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Reporting of data on participant ethnicity and socioeconomic status in high-impact medical journals: A targeted literature review

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Manuscript Title: Reporting of data on participant ethnicity and socioeconomic status in high-impact medical journals: A targeted literature review

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ABSTRACT (236 words)

Objectives: To assess the frequency of reporting of ethnicity (or 'race') and socioeconomic status (SES) indicators in high-impact journals.

Design: Targeted literature review

Data sources and inclusion criteria: The 10 highest ranked general medical journals (Google scholar h5 index) were identified. Working backwards from 19/04/2021 in each journal, we selected the 10 most recent articles meeting inclusion/exclusion criteria, to create a sample of 100 articles. Inclusion criteria were, human research, reporting participant level data. Exclusion criteria were non-research article, animal/other non-human participant/subject; or no participant characteristics reported.

Primary and secondary outcome measures: The frequency of reporting of ethnicity (or 'race') and SES indicators.

Results: Of one hundred research articles included, 35 reported ethnicity and 13 SES. By contrast, 99 reported age, and 97 reported sex or gender. Among the articles not reporting ethnicity only 3 (5%) highlighted this as a limitation, and only 6 (7%) where SES data were missing. Median number of articles reporting ethnicity per journal was 2.5/10 (range 0 to 9). Only 2 journals explicitly requested reporting of ethnicity (or race), and 1 requested SES.

Conclusions: The majority of research published in high-impact medical journals does not include data on the ethnicity and socioeconomic status of participants, and this omission is rarely acknowledged as a limitation. This situation persists despite the well-established importance of this issue and ICMJE recommendations to include relevant demographic variables to ensure representative samples. Standardized explicit minimum standards are required.

Article Summary

Strengths and Limitations of this study

- This article demonstrates that reporting of these ethnicity and socioeconomic status in the highest impact medical journals remains poor despite the well-established importance of reporting these data, and guidelines promoting their inclusion in publications.
- This research demonstrates an issue of substantial public health importance, as inadequate reporting of research participant demographics has been identified as contributing to health inequalities, including racial and socioeconomic dipartites in the impact of the COVID-19 pandemic.
- An important consideration is the potential that alternative approaches could be used in selecting research articles/journals which may alter results. However, our findings are consistent with historical research on this topic.

Background:

Information about the ethnicity and socioeconomic status of participants in clinical research is needed for the interpretation, generalisability and pooling of data as well as to inform discussion around health inequalities. The relevance of ethnicity and socio-economic status to health and biomedical research is well established but has been emphasised by the COVID-19 pandemic, during which specific ethnic groups and poorer individuals have been disproportionately affected[1]. The causal pathways driving health disparities are complex and multifactorial, however under-reporting of participant characteristics has been identified as a potential contributory factor[2-4].

The International Committee of Medical Journal Editors (ICMJE) recommendations[5], and some journal instructions to authors promote inclusion of these data[6 7]. Previous studies have identified that reporting is frequently incomplete with limited progress made over the last three decades [8-13]. Recent years have seen an increased focus on ethnicity and socioeconomic status in medicine, however there is a lack of research as to whether this has resulted in better reporting.

To evaluate the current situation in this area, we assessed the frequency of reporting of ethnicity (or 'race') and socioeconomic status indicators in a sample of research articles published in high impact general medical journals in Spring 2021.

Methods:

We identified the 10 highest ranked journals as per Google scholar 'Health and Medical (general)' category up to April 2021. At the time of data collection these were The New England Journal of Medicine (NEJM), The Lancet, the Journal of the American Medical Association (JAMA), Proceedings of the National Academy of Sciences of the United States of America (PNAS), Nature Medicine, Public Library of Science One (PLOS One), The British Medical Journal (BMJ), Cochrane, Cell Metabolism, and Science Translational Medicine. PNAS and PLOS One include a wide range of subject areas therefore the subsections 'Biological Sciences, Medical Science' and 'Clinical Medicine' were used

respectively. From each of these 10 journals, using the journals own websites, we worked backwards from April 19th 2021, selecting the 10 most recent journal articles that met inclusion/exclusion criteria. Inclusion criteria were: research articles, reporting participant level data. Articles were excluded if they were: not research (e.g. editorial, news, images etc.), animal/other non-human participant/subject; or no participant characteristics reported. Laboratory studies using human derived tissues or cells were included if donor information was provided. Journal reporting guidance and requirements were also assessed by evaluating author guidelines, websites, and contacting the respective editorial/publishing teams. Data were collected on which participant level characteristics were reported and how. Data were also collected on if the absence of reporting these variables was noted as a limitation. The journals' accessible policies and guidance on reporting these variables was also reviewed. Data collection and analysis was conducted by SCB, KEJP, SMA and PW. All journals were reviewed and articles selected by at least two researchers independently, who then came together to discuss any inconsistencies with a third researcher.

Ethnicity and race are related yet different constructs and arguably the latter term should be abandoned[14]. However, given the frequent lack of standardisation in the literature and that the terms are in practice often used interchangeably we accepted the use of either term. Similarly, regarding reporting of socioeconomic status indicators, various often inconsistent methods are used, therefore we opted to assess both direct measures such as the Index of Multiple Deprivation, but also measures from which socioeconomic status could be inferred such as educational attainment and job role. The focus being if, rather than how, such measures are reported.

Patient and Public involvement

No patients or members of the public were specifically involved in the conduct or reporting of this study. However, we consider the topic of interest to be a public health issue of clear and substantial importance.

Results

650 publications were assessed to identify 100 meeting inclusion criteria (see figure 1 and Supplementary Material). Of one hundred research articles included, 35 reported ethnicity (or race) and 13 reported socioeconomic status. By contrast, 99 reported age, and 97 reported sex or gender (Table1). Among the articles not reporting ethnicity only 3 (5%) highlighted this as a limitation, and only 6 (7%) highlighted where socioeconomic status data were missing. Median number of articles reporting ethnicity per journal was 2.5/10 (range 0/10 (PLOS One), to 9/10 (JAMA)). Only 2 journals explicitly requested reporting of participant ethnicity (or race), and 1 requested socioeconomic status. Types of research included – interventional studies (n=30), cohort studies (n=35), case-control studies (n=3), systematic reviews and metanalyses (n=16), epidemiological and surveys (n=3), and other (n=13). Twenty of the 100 were laboratory studies (either observational or involving interventional manipulation of samples) using human samples, of which 4 reported ethnicities of sample donors (of others, none mentioned as a limitation), and none reported socioeconomic status.

Among the 24 papers describing clinical trials, 50% reported ethnicity, with none highlighting the absence of these data as a limitation. 12.5% of trials reported an indicator of socioeconomic status, with one of the 21 not reporting socioeconomic status highlighting this absence as a limitation.

Of note, two of the research articles included in our sample identified ethnicity as being relevant to their research topic, yet did not provide relevant data on their study participants or highlight the lack of this data as a limitation of their study '*in the case of DNA-based mutation testing, poor sensitivity in detecting mutations in infants from ethnic and racial minority groups''*[15], and *'peripheral oxygen saturation can substantially differ from the SaO_2 under certain conditions and may be less accurate in Black patients than in White patients.''*[16].

Figure 1: Flow diagram of included/excluded articles

Table 1: Reporting of ethnicity and/or race, and Socioeconomic Status indicators in research articles

	N	Additional notes
Report participant level characteristics	100	
Report ethnicity and/or race	35/100 report 65 Not report	Range per journal: JAMA 9/10, with clear guidance that this information is expected.
Noted in limitations	62 of the 65 do not state this as a limitation 3 Do highlight this as a limitation.	Some studies identify race and ethnicity as being relevant to the research focus, yet did not provide relevant data on their study participants or highlight this a limitation of their study e.g. • *'in the case of DNA-based mutation testing, poor sensitivity in detecting mutations in infants from ethnic and racial minority groups''(DOI: 10.1126/scitranslmed.abd8109)* • *'peripheral oxygen saturation can substantially differ from the Sao2 under certain conditions and may be less accurate in Black patients than in White patients.' (DOI: 10.1056/NEJMoa2032510)*
Report socioeconomic status indicator	13/100 report at a measure of SES (6 direct measure e.g. Index of Multiple Deprivation, Poverty income ratio; 7 measures from which SES can be inferred eg educational attainment, job role) 87/100 did not report any indication of SES	
Noted in limitations	6/87 identified this as a limitation	
Age reported	99/100	
Sex or Gender reported	97/100	

Percentages not given as most results have 100 as the denominator.

Discussion

The majority of research published in high-impact medical journals does not include data on the ethnicity and socioeconomic status of participants, and this omission is rarely acknowledged as a limitation. This finding echoes related historical research,[8-13] but its persistence is of concern and is surprising given current awareness of such issues[17 18].

These findings have important implications for the interpretation and application of research findings, both within academia and beyond, with the ongoing omission no longer justifiable as simple oversight. As highlighted by Baker et al.[19] in relation to data relating to LGBTQI+ communities, but equally relevant here, '*Data are fundamentally political: decisions about which data are collected and which are overlooked both reflect and shape policy and program priorities.*'

Our results could have multiple contributory factors. For some research including secondary data analyses, ethnicity and socioeconomic status data may not have been available to the researchers, but given the lack of explanation, it remains unclear if these data were unavailable, or available but not included in publications. The low level of reporting in controlled clinical trials suggests issues beyond unavailability of data, as in these studies such data would be simple to collect. Additionally, given research successfully reporting these data, the justification for these omissions remains unexplained.

The increased frequency of reporting ethnicity compared to socioeconomic status, may indicate differences between the perceived relevance of these variables. This would be in keeping journal author guidelines and ICMJE recommendations that encourage the inclusion of relevant demographic variables to ensure representative samples[5], more often explicitly stating race and/or ethnicity, than socioeconomic status. The relevance of these factors may not have been apparent to authors and editorial teams, however ICMJE Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals[5] states *'Because the relevance of such variables as age, sex, or ethnicity is not always known at the time of study design, researchers should aim for inclusion of representative populations into all study types and at a minimum provide descriptive data for these and other relevant demographic variables.'*. Of note, not all of the journals in our sample state

that they follow the ICMJE recommendations[20]. However, whether or not the journal states they follow guidance or not, this has no impact upon the relevance of these data and the importance of reporting them. Additionally, Maduka et al[21] found no difference between journals stating they follow ICMJE recommendations, and those that do not, in the frequency of reporting race and ethnicity in a sample of surgical research publications in 2019.

Certain considerations and limitations require highlighting. Firstly, different approaches to selecting research papers may alter findings. Secondly, we identified high-impact journals using the google scholar h5 index but acknowledge various other equally valid methods exist. Thirdly our analysis focused on if ethnicity and/or race was reported, but we acknowledge that these are not synonymous terms. In addition to *if* these variables are reported, *how* they are reported is also an important area for discussion and research. The widespread omissions identified by this research suggests a structural problem. Indeed, we the authors have published research which would have met the inclusion criteria and failed to report these specific characteristics. Our intention is to highlight an issue and suggest approaches to address it.

Given that inadequate reporting persists despite research highlighting the issue, author and ICMJE recommendations, and the current socio-political climate, there is a clear need for more explicit requirements that are adhered to in practice. This is likely best achieved if steps are integrated into each stage of the research process, from protocol to publication. For example, Fain et al[22] compared reporting of race and ethnicity on ClinicalTrials.gov before and after the requirement to report these data (if collected), was introduced, finding that this was associated with an increase from 42% to 92%. Similar explicit requirements could be taken in EQUATOR guidelines[23], and research ethics applications. From our sample, the journal JAMA had the most explicit guidance for reporting race and ethnicity, and this variable was reported in 9/10 of the articles we reviewed. Of note from 2022 the *New England Journal of Medicine* will be requiring authors of research articles to provide data on the representativeness of the sample including race or ethnic group[24], though it is unclear if socioeconomic status indicators will also be required.

