SUPPLEMENTARY MATERIAL
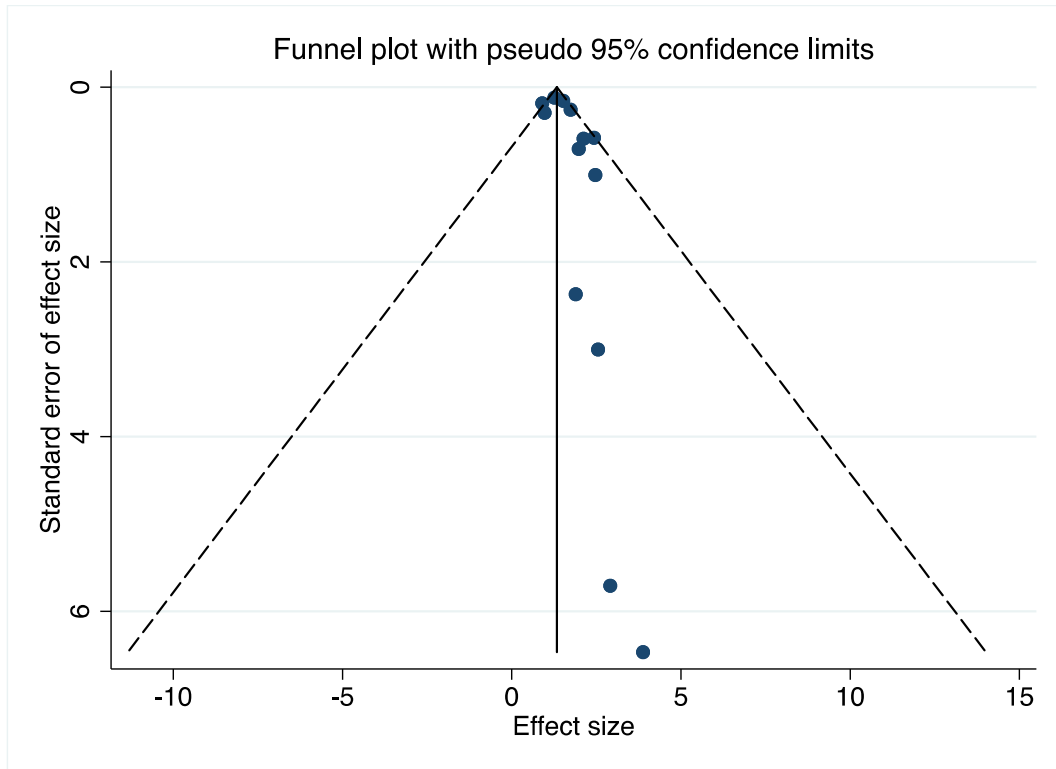
Figure S1. Funnel plot for the association of chronotype with alcohol consumption.

OR: odds-ratio; s.e: standard error.

Table S1. Search strategy used in each database.

DATABASE	SEARCH STRATEGY
Cochrane Library	(alcohol* OR "binge drinking" OR "heavy drinking") AND (chronotype OR morningness OR eveningness OR "Munich Chronotype Questionnaire" OR "Horne Östberg Questionnaire")
PsycINFO	(alcohol* OR "binge drinking" OR "heavy drinking") AND ((chronotype OR morningness OR eveningness OR "Munich Chronotype Questionnaire" OR "Horne Östberg Questionnaire"))
PubMed	(alcohol*[Title/Abstract] OR "binge drinking"[Title/Abstract] OR "heavy drinking"[Title/Abstract] OR Alcohols[MeSH Terms] OR Binge Drinking[MeSH Terms]) AND (chronotype[Title/Abstract] OR chronotype[MeSH Terms] OR morningness[Title/Abstract] OR eveningness[Title/Abstract] OR "Munich Chronotype Questionnaire"[Title/Abstract] OR "Horne Östberg Questionnaire"[Title/Abstract])
Scopus	(TITLE-ABS-KEY (alcohol* OR "binge drinking" OR "heavy drinking") AND TITLE-ABS-KEY (chronotype OR morningness OR eveningness OR "Munich Chronotype Questionnaire" OR "Horne Östberg Questionnaire"))
Web of Science	TS=(alcohol* OR "binge drinking" OR "heavy drinking") AND TS=(chronotope OR morningness OR eveningness OR "Munich chronotope Questionnaire" OR "Horne Östberg Questionnaire")

Table S2. Excluded studies by reason for exclusion (n = 85).

