IVW (fixed effects)	29	0.041	0.030	1.686E-01	-0.017	0.099	1.042	0.983	1.104	

Supplemental Table 5 cont. Results of MR analysis.

Exposures	Outcomes	Methods	nSNPs	beta	se	P	95%_LCI	95%_UCI	OR	OR_95%_LCI	OR_95%_UCI	F statistics
Multisite chronic pain	Smoking initiation	MR Egger	24	0.558	0.509	2.850E-01	-0.440	1.555	1.747	0.644	4.736	12.232
		IVW (random effects)	24	0.389	0.082	2.016E-06	0.228	0.549	1.475	1.257	1.732	
		Weighted median	24	0.310	0.083	2.041E-04	0.146	0.473	1.363	1.158	1.605	
		Maximum likelihood	24	0.402	0.056	8.133E-13	0.292	0.512	1.495	1.339	1.669	
		Penalised weighted median	24	0.311	0.084	2.162E-04	0.146	0.476	1.365	1.158	1.610	
		IVW (fixed effects)	24	0.389	0.052	1.084E-13	0.286	0.491	1.475	1.331	1.634	
Multisite chronic pain	Drinks per week	MR Egger	24	-0.057	0.275	8.384E-01	-0.595	0.482	0.945	0.551	1.619	13.472
		IVW (random effects)	24	0.046	0.044	2.950E-01	-0.040	0.132	1.047	0.961	1.141	
		Weighted median	24	0.053	0.060	3.732E-01	-0.064	0.170	1.055	0.938	1.186	
		Maximum likelihood	24	0.047	0.044	2.868E-01	-0.040	0.134	1.048	0.961	1.144	
		Penalised weighted median	24	0.053	0.060	3.733E-01	-0.064	0.170	1.055	0.938	1.186	
		IVW (fixed effects)	24	0.046	0.044	2.950E-01	-0.040	0.132	1.047	0.961	1.141	
Multisite chronic pain	Coffee consumption	MR Egger	24	0.027	0.163	8.689E-01	-0.292	0.346	1.028	0.747	1.413	13.472
		IVW (random effects)	24	-0.025	0.026	3.318E-01	-0.077	0.026	0.975	0.926	1.026	
		Weighted median	24	-0.028	0.033	3.926E-01	-0.092	0.036	0.972	0.912	1.037	
		Maximum likelihood	24	-0.026	0.023	2.742E-01	-0.071	0.020	0.975	0.931	1.020	
		Penalised weighted median	24	-0.031	0.032	3.338E-01	-0.095	0.032	0.969	0.909	1.033	
		IVW (fixed effects)	24	-0.025	0.023	2.667E-01	-0.070	0.019	0.975	0.932	1.020	
Multisite chronic pain	Vigorous PA	MR Egger	24	0.080	0.154	6.107E-01	-0.223	0.383	1.083	0.800	1.466	13.472
		IVW (random effects)	24	-0.056	0.025	2.595E-02	-0.106	-0.007	0.945	0.900	0.993	
		Weighted median	24	-0.075	0.029	8.461E-03	-0.131	-0.019	0.928	0.877	0.981	
		Maximum likelihood	24	-0.056	0.020	4.770E-03	-0.095	-0.017	0.945	0.909	0.983	
		Penalised weighted median	24	-0.079	0.030	9.034E-03	-0.138	-0.020	0.924	0.871	0.981	
		IVW (fixed effects)	24	-0.056	0.019	3.521E-03	-0.094	-0.018	0.945	0.910	0.982	
Multisite chronic pain	Moderate-to-vigorous PA	MR Egger	23	-0.027	0.237	9.103E-01	-0.492	0.438	0.973	0.611	1.550	13.453
		IVW (random effects)	23	-0.053	0.039	1.679E-01	-0.129	0.022	0.948	0.879	1.023	
		Weighted median	23	-0.084	0.049	8.726E-02	-0.181	0.012	0.919	0.834	1.012	
		Maximum likelihood	23	-0.052	0.034	1.236E-01	-0.118	0.014	0.949	0.889	1.014	
		Penalised weighted median	23	-0.085	0.049	8.477E-02	-0.181	0.012	0.919	0.834	1.012	
		IVW (fixed effects)	23	-0.053	0.033	1.060E-01	-0.118	0.011	0.948	0.889	1.011	

Supplemental Table 5 cont. Results of MR analysis.