Conclusion

The reporting of ethnicity and socioeconomic status in high-impact medical research remains poor, despite a consensus on its importance. Omission of these participant characteristics limits the interpretation, generalisability, and pooling of data, that are required to facilitated informed discussion around health inequalities. Guidance and encouragement have so far proven insufficient to change practice in this area. Standardised, explicit, minimum standards are required.

Author Contributions:

SCB, had the original idea for the study. SCB, KEJP, SMA and PW collected the data. All authors (SCB, KEJP, SMA, PW, JKQ and NSH) contributed to the design of the study. KEJP analysed the data initially, which was verified by SCB, SMA and PW. KEJP wrote the first draft of the manuscript. All authors (SCB, KEJP, SMA, PW, JKQ and NSH) critically appraised the manuscript and approved it for submission, and had full access to the data and can take responsibility for the integrity of the data and the accuracy of the data analysis. The corresponding author attests that all listed authors (SCB, KEJP, SMA, PW, JKQ and NSH) meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interests:

None reported.

Acknowledgements:

None.

Data sharing:

All data used in this study are publicly available.

Ethics Approval

Ethics approval for this study was not required as all data used are freely available in the published literature.

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Figure legend

Figure 1: Flow diagram of study inclusion/exclusion

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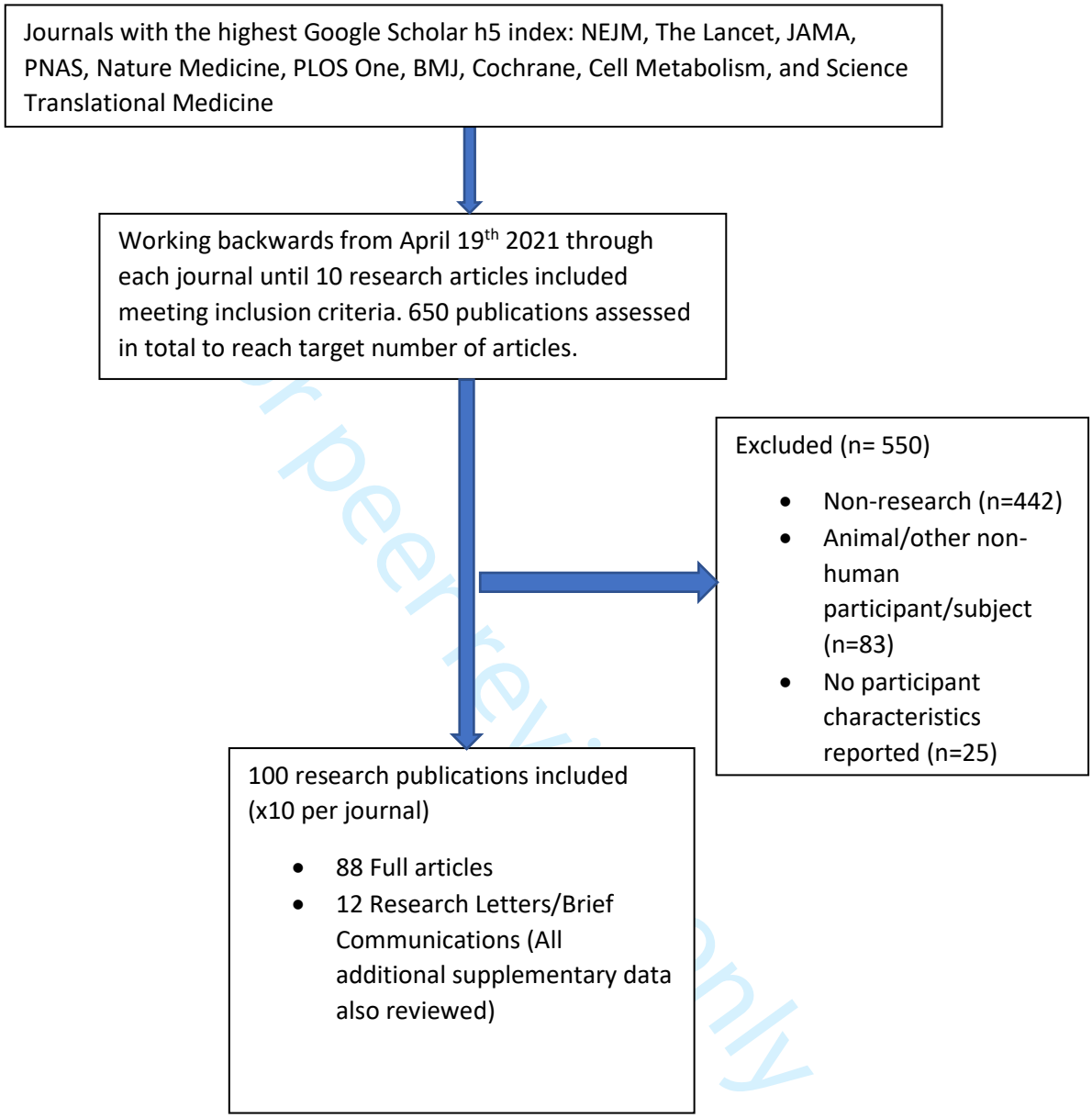

Journal	Specialty fc	Journal typ	Date of pub	Title	DOI	Disease foc
NEJM	Gastroente	Volumes ar	April 15, 202	Hypothermic	DOI: 10.105	Liver transp
NEJM	Psychiatry	Volumes ar	April 15, 202	Trial of Psiloc	DOI: 10.105	Depression
NEJM	Virology/Va	Volumes ar	April 15, 202	BNT162b2 m	DOI: 10.105	Covid-19
NEJM	Intensive ca	Volumes ar	April 15, 202	Dexmedetom	DOI: 10.105	sepsis
NEJM	Renal	Volumes ar	April 8, 2021	Lenvatinib pl	DOI: 10.105	Renal Canc
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BMJ	Cardiology	Volume an	23rd March	Age depende	https://doi	heart failur
BMJ	Virology/pu	Volume and issue		Association b	https://doi.	COVID-19
Cochrane	Oncology/H	continuous	4/15/2021	Abdominal ul	https://doi.	Cancer with
Cochrane	Respiratory	continuous	4/15/2021	Thrombolytic	https://doi.	Thrombolys
Cochrane	Obstetrics	continuous	4/14/2021	Dopamine ag	https://doi.	Ovarian hyp
Cochrane	Respiratory	continuous	4/14/2021	Regular treat	https://doi.	Asthma
Cochrane	Neurology/	continuous	4/14/2021	Botulinum to	https://doi.	dystonia
Cochrane	Orthopaedi	continuous	4/13/2021	Non-steroida	https://doi.	trigger fing
Cochrane	Reproducti	continuous	4/12/2021	Monitoring o	https://doi.	assisted rep
Cochrane	Hepatology	continuous	4/10/2021	Treatment fo	https://doi.	liver cirrhos
Cochrane	Neurology	continuous	4/7/2021	Anti-seizure r	https://doi.	Lennox-Gas
Cochrane	Hepatology	continuous	4/6/2021	Primary prev	https://doi.	liver cirrhos
Cell Metabolism	Metabolic c	Volumes ar	6th April 202	Hyocholic aci	https://doi.	T2DM
Cell Metabolism	CVD	Volumes ar	2nd March 2	The pyruvate	https://doi.	Heart Falui
Cell Metabolism	Resp/ Meta	Volumes ar	2nd February	Neutrophils F	https://doi.	COPD
Cell Metabolism	Oncology	Volumes ar	5th Jan 2021	Acetyl-CoA S	https://doi.	Myeloma
Cell Metabolism	Rheumatol	Volumes ar	1st Dec 2020	Succinyl-CoA	https://doi.	rheumatoic
Cell Metabolism	Virology/In	Volumes ar	1st Dec 2020	SARS-CoV-2 (	https://doi.	SARS-CoV-2
Cell Metabolism	Virology/In	Volumes ar	1st Dec 2020	Expression of	https://doi.	SARS-CoV-3
Cell Metabolism	Endocrinol	Volumes ar	1st Dec 2020	Elevation of J	https://doi.	Diabetic Kid
Cell Metabolism	Endocrinol	Volumes ar	3rd Nov 202	Pyruvate Kina	https://doi.	Diabetes
Cell Metabolism	Oncology	Volumes ar	3rd Nov 202	Bone Marrow	https://doi.	Myeloid Le
Science translational medicine	Infectious c	Volumes/is	4/14/2021	Imaging Ente	DOI: 10.112	Infection
Science translational medicine	Haematolo	Volumes/is	4/14/2021	Rituximab-re	DOI: 10.112	Immune th
Science translational medicine	Endocrinol	Volumes/is	4/7/2021	SerpinB13 an	DOI: 10.112	Diabetes
Science translational medicine	Oncology/H	Volumes/is	4/7/2021	A selective H	DOI: 10.112	Cancer
Science translational medicine	Rheumatol	Volumes/is	4/7/2021	Urolithin A in	DOI: 10.112	muscular d
Science translational medicine	Respiratory	Volumes/is	3/31/2021	Soft, skin-int	DOI: 10.112	CF
Science translational medicine	Infectious c	Volumes/is	3/31/2021	Clearance of	DOI: 10.112	HBV virolog
Science translational medicine	Reproducti	Volumes/is	3/31/2021	Increasing br	DOI: 10.112	Human gro
Science translational medicine	Endocrinol	Volumes/is	3/31/2021	Transcription	DOI: 10.112	Diabetes
Science translational medicine	Neurology	Volumes/is	3/17/2021	GDE2-RECK c	DOI: 10.112	Alzhiemers

Excluded articles from each journal

NEJM Non-research articles (n= 24); Animal studies/Other non human (n=0); human research with no par
Lancet Non-research articles (n= 82); Lancet Animal studies/Other non human (n=0); human research witl
JAMA Non-research articles (n=51); Animal studies/Other non human (n=0); No participant level data rep
PNAS Non-research articles (n=69); Animal studies/Other non human (n=30); No participant level data rep
NatureMed: Non-research articles (total n=18); Animal studies/Other non human (n=1); No participant lev
PLOSOne Non-research articles (n=0); Animal studies/Other non human (n=4);No participant level data re
BMJ Non-research articles (n=141); Animal studies/Other non human (n=1); No participant level data rep
Cochrane Non-research papers (n=0); Animal studies/Other non human (n=0); No participant level data re
Cell metabolism Non-research articles (n=54); Animal studies/Other non human (n=33); No participant lev
SciTransMed Non-research articles (n=3); Animal studies/Other non human (n=14); No participant level d