Article not found (n = 1)
Adán A, Guardia J, Sierra J, et al. Ritmos de consumo diario de sustancias psicoactivas y efecto del cronotipo. *Revista Mexicana de Psicología* 1998, **15**:131-140.
Non-eligible publications (n = 10)
Baker FC, Carskadon MA, Hasler BP. Sleep and Women's Health: Sex- and Age-Specific Contributors to Alcohol Use Disorders. *J Womens Health* (Larchmt) 2020, **29**(3):443-445.
Cappadona R, Simone E, Giorgi A, et al. Biological rhythms, health, and gender-specific differences. *Ital J Gender-Specific Med* 2021, *7*(2):109-115.
Goldschmied JR, Arnedt JT, Kaplish N, et al. Exploring the relationship between morningness-eveningness and harmful patterns of alcohol consumption. *Alcoholism: Clinical and Experimental Research* 2011, **35**, 168A.
Hasler BP, Shaw DS, Sitnick SL, et al. Late adolescents who are evening chronotypes display behavioral and psychological dysregulation, sleep disturbance, and altered reward-related brain function. *Biological Psychiatry* 2012, **71**(8), 274S.
Hee-Jin I, Ha-Yom K, Chang-Ho Y. Social jetlag in Korean adult population: prevalence, associated factors, and effects on mood and health. *Sleep Medicine* 2017, **40**(Supplement 1), e129.
Kong JY. The relationship between chronotype and problematic drinking according to gender in mood disorder. *European Neuropsychopharmacology* 2017, **27**, S803–S804.
Richmond R, Anderson E, Jones S, et al. Using Mendelian Randomization To Understand How Chronotype Influences Breast Cancer Risk. *Sleep* 2019, **42**(Supplement 1), A330–A331.
Taylor BJ. Emotion Regulation as a Potential Mechanism Explaining the Link Between Chronotype and Alcohol Use. *Dissertation Abstracts International: Section B: The Sciences and Engineering* 2017, 79(9-B(E)), 141.

Taylor B, He S, Thakur N, et al. Chronotypes in comorbid Insomnia and Alcohol Use Disorder. *Sleep* 2019, **42**(Supplement 1):A364-A364.

Yang, C.-L. (2022). The relationships between sleep and selected weight gain-related eating behaviors [Thesis]. Michigan State University, 2021.

Study population < 18 years of age (n = 23)

Borisenkov M, Polugrudov A, Paderin N, et al. Young inhabitants of the North with late chronotype and social jetlag consume more high-calorie foods and alcohol. *Biological Rhythm Research* 2019, **50**(3):418-428.

Budkevich RO, Budkevich EV, Kolomeichuk SN, et al. Eating behavior, self-assessment of sleep and features of the emotional sphereof personality in students of extreme chronotypes. *Zh Nevrol Psikhiatr Im S S Korsakova* 2021, **121**(4-2):19-23.

Fernández-mendoza J, Ilioudi C, Montes MI, et al. Circadian preference, nighttime sleep and daytime functioning in young adulthood. *Sleep and Biological Rhythms* 2020, **8**(1), 52–62.

Galland BC, de Wilde T, Taylor RW, et al. Sleep and pre-bedtime activities in New Zealand adolescents: differences by ethnicity. *Sleep Health* 2020, **6**(1), 23–31.

Gangwar A, Tiwari S, Rawat A, et al. Circadian Preference, Sleep Quality, and Health Impairing Lifestyles Among Undergraduates of Medical University. *Cureus* 2018, **10**(6): e2856.

Glozier N, O'Dea B, McGorry PD, et al. Delayed sleep onset in depressed young people. *BMC Psychiatry* 2014, **14**(1):33.