Exposures	Outcomes	Methods	nSNPs	beta	se	P	95%_LCI	95%_UCI	OR	OR_95%_LCI	OR_95%_UCI	F statistics
Multisite chronic pain	Strenuous sports or other exercises	MR Egger	22	-0.192	0.125	1.414E-01	-0.437	0.054	0.826	0.646	1.055	13.544
		IVW (random effects)	22	-0.105	0.021	6.271E-07	-0.146	-0.064	0.900	0.864	0.938	
		Weighted median	22	-0.104	0.026	4.963E-05	-0.154	-0.054	0.902	0.858	0.948	
		Maximum likelihood	22	-0.105	0.018	5.517E-09	-0.140	-0.070	0.901	0.869	0.933	
		Penalised weighted median	22	-0.110	0.025	1.117E-05	-0.159	-0.061	0.896	0.853	0.941	
		IVW (fixed effects)	22	-0.105	0.017	1.041E-09	-0.139	-0.071	0.900	0.871	0.931	

MR, mendelian randomization. SNP, single nucleotide polymorphism. se, standard error. OR, odds ratio. LCI, lower confidence interval. UCI, upper confidence interval. PA, physical activity.

Supplemental Table 6. Heterogeneity analysis.

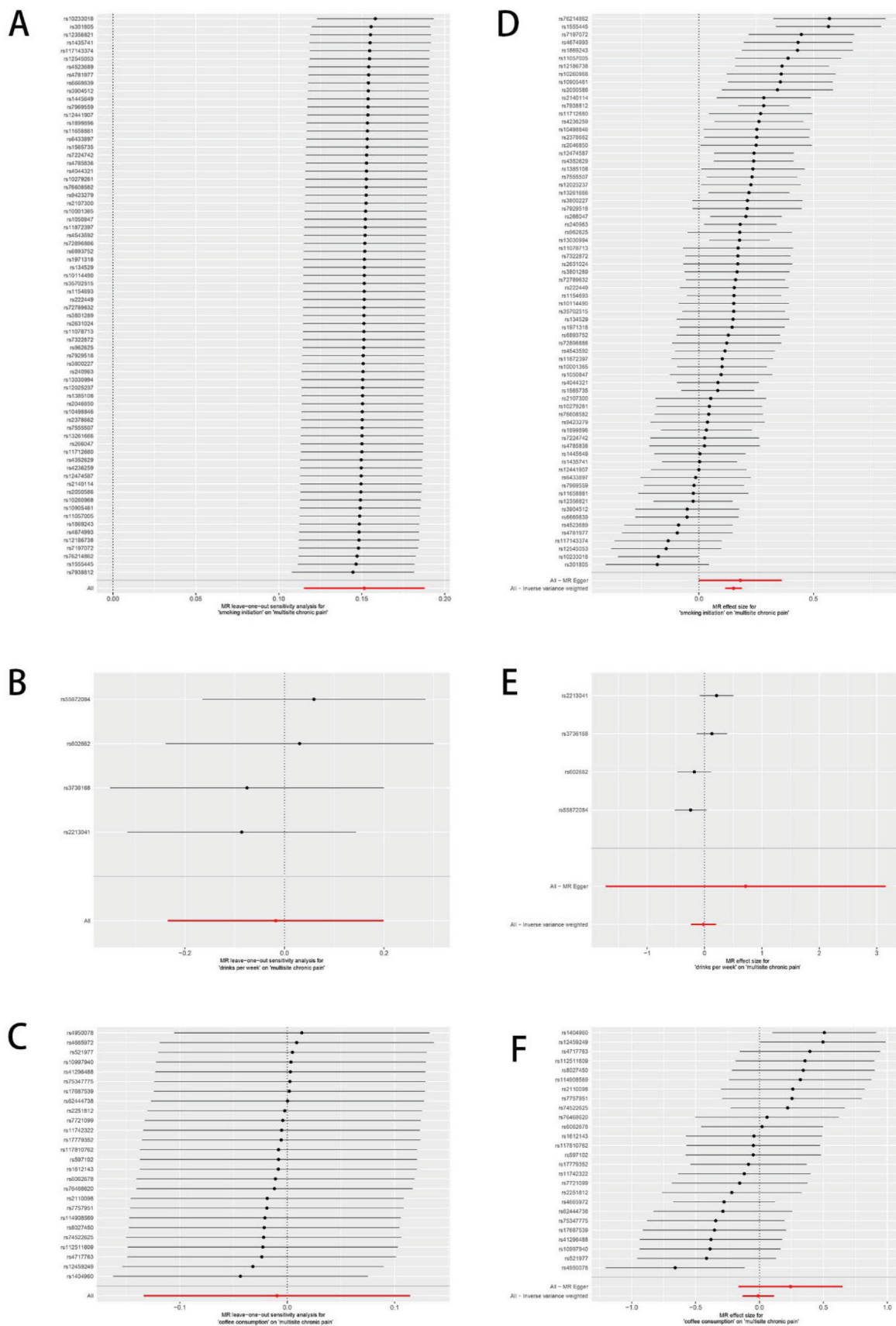
Exposures	Outcomes	Methods	Q-statistic	P
Computer use	Multisite chronic pain	MR Egger	83.992	5.825E-05
		Inverse variance weighted (IVW)	84.845	6.837E-05
Television watching	Multisite chronic pain	MR Egger	296.191	1.997E-12
		Inverse variance weighted (IVW)	298.069	1.764E-12
Driving	Multisite chronic pain	MR Egger	0.292	5.892E-01
		Inverse variance weighted (IVW)	1.434	4.882E-01
Smoking initiation	Multisite chronic pain	MR Egger	147.216	8.967E-08
		Inverse variance weighted (IVW)	147.448	1.256E-07
Drinks per week	Multisite chronic pain	MR Egger	6.067	4.815E-02
		Inverse variance weighted (IVW)	7.132	6.780E-02