Country of	Country of	Manuscrtipt type	Study design	Report bas	Report race
USA	Multicentre	Original research (full paper)	RCT	Yes: Age, m	No (and not
USA	UK	Original research (full paper)	RCT	Yes: Age, fe	Yes: %white
USA	Israel	Original research (full paper)	Case Control	Yes: Age, fe	Yes: 'popula
USA	USA	Original research (full paper)	RCT	Yes: Age, Fe	Yes: 'Race c
USA	Global	Original research (full paper)	RCT	Yes: Age, se	No (and not
USA	Demark	Original research (full paper)	RCT	Yes: Age, se	No (and not
USA	Global	Original research (full paper)	Cohort study	Yes: Age, se	Yes: Results
USA	Germany	Original research (full paper)	Intervention trial (other t	Yes: Age, se	No (and not
USA	USA	Original research (letter)	Cohort study	Yes: Age, ge	No (and not
USA	Global	Original research (full paper)	RCT	Yes: Age, m	Yes: race (w
UK	Denmark	Original research (letter)	Cohort study	Yes: age gr	No (and not
UK	Australia	Original research (full paper)	RCT	Yes: Age, m	No (and not
UK	England	Original research (full paper)	Cohort study	Yes: Gende	Yes: Ethnici
UK	UK	Original research (full paper)	RCT (Secondary data ana	Yes: age, %	Yes: ethnict
UK	UK	Original research (full paper)	RCT	Yes: Age, ge	No (and not
UK	UK	Original research (full paper)	RCT	Yes: Age, ge	No (and not
UK	Global	Original research (full paper)	RCT	Yes: Age, al	Yes: Race (B
UK	France	Original research (full paper)	RCT	Yes: Age, s	No (and not
UK	Not provide	Original research (full paper)	Systematic review and m	Yes: age, al	Yes: Black, a
UK	France	Original research (full paper)	RCT	Yes: Age, se	No (and not
USA	USA/UK	Original research (full paper)	RCT	Yes: age, se	Yes white, b
USA	USA/Swede	Original research (full paper)	RCT	Yes: age, se	Yes white, b
USA	Colombia	Original research (full paper)	RCT	Yes: age, se	Yes mixed r
USA	USA	Original research (Letter)	Cohort study	Yes: age, se	Yes race/etl
USA	USA	Original research (Letter)	Cohort study	Yes: age, se	Yes race/etl
USA	USA	Original research (full paper)	RCT	Yes: Age, Se	Yes: Race W
USA	USA	Original research (full paper)	RCT	Yes: Age, Se	Yes: Race (W
USA	USA	Original research (full paper)	Cohort study	Yes: Age, se	yes: race/et
USA	USA	Original research (Letter)	Epidemiologic assessmen	Yes: Age, (a	Yes: Race/e
USA	Global	Original research (full paper)	Other observational stud	Yes: Age, W	No (and not
USA	Sweeden	Original research (full paper)	Cohort study (lab)	Yes, Sex (al	yes; Thirty-f
USA	China	Original research (full paper)	Other (Mathimatical Mo	Yes age	No (and not
USA	USA	Original research (full paper)	Cohort study (lab)	Yes, sex	No (and not
USA	USA	Original research (full paper)	Survey	Yes, sex, ag	Yes, White,
USA	USA	Original research (full paper)	Cohort study (lab/modeli	Yes age, (se	No (and not
USA	USA	Original research (full paper)	Interventional (lab)	Yes Sex, Ag	No (and not
USA	FRANCE	Original research (full paper)	Cohort study	Yes, Gende	No (and not
USA	China	Original research (full paper)	RCT	Yes, age, se	No (and not
USA	China	Original research (full paper)	Cohort study	Yes, Sex, ag	No (and not
USA	Swizerland	Original research (full paper)	Cohort study	Yes, age, se	No (and not
US	Asia/Scotla	Original research (full paper)	Cohort study	yes; age, ge	No and not
US	US/ Kosovo	Original research (full paper)	Cohort study	yes; gender	no and not i
US	Africa	Original research (brief communicati	Cohort study (Mendelian	yes; age, ge	no and not i
US	UK,US,Swe	Original research (brief communicati	Cohort study	yes: countr	no (BUT IN I
US	US	Original research (full paper)	RCT	yes; age, se	Yes: ethnici
US	Global	Original research (brief communicati	Cohort study	yes; age. Se	No (and not
US	Sweden/UK	Original research (brief communicati	Interventional other (lab)	yes; age, ge	No (and not
US	Germany	Original research (brief communicati	Other Observational (lab)	yes; age, se	No (and not
US	China/USA	Original research (brief communicati	Case control study	yes; n(%) fe	No (and not
US	US	Original research (brief communicati	Interventional trial (not R	yes; age, se	No (and not
USA/UK	China	Original research (full paper)	Systematic review and m	Yes: Age, m	No (BUT IN

USA/UK	China	Original research (full paper)	Meta-analysis	Yes: age gr	No (BUT IN
USA/UK	UK	Original research (full paper)	systematic review (no m	Yes: age on	No (and not
USA/UK	Japan	Original research (full paper)	Cohort study	Yes: sex (M	No (and not
USA/UK	Poland	Original research (full paper)	Cohort study	Yes: Age, m	No (and not
USA/UK	Germany	Original research (full paper)	Cohort study	Yes: Gende	No (and not
USA/UK	Japan	Original research (full paper)	Cohort study	Yes: Sex (b	No (and not
USA/UK	Canada	Original research (full paper)	Cohort study	Yes: '8 fem	No (and not
USA/UK	Global	Original research (full paper)	systematic review (no m	Yes: Age, (a	No (and not
USA/UK	Sweden	Original research (full paper)	Cohort study	Yes: Age, (a	No (and not
UK	USA/UK	Original research (full paper)	Cohort study	yes; mean a	yes; white e
UK	Denmark/N	Original research (full paper)	RCT	yes; age, (a	yes; White
UK	UK	Original research (full paper)	Cohort study	yes; sex, ag	yes; white,
UK	Australia	Original research (full paper)	RCT	yes; age, ge	No (and not
UK	UK	Original research (full paper)	Survey	yes; gender	yes; ethinici
UK	UK	Original research (full paper)	Cohort study	yes; age, se	yes
UK	Canada	Original research (full paper)	systematic review and m	yes; age, %	No (and not
UK	US	Original research (full paper)	Cohort study	yes; age, (a	yes as state
UK	Global	Original research (full paper)	cohort study	yes;age, ma	Yes: white e
UK	UK	Original research (full paper)	Cohort study	Yes; age (gr	yes
UK	Italy	Original research (full paper)	systematic review and m	yes: age, ge	No (and not
UK	China	Original research (full paper)	systematic review and m	Yes: Age, 's	No (and not
UK	China Austr	Original research (full paper)	systematic review and m	Yes: Age if	No (and not
UK	Ireland	Original research (full paper)	systematic review and m	Yes: Age, (r	No (and not
UK	Portugal	Original research (full paper)	systematic review and m	Yes: age, %	No (and not
UK	Singapore	Original research (full paper)	systematic review and m	Yes: age, ge	No (and not
UK	UK	Original research (full paper)	systematic review and m	Yes: age, al	No (and not
UK	UK	Original research (full paper)	systematic review and m	Yes: age , 'f	No (and not
UK	Italy	Original research (full paper)	systematic review and m	Yes: Age, se	Yes - as per
Uk	UK	Original research (full paper)	systematic review and m	Yes: mean a	No (and not
UK	China	Original research (full paper)	Cohort study	Yes, Age, se	No (and not
UK	USA	Original research (full paper)	Other Observational (lab	Yes, Age, se	No (and not
UK	Scotland	Original research (full paper)	Other Observational (lab	Yes, Age, se	No (and not
UK	USA	Original research (full paper)	Other Observational (lab	Yes, age,se	No (and not
UK	USA	Original research (full paper)	Other Observational (lab	Yes, age,se	No (and not
UK	USA	Original research (full paper)	Other Observational (lab	Yes, age, se	Yes, caucasi
UK	USA	Original research (full paper)	Case control	Yes, age, se	Yes, caucasi
UK	China	Original research (full paper)	Other Observational (lab	Yes, age, se	No (and not
UK	USA	Original research (full paper)	Other Observational (lab	Yes, age, se	No (and not
UK	Switzerlanc	Original research (full paper)	Other Observational (lab	Yes, age, se	No (and not
USA	USA	Original research (full paper)	Other Observational (lab	Yes: Age, Se	No (and not
USA	France	Original research (full paper)	Other Observational (lab	Yes: Age, ge	No (and not
USA	USA	Original research (full paper)	cohort study	Yes male to	No (and not
USA	Hong Kong	Original research (full paper)	Interventional other (Lab	Yes : sex mi	No (and not
USA	Switzerlanc	Original research (full paper)	Interventional other (Lab	Yes (under	No (and not
USA	USA	Original research (full paper)	Interventional other (Lab	Yes Age, ge	No. (and no
USA	USA	Original research (full paper)	cohort study	Yes (supp ti	Yes: race 'A
USA	Spain	Original research (full paper)	cohort study	Yes: Age, ge	No (and not
USA	UK	Original research (full paper)	cohort study	Yes: Age, ra	Yes: race (W
USA	USA	Original research (full paper)	Interventional other (Lab	Yes: age, ge	Yes White E

rticipant level data reported (n=2)
h no participant level data reported (n=2)
orted (n=2)
ported (n=4)
vel data reported (n=7)
eported (n=0)
orted (n=2)
eported (n=1, but only because no studies included)
vel data reported (n=0)
ata reported (n=5)

e/ethnicity. Socio-economic s	Report Sex	Noted in limitations of paper (if any of those missing)
t in limitatic	No (and not in lin	Just sex as '	no. Nor in supplementary information
e (patient re	Yes: university level educatic	No, but some mention of all vars of interest
ation sector	No and not in lim	Just sex, th	No
or Ethnic Gr	No (and not in lin	% female se	No
t in limitatic	No (and not in lin	Just sex as	No
t in limitatic	No (and not in lin	Just %male	No. and not in limitations * but do mention that the accuracy of puls
s by global r	No (IN LIMITATIC	No just % n	Yes : the inclusion of many different populations could limit uniform
t in limitatic	No (and not in lin	Just sex % f	No
t in limitatic	No (and not in lin	Just gender	No
white, asian,	No (and not in lin	No just % n	No
t in limitatic	No (and not in lin	Just sex	No
t in limitatic	No (and not in lin	Just male/f	No
ty (white, n	Yes: Index of mul	No, but has	Not required!
ty white, bla	No (and not in lin	No just % fe	No
t in limitatic	No (and not in lin	gender mal	No
t in limitatic	No (and not in lin	gender mal	No
Black, Asian,	No (and not in lin	N/a	No
t in limitatic	No (and not in lin	just sex (fer	No
asian, hispa	No (and not in lin	N/a	No
t in limitatic	No (and not in lin	Sex female,	No
olack or Afri	No (and not in lin	Just sex	No
olack or Afri	No (and not in lin	Just sex	No
race, Black c	Yes but Not speci	Just sex ma	No but quite well reported on these variables.
hnicity (Bla	No (and not in lin	Just sex	No
hnicity Non	No (and not in lin	Just sex	No
White, Black,	No (and not in lin	Just sex ma	No
White, Black	No (and not in lin	Just Sex, m	No
thnicity Oth	No (and not in lin	Just sex me	No
ethnicity (W	Yes: Educational	N/a	Not but not required.
t in limitatic	No (and not in lin	just womer	No
four patient	No (and not in lin	no as all ma	no
t in limitatic	No (and not in lin	no	no
t in limitatic	No (and not in lin	Yes Males,	No
Black, Hisp	No (and not in lin	Yes sex; Ma	No but participants stratified based on education level (years of edu
t in limitatic	No (and not in lin	No	No
t in limitatic	No (and not in lin	Yes all male	No
t in limitatic	No (and not in lin	gender; Ma	No
t in limitatic	No (and not in lin	Yes; sex; nc	No
t in limitatic	No (and not in lin	Yes sex; no	no
t in limitatic	No (and not in lin	Yes; sex; Fe	No
in limitatio	No (and not in lin	yes; male/f	no
in limitatior	No (and not in lin	yes; male/f	no
in limitatior	No (and not in lin	yes % fema	no
LIMITATION	yes: index of mul	yes (male% | yes; 1) App users were disproportionately female, and those over 7(
ty; not hisp	No (and not in lin	yes; sex fen	no
t in limitatic	YES university ed	% boys	no
t in limitatic	No (and not in lin	gender; ma	no
t in limitatic	No Probably not	yes: sex; m	no
t in limitatic	No (and not in lin	yes; womer	no
t in limitatic	No (and not in lin	sex; male/f	no
LIMITATION	No (IN LIMITATIC	Just 'gende	Yes 'Secondly, the impact of dietary factors on stone recurrence vari