Hasler BP, Franzen PL, de Zambotti M, et al. Eveningness and Later Sleep Timing Are Associated with Greater Risk for Alcohol and Marijuana Use in Adolescence: Initial Findings from the National Consortium on Alcohol and Neurodevelopment in Adolescence Study. *Alcoholism: Clinical and Experimental Research* 2017, **41**(6), 1154–1165.

Hasler BP, Graves JL, Wallace ML, et al. Self-reported sleep and circadian characteristics

predict alcohol and cannabis use: A longitudinal analysis of the National Consortium on Alcohol and Neurodevelopment in Adolescence Study. *Alcoholism: Clinical and Experimental Research* 2022, **46**(5), 848–860.

Kumar S, Venkatakrishna S, Ambalavana K, et al. Prevalence of eveningness and its association with cardiometabolic risk factors, risky sexual behavior, and alcohol use in adolescents and young adult males with ADHD. *Arch Ment Health* 2021, **22**:92-97

Kwon B, Lee G. Association between chronotype, tobacco use or alcohol use, and high-risk drinking by age group: The Seventh Korea National Health and Nutrition Examination Survey (VII: 2016-2017), *Sleep Health* 2022, available online.

Liu Y, Zhang J, Li SX, et al. Excessive daytime sleepiness among children and adolescents: prevalence, correlates, and pubertal effects. *Sleep Medicine* 2019, 53, 1–8.

Lund HG, Reider BD, Whiting AB, et al. Sleep Patterns and Predictors of Disturbed Sleep in a Large Population of College Students. *Journal of Adolescent Health* 2010, **46**(2), 124–132.

Martin JS, Gaudreault MM, Perron M, et al. Chronotype, Light Exposure, Sleep, and Daytime Functioning in High School Students Attending Morning or Afternoon School Shifts: An Actigraphic Study. *Journal of Biological Rhythms* 2016, **31**(2), 205–217.

McGlinchey EL, Harvey AG. Risk Behaviors and Negative Health Outcomes for Adolescents with Late Bedtimes. *Journal of Youth and Adolescence* 2015, **44**(2), 478–488.

Negriff S, Dorn LD, Pabst SR, et al. Morningness/eveningness, pubertal timing, and substance use in adolescent girls. *Psychiatry Research* 2011, **185**(3), 408–413.

Nguyen-Louie TT, Brumback T, Worley MJ, et al. Effects of sleep on substance use in adolescents: a longitudinal perspective. *Addiction Biology* 2018, **23**(2), 750–760.

Pieters S, Van Der Vorst H, Burk WJ, et al. Puberty-dependent sleep regulation and alcohol use in early adolescents. *Alcoholism: Clinical and Experimental Research* 2010, **34**(9), 1512–1518.

Saxvig IW, Pallesen S, Wilhelmsen-Langeland A, et al. Prevalence and correlates of delayed sleep phase in high school students. *Sleep Medicine* 2012, **13**(2), 193–199.

Senyk O, Jankowski KS, Cholii S. Ukrainian versions of the Composite Scale of Morningness and Munich Chronotype Questionnaire. *Biological Rhythm Research* 2020, 1–19.

Tavernier R, Munroe M, Willoughby T. Perceived morningness–eveningness predicts academic adjustment and substance use across university, but social jetlag is not to blame. *Chronobiology International* 2015, **32**(9), 1233–1245.

Taylor DJ, Clay KC, Bramoweth AD, et al. Circadian phase preference in college students: Relationships with psychological functioning and academics. *Chronobiology International* 2011, **28**(6), 541–547.

Urbán R, Magyaródi T, Rigó A. Morningness-eveningness, chronotypes and health-impairing behaviors in adolescents. *Chronobiology International* 2011, **28**(3), 238–247.

Wittmann M, Paulus M, Roenneberg T. Decreased psychological well-being in late "chronotypes" is mediated by smoking and alcohol consumption. *Substance Use and Misuse* 2010, **45**(1–2), 15–30.

Indirect data on chronotype (n = 6)

Dashti HS, Chen A, Daghlas I, et al.Morning diurnal preference and food intake: A Mendelian randomization study. *American Journal of Clinical Nutrition* 2020, **112**(5), 1348–1357.