Coffee consumption	Multisite chronic pain	MR Egger	35.369	6.311E-02
		Inverse variance weighted (IVW)	37.766	4.875E-02
Vigorous PA	Multisite chronic pain	MR Egger	5.339	1.486E-01
		Inverse variance weighted (IVW)	5.743	2.192E-01
Moderate-to-vigorous PA	Multisite chronic pain	MR Egger	20.505	8.331E-02
		Inverse variance weighted (IVW)	20.505	1.150E-01
Strenuous sports or other exercises	Multisite chronic pain	MR Egger	16.792	5.207E-02
		Inverse variance weighted (IVW)	18.349	4.936E-02
Multisite chronic pain	Computer use	MR Egger	65.432	2.994E-05
		Inverse variance weighted (IVW)	65.792	4.375E-05
Multisite chronic pain	Television watching	MR Egger	62.889	1.089E-04
		Inverse variance weighted (IVW)	64.057	1.204E-04
Multisite chronic pain	Driving	MR Egger	28.275	3.969E-01
		Inverse variance weighted (IVW)	29.267	3.991E-01
Multisite chronic pain	Smoking initiation	MR Egger	55.947	8.701E-05
		Inverse variance weighted (IVW)	56.236	1.312E-04
Multisite chronic pain	Drinks per week	MR Egger	22.593	4.250E-01
		Inverse variance weighted (IVW)	22.739	4.761E-01
Multisite chronic pain	Coffee consumption	MR Egger	29.984	1.189E-01
		Inverse variance weighted (IVW)	30.130	1.457E-01
Multisite chronic pain	Vigorous PA	MR Egger	38.113	1.779E-02
		Inverse variance weighted (IVW)	39.495	1.750E-02
Multisite chronic pain	Moderate-to-vigorous PA	MR Egger	30.220	8.765E-02
		Inverse variance weighted (IVW)	30.239	1.128E-01
Multisite chronic pain	Strenuous sports or other exercises	MR Egger	30.745	5.865E-02
		Inverse variance weighted (IVW)	31.506	6.565E-02