LIMITATIOI	No (and not in lin	Male Vs Fe	Yes 'most studies come from East Asia, and there may be ethnic diffe
t in limitatic	No (IN LIMITATIC	No	Not patient level but did state 'We also limited our search to high inc
t in limitatic	No (and not in lin	Just sex	No
t in limitatic	No (and not in lin	states data	No
t in limitatic	No (and not in lin	gender mal	No
t in limitatic	No (and not in lin	Just sex (bo	No
t in limitatic	No (and not in lin	just numbe	No
t in limitatic	No (and not in lin	No	No
t in limitatic	No (and not in lin	n/a	No
ethnicity or	YES; as stated;	yes; men n	no
European	no (IN LIMITATIO	yes	no; With respect to external validity, the trial included women from
mixed, asia	no (IN LIMITATIO	yes; men, w	yes; it is discussed but not reported; as the analyses are unadjusted a
t in limitatic	YES education (y	yes; female	some note on socio economic status but no mention of ethnicity/rac
ity; white b	YES household m	yes; male/f	For ethnicity, we grouped together black people, Asian people, and p
	yes; as stated;	yes	n/a
t in limitatic	No (and not in lin	yes % wom	no
ed	No (and not in lin	n/a all wom	no
ethnicity n ?	no (IN LIMITATIO	yes; male s	socio economic status were not observed in the data set
	yes; as stated;	yes	n/a
t in limitatic	No (and not in lin	yes: individ	no
t in limitatic	No (and not in lin	No	no
t in limitatic	No (and not in lin	No	no
t in limitatic	No (and not in lin	Sex reporte	no
t in limitatic	No (and not in lin	%female	no
t in limitatic	No (and not in lin	gender mal	no
t in limitatic	No (and not in lin	All female,	no
t in limitatic	No (and not in lin	n and % fer	no
the study r	Yes 'Other releva	Yes as per s	n/a
t in limitatic	No (and not in lin	n and % fer	no
t in limitatic	No (and not in lin	Yes (Sex n M	no
t in limitatic	No (and not in lin	Yes (Gende	no
t in limitatic	No (and not in lin	Yes (Gende	no
t in limitatic	No (and not in lin	Yes Male, F	no
t in limitatic	No (and not in lin	Yes, (doesn	no
ian, black, h	No (and not in lin	Yes (Sex nM	no
ian, african	No (and not in lin	Yes, (sex nM	no
t in limitatic	No (and not in lin	Yes, (sex nM	no
t in limitatic	No (and not in lin	Yes, (sex nM	no
t in limitatic	No (and not in lin	Yes, States	no
t in limitatic	No (and not in lin	Yes sex m/f	No
t in limitatic	No (and not in lin	Yes gender	No
t in limitatic	No (and not in lin	yes male to	no
t in limitatic	No (and not in lin	No	No
t in limitatic	No (and not in lin	No	No
ot in limitati	No (and not in lin	No	No
sian, Black,	No (and not in lin	Yes: sex ma	No
t in limitatic	No (and not in lin	Yes gender	No
White, Black	No (and not in lin	Yes sex mal	No
Black	No (and not in lin	No	No

se oximetry may be less accurate in black people. Though having not reported race-ethnicity it is unclear
conclusions; however, the diversity also increases the range of differences that may be helpful in establ

cation). Also includes marital status and vote in 2016 presidential election

0 yearsof age were underrepresented, 2). Caution is needed in the interpretation of associations found i

es from age, gender, race, and region remained unknown due to the lack of related studies. '

erences that restrict the generalization and reliability of the results.'

come countries, meaning our results may not be applicable to lower and middle income countries.'

secondary and tertiary level hospitals, and the results are generalisable to countries with similar demogr

and so prone to confounding; information on the accuracy of the Master Patient Service matching at the

ce; Fourthly, the community dwelling older people who participated in our study were highly educated, h

people of mixed ethnicity. This might have obscured differences between ethnic groups.

· if their study particiapnts are all white, all black etc.

lishing associations, and when effects are seen, they are likely to be robust and meaningful.

n smaller population subgroups 3)unable to analyze the impact of ethnicity due to incomplete data.

raphics.

e level of each record within each dataset is needed to provide assurance of high linkage quality and to a

had a high percentage of computer ownership, and lived in more affluent areas of Sydney; our results m

allow assessment of whether this varies by important patient characteristics, such as age, ethnicity, and c
ight not generalise to usage in more rural or less affluent areas.

deprivation;

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1 ('targeted' as we have adapted our approach)
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	As per BMJ Open
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	4-5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	4-5
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.	5
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 confirming data from study investigators, and if applicable, details of automation tools used in the process.	4-5
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.	5
	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.	5
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.	n/a
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.	5-6
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)).	5-6
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	5-6
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	5-6
	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.	5-6
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	5-6
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	n/a
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	n/a
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.	6
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	5-6
Study characteristics	17	Cite each included study and present its characteristics.	Online suppl.
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	n/a
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.	n/a
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Online suppl.
	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.	5-6
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	5-6
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	5-6
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	n/a
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	n/a
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	7-8
	23b	Discuss any limitations of the evidence included in the review.	7-8
	23c	Discuss any limitations of the review processes used.	7-8
	23d	Discuss implications of the results for practice, policy, and future research.	7-9
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.	Not registered
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Agreed between authors but not made available publicly.

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	n/a
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	9
Competing interests	26	Declare any competing interests of review authors.	9
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.	Online Suppl.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71
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Reporting of data on participant ethnicity and socioeconomic status in high-impact medical journals: a targeted literature review

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Reporting of data on participant ethnicity and socioeconomic status in high-impact medical journals: a targeted literature review

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ABSTRACT

Objectives: To assess the frequency of reporting of ethnicity (or 'race') and socioeconomic status (SES) indicators in high-impact journals.

Design: Targeted literature review.

Data sources: The 10 highest ranked general medical journals using Google scholar h5 index.

Eligibility criteria: Inclusion criteria were, human research, reporting participant level data. Exclusion criteria were non-research article, animal/other non-human participant/subject; or no participant characteristics reported.

Data extraction and synthesis: Working backwards from April 19th, 2021 in each journal, two independent reviewers selected the 10 most recent articles meeting inclusion/exclusion criteria, to create a sample of 100 articles. Data on the frequency of reporting of ethnicity (or 'race') and SES indicators were extracted and presented using descriptive statistics.

Results: Of one hundred research articles included, 35 reported ethnicity and 13 SES. By contrast, 99 reported age, and 97 reported sex or gender. Among the articles not reporting ethnicity only 3 (5%) highlighted this as a limitation, and only 6 (7%) where SES data were missing. Median number of articles reporting ethnicity per journal was 2.5/10 (range 0 to 9). Only 2 journals explicitly requested reporting of ethnicity (or race), and 1 requested SES.

Conclusions: The majority of research published in high-impact medical journals does not include data on the ethnicity and socioeconomic status of participants, and this omission is rarely acknowledged as a limitation. This situation persists despite the well-established importance of this issue and ICMJE recommendations to include relevant demographic variables to ensure representative samples. Standardized explicit minimum standards are required.

Strengths and limitations of this study

- This study included recent studies from a range of the highest impact general medical journals.
- Different inclusion/exclusion criteria for articles could be justifiably used, which may have produced different results.
- We identified high-impact journals using the google scholar h5 index, however various other equally valid impact metrics exist, which could change the journals considered.
- Our analysis focused on *if* ethnicity and/or race was reported, but not *how* they are reported which is an important and related area for discussion and research to that covered in this study.

Introduction

Information about the ethnicity and socioeconomic status of participants in clinical research is needed for the interpretation, generalisability and pooling of data as well as to inform discussion around health inequalities. The relevance of ethnicity and socio-economic status to health and biomedical research is well established but has been emphasised by the COVID-19 pandemic, during which specific ethnic groups and poorer individuals have been disproportionately affected[1]. The causal pathways driving health disparities are complex and multifactorial, however under-reporting of participant characteristics has been identified as a potential contributory factor[2-4].

The International Committee of Medical Journal Editors recommendations[5], and some journal instructions to authors promote inclusion of these data[6 7]. Previous studies have identified that reporting is frequently incomplete with limited progress made over the last three decades [8-13]. Recent years have seen an increased focus on ethnicity and socioeconomic status in medicine, however there is a lack of research as to whether this has resulted in better reporting.

To evaluate the current situation in this area, we assessed the frequency of reporting of ethnicity (or 'race') and socioeconomic status indicators in a sample of research articles published in high impact general medical journals in Spring 2021.

Methods

We identified the 10 highest ranked journals as per Google scholar 'Health and Medical (general)' category up to April 2021. At the time of data collection these were The New England Journal of Medicine (NEJM), The Lancet, the Journal of the American Medical Association [7], Proceedings of the National Academy of Sciences of the United States of America (PNAS), Nature Medicine, Public Library of Science One (PLOS One), The British Medical Journal (BMJ), Cochrane, Cell Metabolism, and Science Translational Medicine. PNAS and PLOS One include a wide range of subject areas therefore the subsections 'Biological Sciences, Medical Science' and 'Clinical Medicine' were used

respectively. From each of these 10 journals, using the journals own websites, we worked backwards from April 19th, 2021, selecting the 10 most recent journal articles that met inclusion/exclusion criteria. Inclusion criteria were: research articles, reporting participant level data. Articles were excluded if they were: not research (e.g. editorial, news, images etc.), animal/other non-human participant/subject; or no participant characteristics reported. Laboratory studies using human derived tissues or cells were included if donor information was provided. Journal reporting guidance and requirements were also assessed by evaluating author guidelines, websites, and contacting the respective editorial/publishing teams. Data were collected on which participant level characteristics were reported and how. Data were also collected on if the absence of reporting these variables was noted as a limitation. The journals' accessible policies and guidance on reporting these variables was also reviewed. Data collection and analysis was conducted by SCB, KEJP, SMA and PW. All journals were reviewed and articles selected by at least two researchers independently, who then came together to discuss any inconsistencies with a third researcher.

Ethnicity and race are related yet different constructs and arguably the latter term should be abandoned[14]. However, given the frequent lack of standardisation in the literature and that the terms are in practice often used interchangeably we accepted the use of either term. For the purpose of this study ethnicity (or race) was defined as variables explicitly stated by the authors as 'ethnicity', 'ethnic group', or 'race', 'racial group'. Similarly, regarding reporting of socioeconomic status indicators, various often inconsistent methods are used, therefore we opted to assess both direct measures such as the Index of Multiple Deprivation, but also measures from which socioeconomic status could be inferred such as educational attainment and job role. The focus being if, rather than how, such measures are reported. Variables were considered to be indicators of SES if they were explicitly stated as being included for this purpose in the studies reporting them, or if not explicitly stated in the study itself, variables that might be considered SES indicators were discussed between researchers and included or excluded based on consensus opinion. Given the potential degree of subjectivity related to this approach we have provided the specific terms used by included studies in the results section below. The agreed approach

was to take a more inclusive approach, so that if these variables were found to be infrequently reported, such findings would not be dismissed as relating to overly stringent inclusion criteria.