Davy JP, Scheuermaier K, Roden LC, et al. The COVID-19 Lockdown and Changes in Routine-Oriented Lifestyle Behaviors and Symptoms of Depression, Anxiety, and Insomnia in South Africa. *Journal of Physical Activity and Health* 2021, **18**(9), 1046-1057.

Haynie DL, Lewin D, Luk JW, et al. Beyond sleep duration: Bidirectional associations among chronotype, social jetlag, and drinking behaviors in a longitudinal sample of US high school students. *Sleep* 2018, **41**(2).

Leger D, Andler R, Richard JB, et al. Sleep, substance misuse and addictions: a nationwide observational survey on smoking, alcohol, cannabis and sleep in 12,637 adults. *Journal of Sleep Research* 2022.

Wang, J, Li, YR, Jiang, CQ, et al. Chronotype and cognitive function: Observational study and bidirectional Mendelian randomization. *Eclinicalmedicine* 2022, **53**, 101713.

Williams JA, Russ D, Bravo-Merodio L, et al. A causal web between chronotype and metabolic health traits. *Genes* 2021, **12**(7).

No data on chronotype (n = 5)

Booker LA, Barnes M, Alvaro P, et al. The role of sleep hygiene in the risk of Shift Work Disorder in nurses. *Sleep* 2020, **43**(2), 1–8.

Carone CMM, Da Silva BPD, Rodrigues LT, et al.Factors associated with sleep disorders in university students. *Cadernos de Saude Publica* 2020, **36**(3).

Danielsson K, Markström A, Broman JE, et al. Delayed sleep phase disorder in a Swedish cohort of adolescents and young adults: Prevalence and associated factors. *Chronobiology International* 2016, **33**(10), 1331–1339.

Didikoglu A, Maharani A, Payton A, et al.Longitudinal change of sleep timing: association between chronotype and longevity in older adults. *Chronobiology International* 2019, **36**(9), 1285–1300.

Taghvaee L, Mazandarani AA. Poor sleep is associated with sensation-seeking and risk behavior in college students. *Sleep Science* 2022, **15**(Spec 1), 249.

No data on alcohol consumption (n = 8)

Akram ST, Ewy MW, Said A. Sleep disruption in nonalcoholic fatty liver disease: What is the role of lifestyle and diet? *European Journal of Gastroenterology & Hepatology* 2021, **33**(1S Suppl 1), e308–e312.

Cellini N, Menghini L, Mercurio M, et al. Sleep quality and quantity in Italian University students: an actigraphic study. *Chronobiology International* 2020, **37**(11):1538–1551.

Digdon N, Landry K. University students' motives for drinking alcohol are related to evening preference, poor sleep, and ways of coping with stress. *Biological Rhythm Research* 2013, **44**(1), 1–11.

Fernando J, Stochl J, Ersche KD Drug Use in Night Owls May Increase the Risk for Mental Health Problems. *Frontiers in Neuroscience* 2022, **15**.

Gębska M, Dalewski B, Pałka Ł, et al. Chronotype Profile, Stress, Depression Level, and Temporomandibular Symptoms in Students with Type D Personality. *Journal of Clinical Medicine* 2022, **11**(7), 1886.

Hisler GC, Rothenberger SD, Clark DB, et al. Is there a 24-hour rhythm in alcohol craving and does it vary by sleep/circadian timing? *Chronobiology International* 2021, **38**(1), 109–121.

Sato-Miton N, Sasaki S, Murakami K, et al. The midpoint of sleep is associated with dietary intake and dietary behavior among young Japanese women. *Sleep Medicine* 2011, **12**(3), 289–294.

Senyk O, Jankowski KS, Cholii S. Ukrainian versions of the composite scale of morningness and Munich chronotype questionnaire. *Biological Rhythm Research* 2022, **53**(6), 878-896.

Substance use disorder (SUD), bipolar disorder (BP) or diabetes diagnosis (n = 10)

Antúnez JM, Capella MM, Navarro JF, et al. Circadian rhythmicity in substance use disorder male patients with and without comorbid depression under ambulatory and therapeutic community treatment. *Chronobiology International* 2016, **33**(10), 1410–1421.