PA, physical activity.

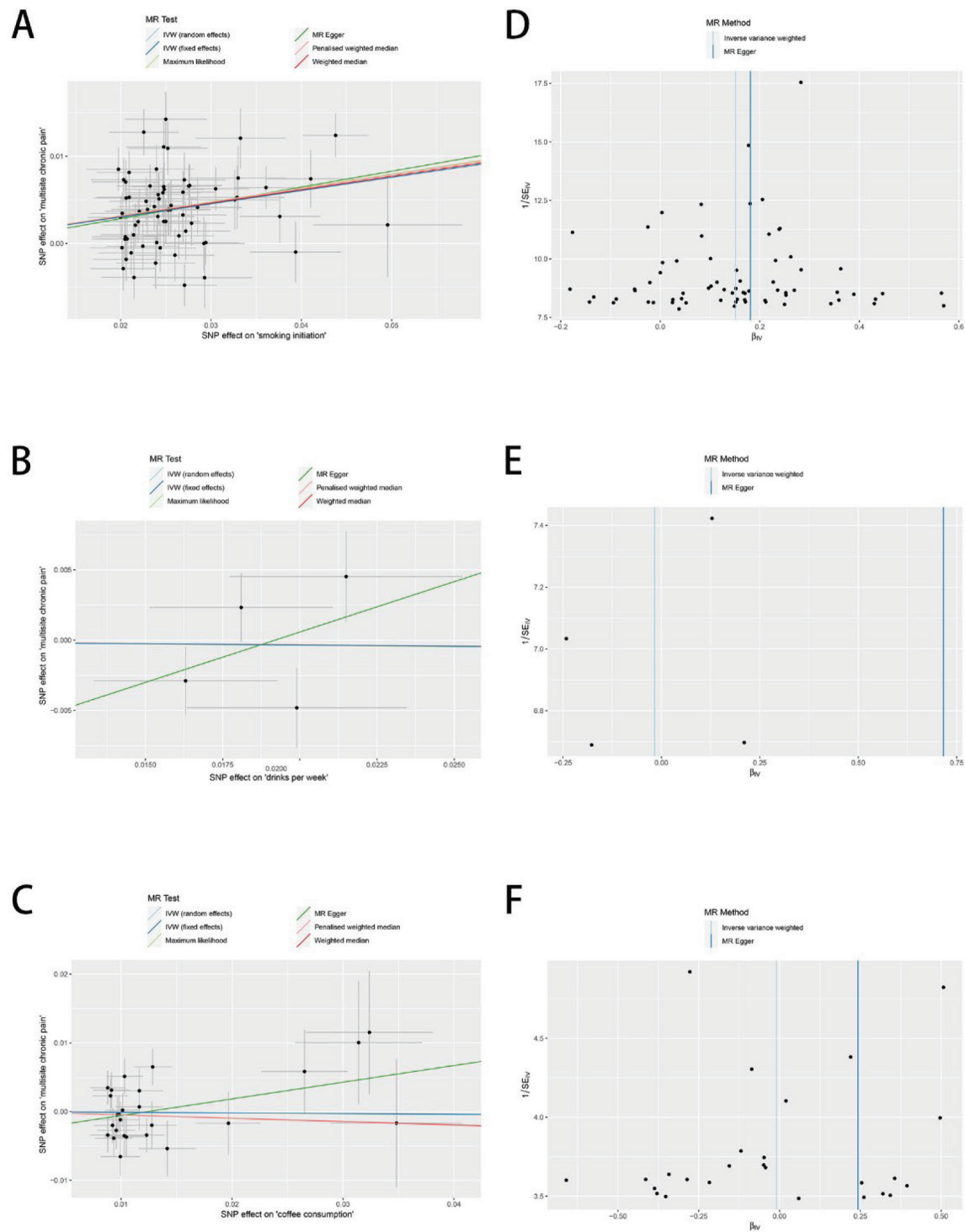
Supplemental Table 7. *Horizontal pleiotropy analysis.*

Exposures	Outcomes	Methods	egger_intercept	se	P
Computer use	Multisite chronic pain	MR Egger_intercept	2.271E-03	3.563E-03	5.276E-01
Television watching	Multisite chronic pain	MR Egger_intercept	1.318E-03	1.375E-03	3.393E-01
Driving	Multisite chronic pain	MR Egger_intercept	-2.322E-02	2.173E-02	4.788E-01
Smoking initiation	Multisite chronic pain	MR Egger_intercept	-7.755E-04	2.370E-03	7.445E-01
Drinks per week	Multisite chronic pain	MR Egger_intercept	-1.375E-02	2.320E-02	6.135E-01
Coffee consumption	Multisite chronic pain	MR Egger_intercept	-3.006E-03	2.357E-03	2.144E-01
Vigorous PA	Multisite chronic pain	MR Egger_intercept	-9.182E-03	1.927E-02	6.662E-01
Moderate-to-vigorous PA	Multisite chronic pain	MR Egger_intercept	4.626E-05	5.599E-03	9.935E-01
Strenuous sports or other exercises	Multisite chronic pain	MR Egger_intercept	7.561E-03	8.279E-03	3.849E-01
Multisite chronic pain	Computer use	MR Egger_intercept	1.431E-03	3.786E-03	7.086E-01
Multisite chronic pain	Television watching	MR Egger_intercept	-2.404E-03	3.395E-03	4.850E-01
Multisite chronic pain	Driving	MR Egger_intercept	2.307E-03	2.370E-03	3.390E-01
Multisite chronic pain	Smoking initiation	MR Egger_intercept	-2.658E-03	7.893E-03	7.395E-01
Multisite chronic pain	Drinks per week	MR Egger_intercept	1.594E-03	4.217E-03	7.090E-01
Multisite chronic pain	Coffee consumption	MR Egger_intercept	-8.189E-04	2.500E-03	7.463E-01
Multisite chronic pain	Vigorous PA	MR Egger_intercept	-2.121E-03	2.375E-03	3.815E-01
Multisite chronic pain	Moderate-to-vigorous PA	MR Egger_intercept	-4.110E-04	3.663E-03	9.117E-01
Multisite chronic pain	Strenuous sports or other exercises	MR Egger_intercept	-4.110E-04	3.663E-03	9.117E-01