Patient and public involvement

None.

Results

650 publications were assessed to identify 100 meeting inclusion criteria (see figure 1 and Supplementary Material Tables 1, 2, and 3). Of one hundred research articles included, 35 reported ethnicity (or race) and 13 reported socioeconomic status. By contrast, 99 reported age, and 97 reported sex or gender (Table1).

Among the articles not reporting ethnicity only 3 (5%) highlighted this as a limitation, and only 6 (7%) highlighted where socioeconomic status data were missing. Median number of articles reporting ethnicity per journal was 2.5/10 (range 0/10 (PLOS One), to 9/10 [7]). Only 2 journals explicitly requested reporting of participant ethnicity (or race), and 1 requested socioeconomic status. Types of research included – interventional studies (n=30), cohort studies (n=35), case-control studies (n=3), systematic reviews and metanalyses (n=16), epidemiological and surveys (n=3), and other (n=13). Twenty of the 100 were laboratory studies (either observational or involving interventional manipulation of samples) using human samples, of which 4 reported ethnicities of sample donors (of others, none mentioned as a limitation), and none reported socioeconomic status.

Among the 24 papers describing clinical trials, 50% reported ethnicity, with none highlighting the absence of these data as a limitation. 12.5% of trials reported an indicator of socioeconomic status, with one of the 21 not reporting socioeconomic status highlighting this absence as a limitation.

Of note, two of the research articles included in our sample identified ethnicity as being relevant to their research topic, yet did not provide relevant data on their study participants or highlight the lack of this

data as a limitation of their study '*in the case of DNA-based mutation testing, poor sensitivity in detecting mutations in infants from ethnic and racial minority groups''*, and *'peripheral oxygen saturation can substantially differ from the SaO_2 under certain conditions and may be less accurate in Black patients than in White patients.'*[15].

Figure 1: Flow diagram of included/excluded articles

Table 1: Reporting of ethnicity and/or race, and Socioeconomic Status indicators in research articles

	N	Additional notes
Report participant level characteristics	100	
Report ethnicity and/or race	35/100 report 65 Not report	Range per journal: JAMA 9/10, with clear guidance that this information is expected.
Noted in limitations	62 of the 65 do not state this as a limitation 3 Do highlight this as a limitation.	Some studies identify race and ethnicity as being relevant to the research focus, yet did not provide relevant data on their study participants or highlight this a limitation of their study e.g. • *'in the case of DNA-based mutation testing, poor sensitivity in detecting mutations in infants from ethnic and racial minority groups''(DOI: 10.1126/scitranslmed.abd8109)* • *'peripheral oxygen saturation can substantially differ from the Sao2 under certain conditions and may be less accurate in Black patients than in White patients.' (DOI: 10.1056/NEJMoa2032510)*
Report socioeconomic status indicator	13/100 report at a measure of SES (6 direct measure e.g. Index of Multiple Deprivation, Poverty income ratio; 7 measures from which SES can be inferred eg educational attainment, job role) 87/100 did not report any indication of SES	
Noted in limitations	6/87 identified this as a limitation	
Age reported	99/100	
Sex or Gender reported	97/100	

Percentages not given as most results have 100 as the denominator.

Discussion

The majority of research published in high-impact medical journals does not include data on the ethnicity and socioeconomic status of participants, and this omission is rarely acknowledged as a limitation. This finding echoes related historical research,[8-13] but its persistence is of concern and is surprising given current awareness of such issues[16 17].

These findings have important implications for the interpretation and application of research findings, both within academia and beyond, with the ongoing omission no longer justifiable as simple oversight. As highlighted by Baker et al.[18] in relation to data relating to LGBTQI+ communities, but equally relevant here, '*Data are fundamentally political: decisions about which data are collected and which are overlooked both reflect and shape policy and program priorities.*'

Our results could have multiple contributory factors. For some research including secondary data analyses, ethnicity and socioeconomic status data may not have been available to the researchers, but given the lack of explanation, it remains unclear if these data were unavailable, or available but not included in publications. The low level of reporting in controlled clinical trials suggests issues beyond unavailability of data, as in these studies such data would be simple to collect. Additionally, given research successfully reporting these data, the justification for these omissions remains unexplained. Non-reporting of ethnicity (or race) and SES data may also result from explicit or implicit racism, or other forms of discrimination such as that based on SES, which could include failing to appreciate the relevance of these factors to the generalisability of findings.

The increased frequency of reporting ethnicity compared to socioeconomic status, may indicate differences between the perceived relevance of these variables. This would be in keeping journal author guidelines and ICMJE recommendations that encourage the inclusion of relevant demographic variables to ensure representative samples[5], more often explicitly stating race and/or ethnicity, than socioeconomic status. The relevance of these factors may not have been apparent to authors and editorial teams, however ICMJE Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals[5] states *'Because the relevance of such variables as*

age, sex, or ethnicity is not always known at the time of study design, researchers should aim for inclusion of representative populations into all study types and at a minimum provide descriptive data for these and other relevant demographic variables.'. Of note, not all of the journals in our sample state that they follow the ICMJE recommendations[19]. However, whether or not the journal states they follow guidance or not, this has no impact upon the relevance of these data and the importance of reporting them. Additionally, Maduka et al[20] found no difference between journals stating they follow ICMJE recommendations, and those that do not, in the frequency of reporting race and ethnicity in a sample of surgical research publications in 2019.

Certain considerations and limitations require highlighting. Firstly, different approaches to selecting research papers may alter findings. Secondly, we identified high-impact journals using the google scholar h5 index but acknowledge various other equally valid methods exist. Thirdly our analysis focused on if ethnicity and/or race was reported, but we acknowledge that these are not synonymous terms. In addition to *if* these variables are reported, *how* they are reported is also an important area for discussion and research. The choice to analyse 100 papers was somewhat arbitrary. We wanted to include an adequate number of articles from the selected journals to provide a representative sample of their original research papers. Furthermore, given the substantial differences in the number of original research papers published between journals, keeping to ten per journal ensured all included papers were published within a 4-month window. If we had included 100 papers per journal, the sample from some journals might be 2 months, while others nearer 2 years, which could complicate interpretation given the potential for changing levels of reporting over time. The widespread omissions identified by this research suggests a structural problem. Indeed, we the authors have published research which would have met the inclusion criteria and failed to report these specific characteristics. Our intention is to highlight an issue and suggest approaches to address it.

Given that inadequate reporting persists despite research highlighting the issue, author and ICMJE recommendations, and the current socio-political climate, there is a clear need for more explicit requirements that are adhered to in practice. This is likely best achieved if steps are integrated into each stage of the research process, from protocol to publication. For example, Fain et al[21] compared reporting

of race and ethnicity on ClinicalTrials.gov before and after the requirement to report these data (if collected), was introduced, finding that this was associated with an increase from 42% to 92%. Similar explicit requirements could be taken in EQUATOR guidelines[22], and research ethics applications. From our sample, the journal JAMA had the most explicit guidance for reporting race and ethnicity, and this variable was reported in 9/10 of the articles we reviewed. Of note, from 2022 the *New England Journal of Medicine* will be requiring authors of research articles to provide data on the representativeness of the sample including race or ethnic group[23], though it is unclear if socioeconomic status indicators will also be required. Much of the recent literature appears to focus on ethnicity reporting, likely due to the COVID-19 pandemic exposing its disproportionate effects on some ethnic groups [24].One recent publication in Nature medicine[24] suggested it would require changes at policy level as well as engaging with professionals, patients and the public to communicate the importance of this issue in understanding inequalities, Barriers suggested include problems collecting ethnicity data, whether this be reported by a healthcare professional or self-reported, and in defining ethnic groups where categorisation is inconsistent. [24 25]This is reflected in the diverse terms used to report ethnicity in the papers we reviewed (Table 3 Supplementary Material). Future research would be useful investigating changing in reporting overtime, especially in relation to specific actions taken to improve this issue, which could inform research reporting guidelines.

Conclusion

The reporting of ethnicity and socioeconomic status in high-impact medical research remains poor, despite a consensus on its importance. Omission of these participant characteristics limits the interpretation, generalisability, and pooling of data, that are required to facilitated informed discussion around health inequalities. Guidance and encouragement have so far proven insufficient to change practice in this area. Standardised, explicit, minimum standards are required.

Contributors

SCB, had the original idea for the study. SCB, KEJP, SMA and PW collected the data. All authors (SCB, KEJP, SMA, PW, JKQ and NSH) contributed to the design of the study. KEJP analysed the data initially, which was verified by SCB, SMA and PW. KEJP wrote the first draft of the manuscript. All authors (SCB, KEJP, SMA, PW, JKQ and NSH) critically appraised the manuscript and approved it for submission and had full access to the data and can take responsibility for the integrity of the data and the accuracy of the data analysis. The corresponding author attests that all listed authors (SCB, KEJP, SMA, PW, JKQ and NSH) meet authorship criteria and that no others meeting the criteria have been omitted.

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Competing interests

None reported.

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None.

Data availability statement

All data used in this study are publicly available.

Ethics approval

Ethics approval for this study was not required as all data used are freely available in the published literature.

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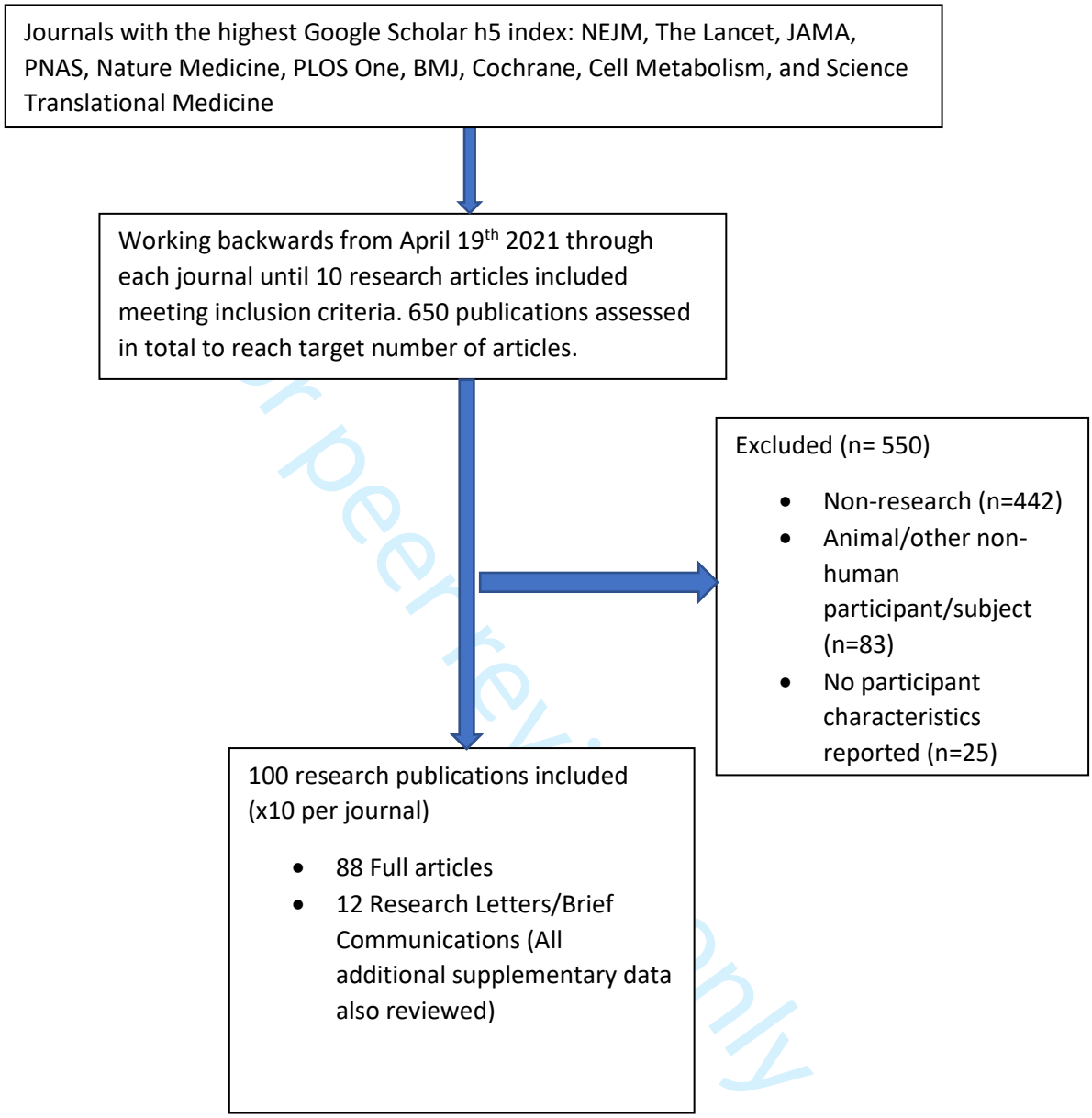
Figure titles