Boness CL, Hasler BP, Sheehan H, et al. Associations between specific sleep and circadian characteristics and alcohol use disorder criteria and problems. *Addictive Behaviors* 2022, 132.

Burgess HJ, Rizvydeen M, Kikyo F, et al. Sleep and circadian differences between light and heavy adult alcohol drinkers. *Alcoholism: Clinical and Experimental Research* 2022, **46**(7),

1181–1191.

Capella MM, Martinez-Nicolas A, Adan A. Circadian rhythmic characteristics in men with substance use disorder under treatment. Influence of age of onset of substance use and duration of abstinence. *Frontiers in Psychiatry* 2018, **9**, A373.

Hashemzadeh I, Marquez-Arrico JE, Hashemzadeh K, et al. Circadian Functioning and Quality of Life in Substance Use Disorder Patients With and Without Comorbid Major Depressive Disorder. *Frontiers in Psychiatry* 2021, **12**, A750500.

Hätönen T, Forsblom S, Kieseppä T, et al. Circadian phenotype in patients with the co-morbid alcohol use and bipolar disorders. *Alcohol and Alcoholism* 2008, **43**(5), 564–568.

Kervran C, Fatséas M, Serre F, et al. Association between morningness/eveningness, addiction severity and psychiatric disorders among individuals with addictions. *Psychiatry Research* 2015, **229**(3), 1024–1030.

Ko S, Park Y, Kang M, et al. Influence of Severity of Problem Drinking, Circadian Rhythm and Sleep Quality on Sleep Disorder in Alcohol Use Disorder Patients. *Journal of Korean Biological Nursing Science* 2017, **19**(1), 48–54.

Nowakowska-Domagała K, Mokros Ł, Jabłkowska-Górecka K, et al. The relationship between chronotype and personality among patients with alcohol dependence syndrome: Pilot study. *Chronobiology International* 2016, **33**(10), 1351–1358.

Voinescu B, Vesa S, Coogan A. Self-reported diurnal preference and sleep disturbance in type 2 diabetes mellitus. *Acta Endocrinologica* 2011, **7**(1), 69–81.

No data between chronotype and alcohol (n = 22)

Adan A. Functional and dysfunctional impulsivity in young binge drinkers. *Adicciones* 2012, **24**(1), 17–22.

Adan A, Navarro JF, Forero DA. Personality profile of binge drinking in university students is modulated by sex. A study using the Alternative Five Factor Model. *Drug and Alcohol Dependence* 2016, **165**, 120–125.

Albrecht JN, Werner H, Riege, N, et al. Sleep and health-related characteristics among adolescents during COVID-19: An update. *International Journal of Environmental Research and Public Health* 2022, **19**(9), 5078.

Arslan M, Ayhan NY, Çolak H, et al. The Effect of Chronotype on Addictive Eating Behavior and BMI among University Students: A Cross-Sectional Study. *Nutrients* 2022, **14**(14), 2907.

Culnan E, Kloss JD, Grandner M. A prospective study of weight gain associated with chronotype among college freshmen. *Chronobiology International* 2013, **30**(5), 682–690.

Devaraj D, Devaraj U, Venkatnarayan K, et al. Prevalence of Sleep Practices, Circadian Types and Their Effect on Sleep Beliefs in General Population: Knowledge and Beliefs About Sleep and Sleep Practices (KNOBS Survey). *Sleep and Vigilance* 2021, **5**(1), 61–69.

Evans S, Alkan E, Bhangoo JK, et al. Effects of the COVID-19 lockdown on mental health, wellbeing, sleep, and alcohol use in a UK student sample. *Psychiatry Research* 2021, **298**, A113819.

Hasler BP, Sitnick SL, Shaw DS, et al. An altered neural response to reward may contribute to alcohol problems among late adolescents with an evening chronotype. *Psychiatry research: neuroimaging* 2013, **214**(3), 357-364.

Hasler BP, Wallace ML, Graves JL, et al. Circadian preference is associated with multiple domains of trait and state level impulsivity. *Chronobiology International* 2022, **39**(6), 792–804.