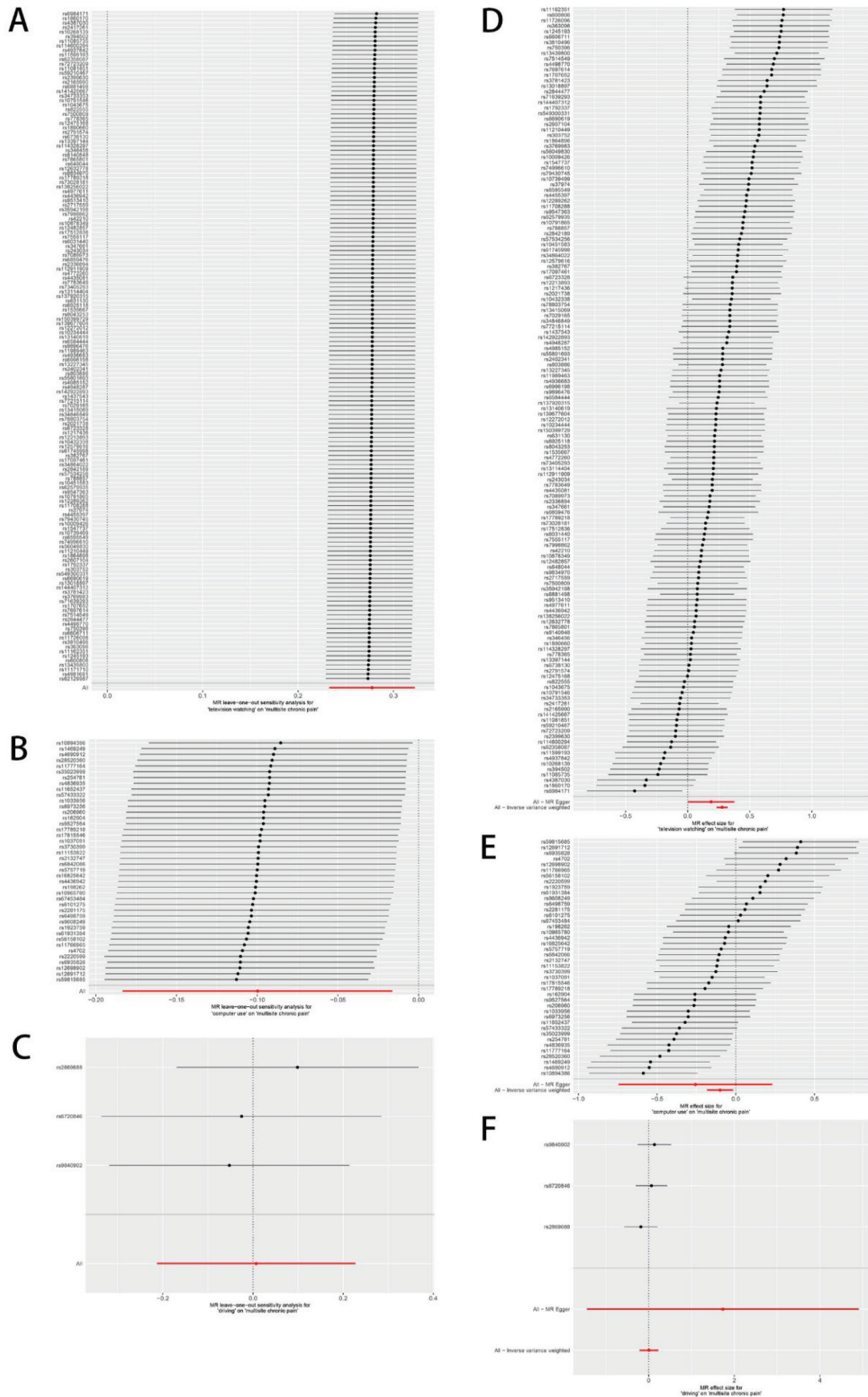
se, Standard error. PA, physical activity.