Figure 1: Flow diagram of study inclusion/exclusion

Figure 1: Flow diagram of study inclusion/exclusion



Reporting of data on participant ethnicity and socioeconomic status in high-impact medical journals: A targeted literature review: Supplementary Tables

Table 1: Research papers included in the sample

Journal	Date of pub	Title	DOI	Country of journal	Country of study/Corresponding author	Manuscript type	Study design	Report baseline/participants characteristics (which & how)
NEJM	15/04/2021	Hypothermic Machine Perfusion in Liver Transplantation — A Randomized Trial	10.1056/NEJMoa2031532	USA	Multicentre Europe	Original research (full paper)	RCT	Yes: Age, male sex, BMI, preservation of liver measures,
NEJM	15/04/2021	Trial of Psilocybin versus Escitalopram for Depression	10.1056/NEJMoa2032994	USA	UK	Original research (full paper)	RCT	Yes: Age, female sex, white race, employment status, university level education, disease specific variables.
NEJM	15/04/2021	BNT162b2 mRNA Covid-19 Vaccine in a Nationwide Mass Vaccination Setting	10.1056/NEJMoa2101765	USA	Israel	Original research (full paper)	Case Control	Yes: Age, female/male (sex), population sector (general Jewish, Arab, Ultra-orthodox Jewish), comorbidities,
NEJM	15/04/2021	Dexmedetomidine or Propofol for Sedation in Mechanically Ventilated Adults with Sepsis	10.1056/NEJMoa2024922	USA	USA	Original research (full paper)	RCT	Yes: Age, Female sex %, BMI, 'Race or Ethnic Group' White, Black, Latinx, multiple or other; cognitive decline score; clinical illness
NEJM	08/04/2021	Lenvatinib plus Pembrolizumab or Everolimus for Advanced Renal Cell Carcinoma	10.1056/NEJMoa2035716	USA	Global	Original research (full paper)	RCT	Yes: Age, sex (male/female), geographic region,
NEJM	08/04/2021	Lower or Higher Oxygenation Targets for Acute Hypoxemic Respiratory Failure	10.1056/NEJMoa2032510	USA	Demark	Original research (full paper)	RCT	Yes: Age, sex %male, comorbidities, illness/admission metrics
NEJM	08/04/2021	Glycemic Index, Glycemic Load, and Cardiovascular Disease and Mortality	10.1056/NEJMoa2007123	USA	Global	Original research (full paper)	Cohort study	Yes: Age, sex %male, urban residence, health risk factors, results by continents
NEJM	08/04/2021	Sutimlimab in Cold Agglutinin Disease	10.1056/NEJMoa2027760	USA	Germany	Original research (full paper)	Intervention trial (other than RCT)	Yes: Age, sex %female, geographic location (Europe, Japan, USA, Australia), disease characteristics,

NEJM	08/04/2021	Antibody Responses in Seropositive Persons after a Single Dose of SARS-CoV-2 mRNA Vaccine	10.1056/NEJMc2101667	USA	USA	Original research (letter)	Cohort study	Yes: Age, gender (male, female, prefer not to say,
NEJM	01/04/2021	Adjuvant Nivolumab in Resected Esophageal or Gastroesophageal Junction Cancer	10.1056/NEJMoa2032125	USA	Global	Original research (full paper)	RCT	Yes: Age, male sex %, race (white, Asian, black, other, not reported), Geographic region (Europe, US, Canada, Asia)
The Lancet	17/04/2021	Thromboembolism and the Oxford–AstraZeneca COVID-19 vaccine: side-effect or coincidence?	10.1016/S0140-6736(21)00762-5	UK	Denmark	Original research (letter)	Cohort study	Yes: age group, female + male numbers
The Lancet	17/04/2021	Effect of infusion set replacement intervals on catheter-related bloodstream infections (RSVP): a randomised, controlled, equivalence (central venous access device)–non-inferiority (peripheral arterial catheter) trial	10.1016/S0140-6736(21)00351-2	UK	Australia	Original research (full paper)	RCT	Yes: Age, male/female, disease/hospital stay characteristics
The Lancet	17/04/2021	SARS-CoV-2 infection rates of antibody-positive compared with antibody-negative health-care workers in England: a large, multicentre, prospective cohort study (SIREN)	10.1016/S0140-6736(21)00675-9	UK	England	Original research (full paper)	Cohort study	Yes: Gender (female, male, other); Age; Ethnicity (white, mixed race, Asian, black, Chinese, other, prefer not to say), medical conditions, index of multiple deprivation, region of England.
The Lancet	10/04/2021	Efficacy of ChAdOx1 nCoV-19 (AZD1222) vaccine against SARS-CoV-2 variant of concern 202012/01 (B.1.1.7): an exploratory analysis of a randomised controlled trial	10.1016/S0140-6736(21)00628-0	UK	UK	Original research (full paper)	RCT (Secondary data analysis)	Yes: age, % female, ethnicity white, black, Asian, mixed, other, missing,
The Lancet	10/04/2021	The SANAD II study of the effectiveness and cost-effectiveness of levetiracetam, zonisamide, or lamotrigine for newly diagnosed focal epilepsy: an open-label, non-inferiority, multicentre, phase 4, randomised controlled trial	10.1016/S0140-6736(21)00247-6	UK	UK	Original research (full paper)	RCT	Yes: Age, gender (male/female),
The Lancet	10/04/2021	The SANAD II study of the effectiveness and cost-effectiveness of valproate versus levetiracetam for newly diagnosed generalised and unclassifiable epilepsy: an open-label, non-	10.1016/S0140-6736(21)00246-4	UK	UK	Original research (full paper)	RCT	Yes: Age, gender (male/female),

		inferiority, multicentre, phase 4, randomised controlled trial						
The Lancet	03/04/2021	Efficacy and safety of dolutegravir with emtricitabine and tenofovir alafenamide fumarate or tenofovir disoproxil fumarate, and efavirenz, emtricitabine, and tenofovir disoproxil fumarate HIV antiretroviral therapy regimens started in pregnancy (IMPAACT 2010/VESTED): a multicentre, open-label, randomised, controlled, phase 3 trial	10.1016/S0140-6736(21)00314-7	UK	Global	Original research (full paper)	RCT	Yes: Age, all female (in pregnancy), Country, race (Black, Asian, White, Other, unknown),
The Lancet	03/04/2021	Comparison of two delayed strategies for renal replacement therapy initiation for severe acute kidney injury (AKIKI 2): a multicentre, open-label, randomised, controlled trial	10.1016/S0140-6736(21)00350-0	UK	France	Original research (full paper)	RCT	Yes: Age, sex (female/male), comorbidities
The Lancet	27/03/2021	Evaluating Progestogens for Preventing Preterm birth International Collaborative (EPPPIC): meta-analysis of individual participant data from randomised controlled trials	10.1016/S0140-6736(21)00217-8	UK	Not provided	Original research (full paper)	Systematic review and meta-analysis	Yes: age, all female (in pregnancy) ethnicity (Black, Asian, Hispanic, middle eastern, other, white, unknown), disease variables
The Lancet	27/03/2021	Discontinuing β-lactam treatment after 3 days for patients with community-acquired pneumonia in non-critical care wards (PTC): a double-blind, randomised, placebo-controlled, non-inferiority trial	10.1016/S0140-6736(21)00313-5	UK	France	Original research (full paper)	RCT	Yes: Age, sex (female/male),
JAMA	13/04/2021	Effect of Subcutaneous Semaglutide vs Placebo as an Adjunct to Intensive Behavioural Therapy on Body Weight in Adults With Overweight or Obesity The STEP 3 Randomized Clinical Trial	10.1001/jama.2021.1831	USA	USA/UK	Original research (full paper)	RCT	Yes: age, sex (women, men), race (white, black or African American, other, Asian, Native Hawaiian or other pacific island, American Indian or Alaska native, Hispanic or Latino ethnic group, body weight, BMI, comorbidities, clinical measurements,
JAMA	13/04/2021	Effect of Continued Weekly Subcutaneous Semaglutide vs Placebo on Weight Loss Maintenance in Adults With	10.1001/jama.2021.3224	USA	Global	Original research (full paper)	RCT	Yes: age, sex (women, men), race (white, black or African American, other, Asian, Hispanic or Latino ethnic group), body weight, BMI,