Hasler BP, Wallace ML, White SJ, et al. Preliminary evidence that real world sleep timing and duration are associated with laboratory-assessed alcohol response. *Alcoholism: Clinical and Experimental Research* 2019, **43**(7), 1575-1584.

Henrich LC, Antypa N, Van den Berg JF. Sleep quality in students: Associations with psychological and lifestyle factors. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues* 2021, No Pagination Specified.

Hühne A, Hoch E, Landgraf D. DAILY—A Personalized Circadian Zeitgeber Therapy as an Adjunctive Treatment for Alcohol Use Disorder Patients: Study Protocol for a Randomized Controlled Trial. *Frontiers in Psychiatry* 2021, **11**, 569864.

Juliatte TPR, Costa PD, Canaan JDR, et al. Circadian preference and its relationship with possible sleep and awake bruxism in adults assisted by the public health system. *Chronobiology International* 2022, **39**(1), 68–76.

Lv Y, Jiang G, Tan X, et al. Association of sleep patterns and lifestyles with incident hypertension: evidence from a large population-Based Cohort Study. *Frontiers in Cardiovascular Medicine* 2022, **9**, 741.

Onyper SV, Thacher PV, Gilbert JW, et al. Class start times, Sleep, and academic performance in college: A path analysis. *Chronobiology International* 2012, **29**(3), 318–335.

Potvin J, Socarras LR, Forest G. Sleeping through a Lockdown: How Adolescents and Young Adults Struggle with Lifestyle and Sleep Habits Upheaval during a Pandemic. *Behavioral Sleep Medicine* 2022, **20**(3), 304–320.

Rodríguez-Muñoz PM, Carmona-Torres JM, Rivera-Picón C, et al. Risky behaviours of spanish university students: Association with mediterranean diet, sexual attitude and chronotype. *Nutrients* 2021, **13**(11).

Son KL, Jung D, Lee KM, et al. Morning Chronotype Decreases the Risk of Chemotherapy-Induced Peripheral Neuropathy in Women With Breast Cancer. *Journal of Korean Medical Science* 2022, **37**(5).

Song Q, Wang M, Zhou T, et al. The Lifestyle-Related Cardiovascular Risk Is Modified by Sleep Patterns. *Mayo Clinic Proceedings* 2022, **97**(3), 519–530.

Sultan A, Taj S, Choudhary V, et al. Predictive role of socio-demographic and chronotype on health-related quality of life of cancer patients from southeastern India. *Biological Rhythm Research* 2022, **53**(4), 592–607.

Sunwoo JS, Kim D, Chu MK, et al. Fatigue is associated with depression independent of excessive daytime sleepiness in the general population. *Sleep and Breathing* 2022, **26**(2), 933–940.

Toscano VG, Coelho FM, Prado GFD, et al. Sleep disorders in multiple sclerosis: a case-control study using the São Paulo Epidemiologic sleep study (Episono) database. *Arquivos de Neuro-Psiquiatria* 2022, **80**, 822-830.

Table S3. Quality assessment of the included studies.

Authors, Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Adan, 1994	Y	N	NR	CD	N	N	NA	N	Y	N	N	NA	NA	NA
Arosemena et al., 2022	Y	Y	NR	Y	N	N	NA	Y	Y	N	N	NA	NA	Y
Arrona-Palacios et al., 2019	Y	Y	NR	CD	N	N	NA	Y	Y	N	N	NA	NA	NA
Barclay et al., 2013	Y	Y	Y	Y	N	N	NA	Y	Y	N	N	NA	NA	Y
Bruno et al., 2022	Y	Y	CD	Y	N	N	NA	N	Y	N	N	NA	NA	NA
Esposito, Martoni and Natale, 2002	Y	N	NR	CD	N	N	NA	N	Y	N	N	NA	NA	NA
Evans and Norbury 2021	Y	Y	NR	Y	N	N	NA	Y	Y	N	N	NA	NA	Y
Garbazza et al., 2022	Y	Y	NR	Y	N	N	NA	Y	Y	N	CD	NA	NA	N
Goodhines et al., 2019	Y	Y	NR	Y	N	N	NA	Y	Y	N	N	NA	NA	NA
Haraszti et al., 2014	Y	Y	NR	Y	N	N	NA	Y	Y	N	N	NA	NA	Y
Hasler et al., 2017	Y	Y	NR	Y	N	N	NA	Y	Y	Y	N	NA	NA	N
Hug et al., 2019	Y	Y	NR	Y	N	N	NA	N	Y	N	N	NA	NA	N
Ishihara et al., 1985	Y	Y	NR	CD	N	N	NA	N	Y	N	N	NA	NA	NA
Kanerva et al., 2012	Y	Y	Y	Y	Y	N	NA	Y	Y	N	N	NA	NA	Y
Lee et al., 2022	Y	Y	NR	Y	N	N	NA	Y	Y	N	Y	NA	NA	N