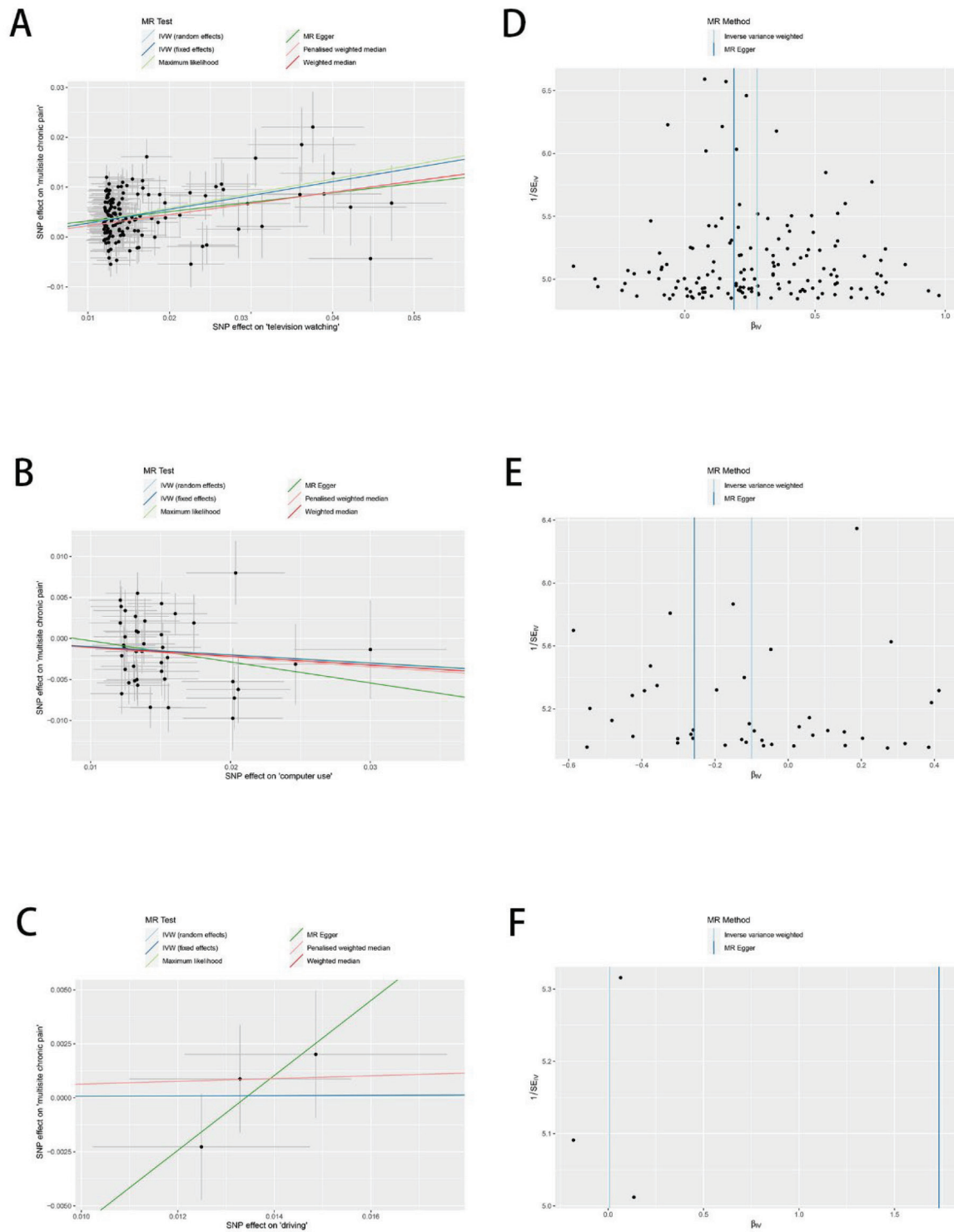
Supplemental Fig. 1. Leave-one-out analyses and forest plots from genetically predicted “smoking initiation”, “drinks per week” and “coffee consumption” on multisite chronic pain. A, D genetically predicted “smoking initiation” on multisite chronic pain; B, E genetically predicted “drinks per week” on multisite chronic pain; C, F genetically predicted “coffee consumption” on multisite chronic pain.