		Overweight or Obesity The STEP 4 Randomized Clinical Trial						comorbidities, clinical measurements,
JAMA	13/04/2021	Effect of Ivermectin on Time to Resolution of Symptoms Among Adults with Mild COVID-19A Randomized Clinical Trial	10.1001/jama.2021.3071	USA	Colombia	Original research (full paper)	RCT	Yes: age, sex (male, female), race or ethnic group (mixed race, Black or African American, Colombian native), Health Insurance (private/semiprivate, government subsidised, uninsured), number of people in the household, current smoker, BMI, Comorbidities etc
JAMA	13/04/2021	Binding and Neutralization Antibody Titers After a Single Vaccine Dose in Health Care Workers Previously Infected With SARS-CoV-2	10.1001/jama.2021.3341	USA	USA	Original research (Letter)	Cohort study	Yes: age, sex (male , female), race/ethnicity (Black or Black American, White, Asian) vaccine received
JAMA	13/04/2021	Discriminant Accuracy of the SOFA Score for Determining the Probable Mortality of Patients With COVID-19 Pneumonia Requiring Mechanical Ventilation	10.1001/jama.2021.1545	USA	USA	Original research (Letter)	Cohort study	Yes: age, sex (male , female), race/ethnicity (Non-Hispanic white, Hispanic, Native American, Black), BMI, comorbidities, lab results
JAMA	06/04/2021	Effect of Low-Intensity vs High-Intensity Home-Based Walking Exercise on Walk Distance in Patients With Peripheral Artery Disease The LITE Randomized Clinical Trial	10.1001/jama.2021.2536	USA	USA	Original research (full paper)	RCT	Yes: Age, Sex (Male/Female), Race White, Black, Asian, Other), Hispanic ethnicity.
JAMA	06/04/2021	Effect of Celecoxib vs Placebo Added to Standard Adjuvant Therapy on Disease-Free Survival Among Patients With Stage III Colon Cancer The CALGB/SWOG 80702 (Alliance) Randomized Clinical Trial	10.1001/jama.2021.2454	USA	USA	Original research (full paper)	RCT	Yes: Age, Sex (Men/Women), Race (White, Black or African American, Asian, All others or not reported), Hispanic or Latino %) Disease characteristics
JAMA	06/04/2021	Antimicrobial Use in a Cohort of US Nursing Homes, 2017	10.1001/jama.2021.2900	USA	USA	Original research (full paper)	Cohort study	Yes: Age, sex (men/women), race/ethnicity (Other, Hispanic or Latino, Black non-Hispanic, white non-Hispanic,)
JAMA	06/04/2021	Trends in Age at Natural Menopause and Reproductive Life Span Among US Women, 1959-2018	10.1001/jama.2021.0278	USA	USA	Original research (Letter)	Epidemiologic assessment survey	Yes: Age, (all female), Race/ethnicity (White, Black, Hispanic, non-US born), Educational attainment,

								poverty (Poverty income ratio), other health indicators
JAMA	30/03/2021	Intubation Practices and Adverse Peri-intubation Events in Critically Ill Patients From 29 Countries	10.1001/jama.2021.1727	USA	Global	Original research (full paper)	Other observational study	Yes: Age, Women%, comorbidities
PNAS	30/03/2021	Estrogen receptor β and treatment with a phytoestrogen are associated with inhibition of nuclear translocation of EGFR in the prostate	10.1073/pnas.2011269118	USA	Sweden	Original research (full paper)	Cohort study (lab)	Yes, Sex (all Males), age ethnicity
PNAS	30/03/2021	Health and economic impact of the pneumococcal conjugate vaccine in hindering antimicrobial resistance in China	10.1073/pnas.2004933118	USA	China	Original research (full paper)	Other (Mathematical Modelling)	Yes age
PNAS	16/03/2021	Loss of expression of both miR-15/16 loci in CML transition to blast crisis	10.1073/pnas.2101566118	USA	USA	Original research (full paper)	Cohort study (lab)	Yes, sex
PNAS	09/03/2021	Influence of a COVID-19 vaccine's effectiveness and safety profile on vaccination acceptance	10.1073/pnas.2021726118	USA	USA	Original research (full paper)	Survey	Yes, sex, age, race
PNAS	09/03/2021	Elevated cerebrospinal fluid cytokine levels in tuberculous meningitis predict survival in response to dexamethasone	10.1073/pnas.2024852118	USA	USA	Original research (full paper)	Cohort study (lab/modelling)	Yes age, (sex/gender not reported)
PNAS	02/03/2021	Glucagon blockade restores functional β-cell mass in type 1 diabetic mice and enhances function of human islets	10.1073/pnas.2022142118	USA	USA	Original research (full paper)	Interventional (lab)	Yes Sex, Age
PNAS	23/03/2021	Modelling SARS-CoV-2 viral kinetics and association with mortality in hospitalized patients from the French COVID cohort	10.1073/pnas.2017962118	USA	France	Original research (full paper)	Cohort study	Yes, Gender, Age
PNAS	09/02/2021	Arsenic trioxide replacing or reducing chemotherapy in consolidation therapy for acute promyelocytic leukemia (APL2012 trial)	10.1073/pnas.2020382118	USA	China	Original research (full paper)	RCT	Yes, age, sex
PNAS	02/02/2021	Efficient detection and post-surgical monitoring of colon cancer with a multi-marker DNA methylation liquid biopsy	10.1073/pnas.2017421118	USA	China	Original research (full paper)	Cohort study	Yes, Sex, age
PNAS	05/01/2021	A data-driven approach to identify risk profiles and protective drugs in COVID-19	10.1073/pnas.2016877118	USA	Switzerland	Original research (full paper)	Cohort study	Yes, age, sex

Nature Medicine	15/04/2021	Integrative microbiomics in bronchiectasis exacerbations	10.1016/S0140-6736(21)00313-5	US	Asia/Scotland	Original research (full paper)	Cohort study	yes; age, gender, geographic origin, aetiology, smoking status, BSI (status/score), BMI, MRC, FEV1)
Nature Medicine	15/04/2021	Assessment of medication self-administration using artificial intelligence	10.1038/s41591-021-01273-1	US	US/ Kosovo	Original research (full paper)	Cohort study	yes; gender, and Age
Nature Medicine	15/04/2021	Malaria is a cause of iron deficiency in African children	10.1038/s41591-021-01238-4	US	Africa	Original research (brief communication/letter)	Cohort study	yes; age, gender (female), inflammation, underweight
Nature Medicine	15/04/2021	Attributes and predictors of long COVID	10.1038/s41591-021-01292-y	US	UK, US, Sweden	Original research (brief communication/letter)	Cohort study	yes: country, sex, age (years), age group, obese (%), BMI, comorbidities, IMD, hospital visits, symptoms
Nature Medicine	15/04/2021	Development of a human skin commensal microbe for bacteriotherapy of atopic dermatitis and use in a phase 1 randomized clinical trial	10.1038/s41591-021-01256-2	US	US	Original research (full paper)	RCT	yes; age, sex, ethnicity and race
Nature Medicine	15/04/2021	Fetal cranial growth trajectories are associated with growth and neurodevelopment at 2 years of age: INTERBIO-21st Fetal Study	10.1038/s41591-021-01280-2	US	Global	Original research (brief communication/letter)	Cohort study	yes; age. Sex, SES (university education, married/living as married, work outside of home), health status outcomes
Nature Medicine	15/04/2021	altered perivascular fibroblast activity predicts ALS disease onset	10.1038/s41591-021-01295-9	US	Europe	Original research (brief communication/letter)	Interventional other (lab)	yes; age, gender
Nature Medicine	15/04/2021	Homozygous BCMA gene deletion in response to anti-BCMA CAR T cells in a patient with multiple myeloma	10.1038/s41591-021-01245-5	US	Germany	Original research (brief communication/letter)	Other Observational (lab)	yes; age, sex
Nature Medicine	15/03/2021	Impaired meningeal lymphatic drainage in patients with idiopathic Parkinson's disease	10.1038/s41591-020-01198-1	US	China/USA	Original research (brief communication/letter)	Case control study	yes; n (%) female, age,
Nature Medicine	15/03/2021	TCR-engineered T cells targeting E7 for patients with metastatic HPV-associated epithelial cancers	10.1038/s41591-020-01225-1	US	US	Original research (brief communication/letter)	Interventional trial (not RCT)	yes; age, sex male/female,
PLOS One	19/04/2021	Effect of dietary treatment and fluid intake on the prevention of recurrent calcium stones and changes in urine composition: A meta-analysis and systematic review	10.1371/journal.pone.0250257	USA/UK	China	Original research (full paper)	Systematic review and meta-analysis	Yes: Age, male (n)
PLOS One	19/04/2021	Prognostic value of the postoperative neutrophil-	10.1371/journal.pone.0250091	USA/UK	China	Original research (full paper)	Meta-analysis	Yes: age group, male vs female, disease characteristics

		lymphocyte ratio in solid tumors: A meta-analysis						
PLOS One	19/04/2021	Predicting poor outcomes in children aged 1–12 with respiratory tract infections: A systematic review	10.1371/journal.pone.0249533	USA/UK	UK	Original research (full paper)	systematic review (no meta-analysis)	Yes: age only
PLOS One	16/04/2021	Effect of smoking status and programmed death-ligand 1 expression on the microenvironment and malignant transformation of oral leukoplakia: A retrospective cohort study	10.1371/journal.pone.0250359	USA/UK	Japan	Original research (full paper)	Cohort study	Yes: sex (Male, Female), Age, alcohol drinking, lesion site, disease specific features
PLOS One	16/04/2021	A dose-dependent beneficial effect of methotrexate on the risk of interstitial lung disease in rheumatoid arthritis patients	10.1371/journal.pone.0250339	USA/UK	Poland	Original research (full paper)	Cohort study	Yes: Age, male sex, disease specific factors
PLOS One	16/04/2021	CT-based determination of excessive visceral adipose tissue is associated with an impaired survival in critically ill patients	10.1371/journal.pone.0250321	USA/UK	Germany	Original research (full paper)	Cohort study	Yes: Gender (male, female), Age, BMI, disease specific features and comorbidities
PLOS One	16/04/2021	Parental educational level and childhood wheezing and asthma: A prospective cohort study from the Japan Environment and Children's Study (plos.org)	10.1371/journal.pone.0250255	USA/UK	Japan	Original research (full paper)	Cohort study	Yes: Sex (boy/Girl), Child age, mothers educational level, fathers educational level
PLOS One	16/04/2021	The processing of intimately familiar and unfamiliar voices: Specific neural responses of speaker recognition and identification	10.1371/journal.pone.0250214	USA/UK	Canada	Original research (full paper)	Cohort study	Yes: '8 females', age
PLOS One	16/04/2021	Pathological complete response of adding targeted therapy to neoadjuvant chemotherapy for inflammatory breast cancer: A systematic review	10.1371/journal.pone.0250057	USA/UK	Global	Original research (full paper)	systematic review (no meta-analysis)	Yes: Age, (all females)
PLOS One	16/04/2021	Dose-response relationships of intestinal organs and excessive mucus discharge after gynaecological radiotherapy	10.1371/journal.pone.0250004	USA/UK	Sweden	Original research (full paper)	Cohort study	Yes: Age, (all females)
BMJ	14/04/2021	Associations of healthy lifestyle and socioeconomic status with mortality and incident cardiovascular disease: two prospective cohort studies	10.1136/bmj.n604	UK	USA/UK	Original research (full paper)	Cohort study	yes; mean age, men, white ethnicity or race, married, household income, occupation, education, health insurance, socio-economic index,

								smoking, alcohol, diet, BMI, comorbidities
BMJ	14/04/2021	Continued versus discontinued oxytocin stimulation in the active phase of labour (CONDISOX): double blind randomised controlled trial	10.1136/bmj.n716	UK	Denmark/Netherlands	Original research (full paper)	RCT	yes; age, (all women), white European, BMI, smoking, married or living with partner, parity, comorbidities
BMJ	07/04/2021	Linked electronic health records for research on a nationwide cohort of more than 54 million people in England: data resource	10.1136/bmj.n826	UK	UK	Original research (full paper)	Cohort study	yes; sex, age, ethnicity, comorbidities,
BMJ	06/04/2021	E-health StandingTall balance exercise for fall prevention in older people: results of a two year randomised controlled trial	10.1136/bmj.n740	UK	Australia	Original research (full paper)	RCT	yes; age, gender, BMI, education, living alone, owns a computer,
BMJ	31/03/2021	Adherence to the test, trace, and isolate system in the UK: results from 37 nationally representative surveys	10.1136/bmj.n608	UK	UK	Original research (full paper)	Survey	yes; gender, age, dependant child in household, clinical vulnerability, household member with chronic illness, employment status, socioeconomic grade, index of multiple deprivation, highest educational or professional qualification, ethnicity (white British, white other, mixed, Asian or Asian British, black or black British, Arab or other (don't know or prefer not to say), living alone, marital status, employment, hardship
BMJ	31/03/2021	Post-covid syndrome in individuals admitted to hospital with covid-19: retrospective cohort study	10.1136/bmj.n693	UK	UK	Original research (full paper)	Cohort study	yes; age, sex (men/women), ethnicity (white, Asian, mixed/other, unknown) index od multiple deprivation category
BMJ	24/03/2021	Comparative efficacy of interventions for reducing symptoms of depression in people with dementia: systematic review and network meta-analysis	10.1136/bmj.n532	UK	Canada	Original research (full paper)	systematic review and meta-analysis	yes; age, % women enrolled
BMJ	24/03/2022	Association of spontaneous abortion with all cause and cause specific premature mortality: prospective cohort study	10.1136/bmj.n530	UK	US	Original research (full paper)	Cohort study	yes; age, (all women) race/ ethnicity (n %) non-Hispanic white, non-Hispanic black, Hispanic and other