Study														
Millar et al., 2019	Y	Y	NR	Y	N	N	NA	N	Y	N	N	NA	NA	Y
Mulè et al., 2022	Y	Y	NR	Y	N	N	NA	Y	Y	N	CD	NA	NA	N
Nakade et al., 2009	Y	Y	Y	CD	N	N	NA	Y	Y	N	N	NA	NA	NA
Pereira-Morales et al., 2019	Y	Y	NR	Y	N	N	NA	N	Y	N	N	NA	NA	Y
Rosenberg et al., 2013	Y	N	NR	Y	N	N	NA	Y	Y	N	N	NA	NA	N
Rusnac, Spitzenstetter and Tassi, 2016	Y	N	NR	Y	N	N	NA	Y	Y	N	N	NA	NA	NA
Sansom et al., 2022	Y	Y	NR	Y	N	N	NA	Y	Y	N	Y	NA	NA	N
Siudej and Malinowska-Borowska, 2021	Y	N	NR	CD	N	N	NA	N	Y	N	N	NA	NA	NA
Sun et al., 2019	Y	Y	NR	CD	N	N	NA	N	Y	N	N	NA	NA	NA
Taylor et al., 2020	Y	Y	NR	CD	N	N	NA	N	Y	N	Y	NA	NA	N
Van den Berg, Kivelä and Antypa, 2018	Y	Y	NR	Y	N	N	NA	Y	Y	N	N	NA	NA	Y
Vedaa et al., 2013	Y	Y	Y	Y	N	N	NA	Y	Y	N	N	NA	NA	N
Vera et al., 2018	Y	Y	NR	CD	N	N	NA	N	Y	N	N	NA	NA	Y
Watson, Buchwald and Harden, 2013	Y	Y	NR	CD	N	N	NA	N	Y	N	N	NA	NA	CD
Whittier et al., 2014	Y	Y	CD	Y	N	N	NA	N	Y	N	N	NA	NA	NA

Study	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Yang and Tucker, 2022	Y	Y	NR	Y	N	N	NA	N	Y	N	N	NA	NA	Y
Yun et al., 2015	Y	Y	NR	Y	N	N	NA	N	Y	N	N	NA	NA	Y
Zhang et al., 2017	Y	Y	Y	Y	Y	N	NA	N	Y	N	N	NA	NA	NA

Y: Yes; N: No; CD: Cannot determine; NA: Not applicable; NR: Not reported.

(1) Was the research question or objective in this paper clearly stated? (2) Was the study population clearly specified and defined? (3) Was the participation rate of eligible persons at least 50%? (4) Were all the subjects selected or recruited from the same or similar populations? Were inclusion and exclusion criteria prespecified and applied uniformly to all participants? (5) Was a sample size justification, power description, or variance and effect estimates provided? (6) For the study's analysis, were the exposure(s) of interest measured prior to the outcome(s) being measured? (7) Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed? (8) Did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)? (9) Were the exposure measures clearly defined, valid, reliable, and implemented consistently across all study participants? (10) Was the exposure(s) assessed more than once over time? (11) Were the outcome measures clearly defined, valid, reliable, and implemented consistently across all study participants? (12) Were the outcome assessors blinded to the exposure status of the participants? (13) Was loss to follow-up after baseline 20% or less? (14) Were key potential confounding variables* measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?

*For this analysis, age was the only variable considered a key potential confounding variable.