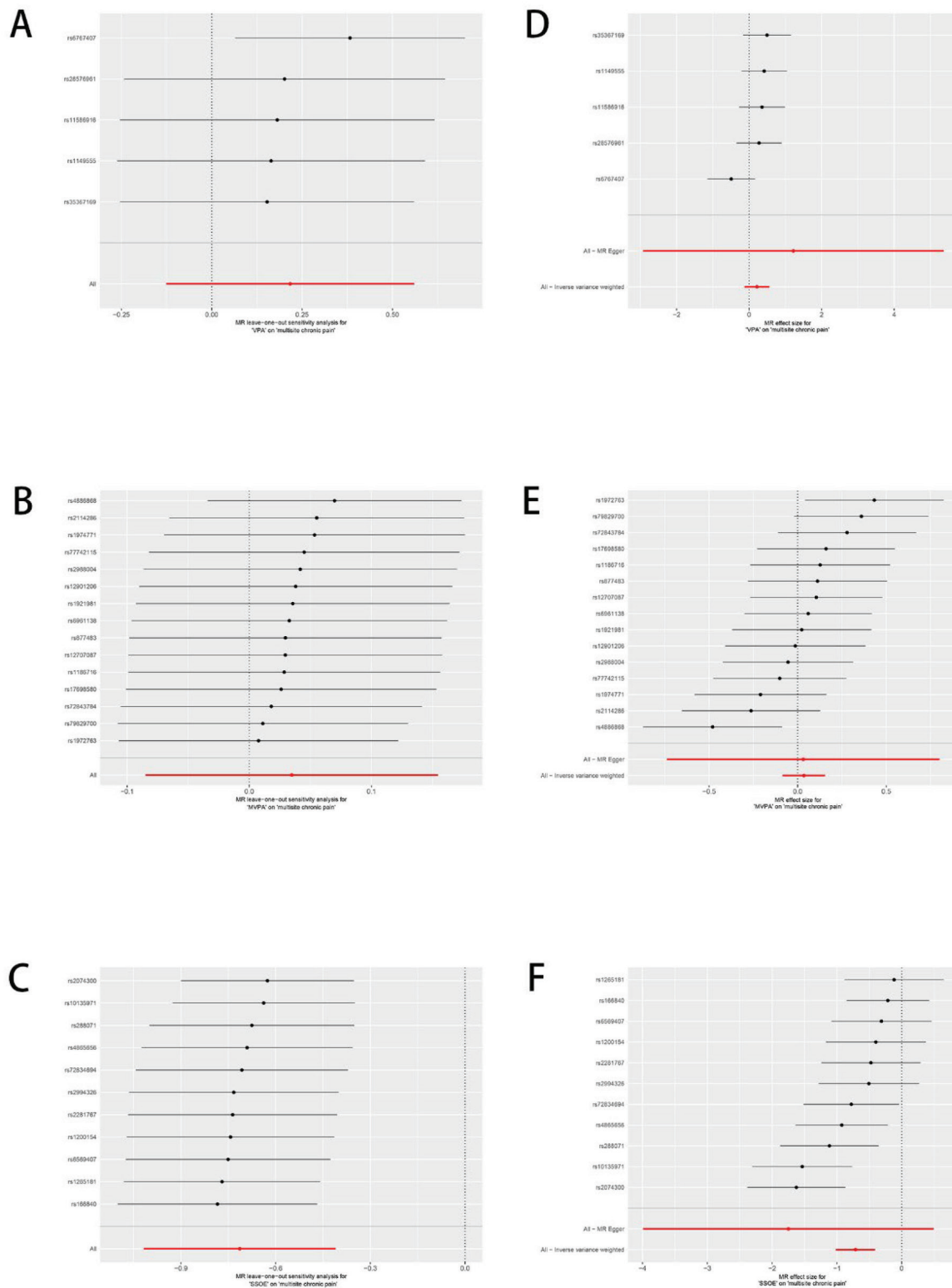
Supplemental Fig. 2. Scatter plots and funnel plots from genetically predicted “smoking initiation”, “drinks per week” and “coffee consumption” on multisite chronic pain. A, D genetically predicted “smoking initiation” on multisite chronic pain; B, E genetically predicted “drinks per week” on multisite chronic pain; C, F genetically predicted “coffee consumption” on multisite chronic pain.