Table S4. PRISMA Checklist of items to include when reporting a systematic review or meta-analysis.

For abstract			
Section/Topic	**#**	**Checklist item**	**Reported (Yes/No)**
TITLE			
Title	1	Identify the report as a systematic review.	Yes
BACKGROUND			
Objectives	2	Provide an explicit statement of the main objective(s) or question(s) the review addresses.	Yes
METHODS			
Eligibility criteria	3	Specify the inclusion and exclusion criteria for the review.	Yes
Information sources	4	Specify the information sources (e.g. databases, registers) used to identify studies and the date when each was last searched.	Yes
Risk of bias	5	Specify the methods used to assess risk of bias in the included studies.	Yes
Synthesis of results	6	Specify the methods used to present and synthesis results.	Yes
RESULTS			
Included studies	7	Give the total number of included studies and participants and summarise relevant characteristics of studies.	Yes

Synthesis of results	8	Present results for main outcomes, preferably indicating the number of included studies and participants for each. If meta-analysis was done, report the summary estimate and confidence/credible interval. If comparing groups, indicate the direction of the effect (i.e. which group is favoured).	Yes
DISCUSSION			
Limitations of evidence	9	Provide a brief summary of the limitations of the evidence included in the review (e.g. study risk of bias, inconsistency and imprecision).	Yes
Interpretation	10	Provide a general interpretation of the results and important implications.	Yes
OTHER			
Funding	11	Specify the primary source of funding for the review.	Yes
Registration	12	Provide the register name and registration number.	Yes
For main article			
Section/Topic	**#**	**Checklist item**	**Reported on page #**
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	2-3

INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4-5
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	6-7
Information sources	6	Specify all databases, registers, websites, organizations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	7-8
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Table S1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	6-8
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or	6-8

		confirming data from study investigators, and if applicable, details of automation tools used in the process.	
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	7-8
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	7-8
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	8
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	8
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	7-8

	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	7-8
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	7-8
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	7-8
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	8-9
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	9
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	8-9
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	NA
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	9 Figure 1

	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Table S2
Study characteristics	17	Cite each included study and present its characteristics.	9-10 Tables 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Table S3
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Figure 2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Table 2
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Figure 2 Table S5
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	10-12
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Table S5
Reporting biases	21	Present assessments of risk of bias due to missing	Figure S3

		results (arising from reporting biases) for each synthesis assessed.	
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	NA

DISCUSSION

Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	13-16
	23b	Discuss any limitations of the evidence included in the review.	13-16
	23c	Discuss any limitations of the review processes used.	15-16
	23d	Discuss implications of the results for practice, policy, and future research.	15-16

OTHER INFORMATION

Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	6
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	6
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	NA
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	17

Competing interests	26	Declare any competing interests of review authors.	17
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	NA

NA: Not applicable.

Table S5. Sensitivity analysis.

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---------------------------------------------------------------------------
 Study omitted                  |    Estimate    [95%  Conf.  Interval]
------------------+--------------------------------------------------------
 Ishihara et al.                |    1.3733075   1.1244961   1.6221187
 Esposito, Martoni & Natale     |    1.3918918   1.1351289   1.6486547
 Rosenberg et al.               |    1.4128450   1.1534399   1.6722503
 Haraszti et al.                |    1.4132782   1.1544989   1.6720575
 Vera et al.                    |    1.3987119   1.0980843   1.6993394
 Zhang et al.                   |    1.4908884   1.1586922   1.8230845
 Pereira-Morales et al.         |    1.3491371   1.0897573   1.6085167
 Siudej & Malinowska-Borowska   |    1.3893056   1.1394520   1.6391591
 Mulè et al.                    |    1.3487011   1.1208448   1.5765574
 Garbazza                       |    1.4113147   1.1531011   1.6695284
 Arosemena et al.               |    1.4124849   1.1544418   1.6705281
 Sansom et al.                  |    1.4654967   1.2558022   1.6751912
 Lee et al.                     |    1.4655235   1.1981230   1.7329240
------------------+--------------------------------------------------------
 Combined                       |    1.4072397   1.1571519   1.6573275
---------------------------------------------------------------------------
```