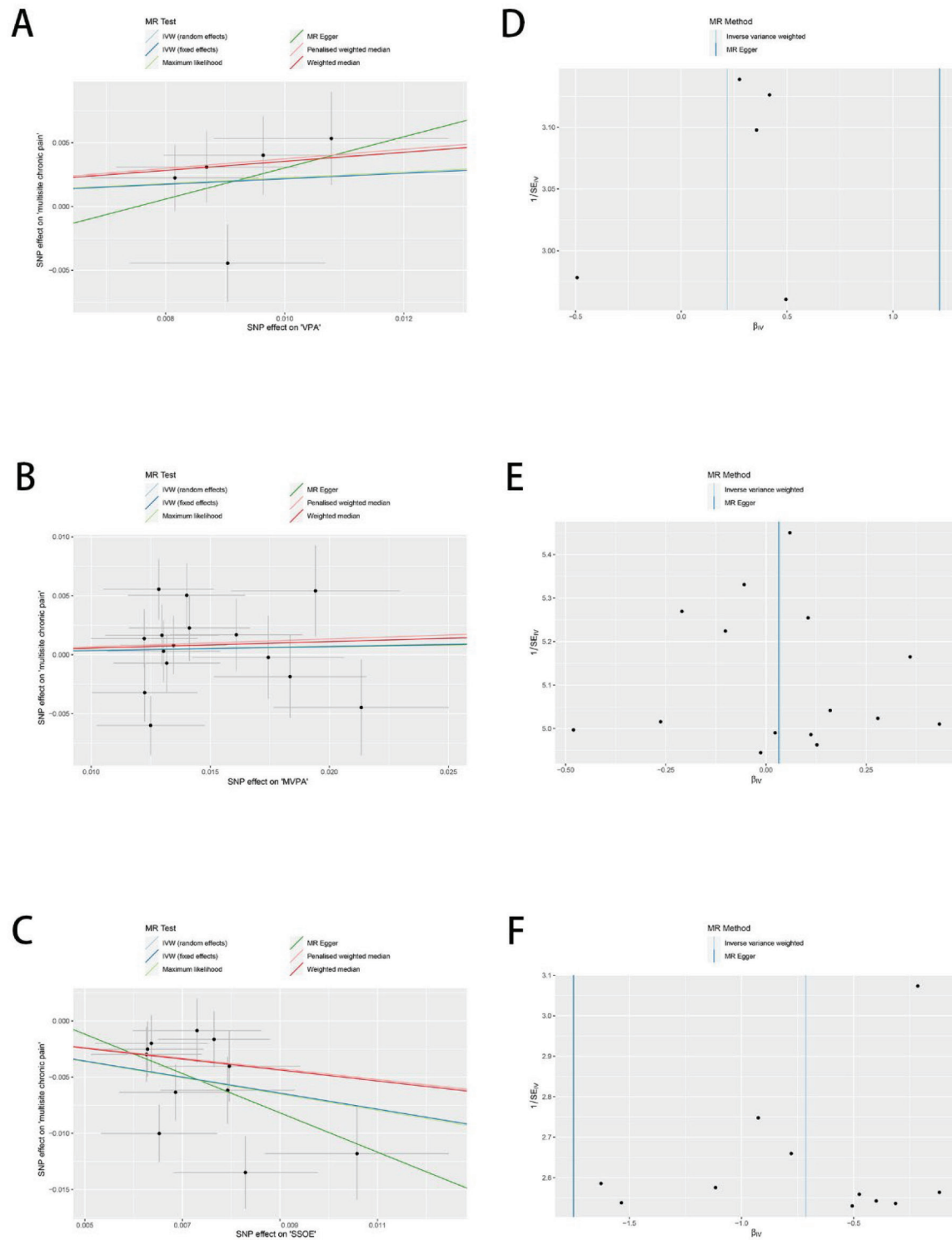
Supplemental Fig. 3. Leave-one-out analyses and forest plots from genetically predicted “television watching”, “computer use” and “driving” on multisite chronic pain. A, D genetically predicted “television watching” on multisite chronic pain; B, E genetically predicted “computer use” on multisite chronic pain; C, F genetically predicted “driving” on multisite chronic pain.



Supplemental Fig. 4. Scatter plots and funnel plots from genetically predicted “television watching”, “computer use” and “driving” on multisite chronic pain. A, D genetically predicted “television watching” on multisite chronic pain; B, E genetically predicted “computer use” on multisite chronic pain; C, F genetically predicted “driving” on multisite chronic pain.



Supplemental Fig. 5. Leave-one-out analyses and forest plots from genetically predicted “VPA”, “MVP” and “SSOE” on multisite chronic pain. A, D genetically predicted “VPA” on multisite chronic pain; B, E genetically predicted “MVP” on multisite chronic pain; C, F genetically predicted “SSOE” on multisite chronic pain.



Supplemental Fig. 6. Scatter plots and funnel plots from genetically predicted “VPA”, “MVPA” and “SSOE” on multisite chronic pain. A, D genetically predicted “VPA” on multisite chronic pain; B, E genetically predicted “MVPA” on multisite chronic pain; C, F genetically predicted “SSOE” on multisite chronic pain.