BMJ	23/02/2022	Age dependent associations of risk factors with heart failure: pooled population based cohort study	10.1136/bmj.n461	UK	Global	Original research (full paper)	cohort study	Yes: age, male sex, white ethnicity,
BMJ	18/03/2021	Association between living with children and outcomes from covid-19: OpenSAFELY cohort study of 12 million adults in England	10.1136/bmj.n628	UK	UK	Original research (full paper)	Cohort study	Yes; age (groups), female sex, ethnicity (white, mixed, south Asian, black, other), Index of multiple deprivation, over 3 adults in a household,
Cochrane	15/04/2021	Abdominal ultrasound and alpha-foetoprotein for the diagnosis of hepatocellular carcinoma in adults with chronic liver disease	10.1002/14651858.CD013346.pub2	UK	Italy	Original research (full paper)	systematic review and meta-analysis	yes: age, gender individually
Cochrane	15/04/2021	Thrombolytic therapy for pulmonary embolism	10.1002/14651858.CD004437.pub6	UK	China	Original research (full paper)	systematic review and meta-analysis	Yes: Age, 'sex' as men and women, when reporting characteristics of studies included
Cochrane	14/04/2021	Dopamine agonists for preventing ovarian hyperstimulation syndrome	10.1002/14651858.CD008605.pub4	UK	China Australia	Original research (full paper)	systematic review and meta-analysis	Yes: Age if reported in primary study, all women,
Cochrane	14/04/2021	Regular treatment with formoterol and an inhaled corticosteroid versus regular treatment with salmeterol and an inhaled corticosteroid for chronic asthma: serious adverse events	10.1002/14651858.CD007694.pub3	UK	Ireland	Original research (full paper)	systematic review and meta-analysis	Yes: Age, (no sex or gender reported)
Cochrane	14/04/2021	Botulinum toxin type A versus anticholinergics for cervical dystonia	10.1002/14651858.CD004312.pub3	UK	Portugal	Original research (full paper)	systematic review and meta-analysis	Yes: age, % female
Cochrane	13/04/2021	Non-steroidal anti-inflammatory drugs (NSAIDs) for trigger finger	10.1002/14651858.CD012789.pub2	UK	Singapore	Original research (full paper)	systematic review and meta-analysis	Yes: age, gender (male/female)
Cochrane	12/04/2021	Monitoring of stimulated cycles in assisted reproduction (IVF and ICSI)	10.1002/14651858.CD005289.pub4	UK	UK	Original research (full paper)	systematic review and meta-analysis	Yes: age, all female,
Cochrane	10/04/2021	Treatment for bleeding oesophageal varices in people with decompensated liver cirrhosis: a network meta-analysis	10.1002/14651858.CD013155.pub2	UK	UK	Original research (full paper)	systematic review and meta-analysis	Yes: age , 'females n and %'
Cochrane	07/04/2021	Anti-seizure medications for Lennox-Gastaut syndrome	10.1002/14651858.CD003277.pub4	UK	Italy	Original research (full paper)	systematic review and meta-analysis	Yes: Age, sex (as per study), race/ethnicity
Cochrane	06/04/2021	Primary prevention of variceal bleeding in people with oesophageal varices due to liver cirrhosis: a network meta-analysis	10.1002/14651858.CD013121.pub2	UK	UK	Original research (full paper)	systematic review and meta-analysis	Yes: mean age, females n and %

Cell Metabolism	06/04/2021	Hyocholic acid species improve glucose homeostasis through a distinct TGR5 and FXR signaling mechanism	10.1016/j.cmet.2020.11.017	UK	China	Original research (full paper)	Cohort study	Yes, Age, sex
Cell Metabolism	02/03/2021	The pyruvate-lactate axis modulates cardiac hypertrophy and heart failure	10.1016/j.cmet.2020.12.003	UK	USA	Original research (full paper)	Other Observational (lab)	Yes, Age, sex
Cell Metabolism	02/02/2021	Neutrophils Fuel Effective Immune Responses through Gluconeogenesis and Glycogenesis	10.1016/j.cmet.2020.11.016	UK	Scotland	Original research (full paper)	Other Observational (lab)	Yes, Age, sex
Cell Metabolism	05/01/2021	Acetyl-CoA Synthetase 2: A Critical Linkage in Obesity-Induced Tumorigenesis in Myeloma	10.1016/j.cmet.2020.12.011	UK	USA	Original research (full paper)	Other Observational (lab)	Yes, age, sex
Cell Metabolism	01/12/2020	Succinyl-CoA Ligase Deficiency in Pro-inflammatory and Tissue-Invasive T Cells	10.1016/j.cmet.2020.10.025	UK	USA	Original research (full paper)	Other Observational (lab)	Yes, age, sex
Cell Metabolism	01/12/2020	SARS-CoV-2 Cell Entry Factors ACE2 and TMPRSS2 Are Expressed in the Microvasculature and Ducts of Human Pancreas but Are Not Enriched in β Cells	10.1016/j.cmet.2020.11.006	UK	USA	Original research (full paper)	Other Observational (lab)	Yes, age, sex, ethnicity, BMI
Cell Metabolism	01/12/2020	Expression of SARS-CoV-2 Entry Factors in the Pancreas of Normal Organ Donors and Individuals with COVID-19	10.1016/j.cmet.2020.11.005	UK	USA	Original research (full paper)	Case control	Yes, age, sex, ethnicity, BMI
Cell Metabolism	01/12/2020	Elevation of JAML Promotes Diabetic Kidney Disease by Modulating Podocyte Lipid Metabolism	10.1016/j.cmet.2020.10.019	UK	China	Original research (full paper)	Other Observational (lab)	Yes, age, sex
Cell Metabolism	03/11/2020	Pyruvate Kinase Controls Signal Strength in the Insulin Secretory Pathway	10.1016/j.cmet.2020.10.007	UK	USA	Original research (full paper)	Other Observational (lab)	Yes, age, sex
Cell Metabolism	03/11/2020	Bone Marrow Mesenchymal Stem Cells Support Acute Myeloid Leukemia Bioenergetics and Enhance Antioxidant Defense and Escape from Chemotherapy	10.1016/j.cmet.2020.09.001	UK	Switzerland	Original research (full paper)	Other Observational (lab)	Yes, age, sex
Science translational medicine	14/04/2021	Imaging Enterobacterales infections in patients using pathogen-specific positron emission tomography	10.1126/scitranslmed.abe9805	USA	USA	Original research (full paper)	Other Observational (lab)	Yes: Age, Sex (M/F), weight, medical conditions
Science translational medicine	14/04/2021	Rituximab-resistant splenic memory B cells and newly engaged naive B cells fuel relapses in patients with immune thrombocytopenia	10.1126/scitranslmed.abc3961	USA	France	Original research (full paper)	Other Observational (lab)	Yes: Age, gender (M/F)

Science translational medicine	07/04/2021	SerpinB13 antibodies promote β cell development and resistance to type 1 diabetes	10.1126/scitranslmed.abf1587	USA	USA	Original research (full paper)	cohort study	Yes male to female ratio, age, diagnosis
Science translational medicine	07/04/2021	A selective HDAC8 inhibitor potentiates antitumor immunity and efficacy of immune checkpoint blockade in hepatocellular carcinoma	10.1126/scitranslmed.aaz6804	USA	Hong Kong	Original research (full paper)	Interventional other (Lab)	Yes : sex male/female; Age; disease characteristics (in suppl table s1)
Science translational medicine	07/04/2021	Urolithin A improves muscle function by inducing mitophagy in muscular dystrophy	10.1126/scitranslmed.abb0319	USA	Switzerland	Original research (full paper)	Interventional other (Lab)	Yes (under 'Human Cells' heading) age, sex male (sex linked disorder),
Science translational medicine	31/03/2021	Soft, skin-interfaced sweat stickers for cystic fibrosis diagnosis and management	10.1126/scitranslmed.abd8109	USA	USA	Original research (full paper)	Interventional other (Lab)	Yes Age, gender Female/male
Science translational medicine	31/03/2021	Clearance of pegylated interferon by Kupffer cells limits NK cell activation and therapy response of patients with HBV infection	10.1126/scitranslmed.aba6322	USA	USA	Original research (full paper)	cohort study	Yes (supp tab s1): sex %Male, % female, race 'Asian, Black, Caucasian', BMI, disease characteristics,
Science translational medicine	31/03/2021	Increasing breast milk betaine modulates Akkermansia abundance in mammalian neonates and improves long-term metabolic health	10.1126/scitranslmed.abb0322	USA	Spain	Original research (full paper)	cohort study	Yes: Age, gender (M/F)
Science translational medicine	31/03/2021	Transcriptional networks in at-risk individuals identify signatures of type 1 diabetes progression	10.1126/scitranslmed.abd5666	USA	UK	Original research (full paper)	cohort study	Yes: Age, race, race-ethnicity
Science translational medicine	17/03/2021	GDE2-RECK controls ADAM10 α-secretase–mediated cleavage of amyloid precursor protein	10.1126/scitranslmed.abe6178	USA	USA	Original research (full paper)	Interventional other (Lab)	Yes: age, gender male/female, Race (White, Black)

Table 2: Excluded articles from each journal

NEJM	Non-research articles (n= 24); Animal studies/Other non-human (n=0); human research with no participant level data reported (n=2)
Lancet	Non-research articles (n= 82); Lancet Animal studies/Other non-human (n=0); human research with no participant level data reported (n=2)
JAMA	Non-research articles (n=51); Animal studies/Other non-human (n=0); No participant level data reported (n=2)
PNAS	Non-research articles (n=69); Animal studies/Other non-human (n=30); No participant level data reported (n=4)
Nature Medicine	Non-research articles (total n=18); Animal studies/Other non-human (n=1); No participant level data reported (n=7)
PLOSOne	Non-research articles (n=0); Animal studies/Other non-human (n=4); No participant level data reported (n=0)
BMJ	Non-research articles (n=141); Animal studies/Other non-human (n=1); No participant level data reported (n=2)
Cochrane	Non-research papers (n=0); Animal studies/Other non-human (n=0); No participant level data reported (n=1, but only because no studies included)
Cell metabolism	Non-research articles (n=54); Animal studies/Other non-human (n=33); No participant level data reported (n=0)
Science Translational Medicine	Non-research articles (n=3); Animal studies/Other non-human (n=14); No participant level data reported (n=5)

Table 3: Terms accepted within papers for reporting gender, ethnicity or SES

Accepted gender reporting terms	Accepted ethnicity reporting terms	Accepted Socio-economic status reporting terms
Male (number and/or %)	Race	Employment status
Female (number and/or %)	Ethnicity	University level education
Gender: Male/Female (number and/or %)	Race or ethnic group	Urban residence
Sex: Male/Female (number and/or %)	Race/ethnicity	Index of multiple deprivation
Male/ female /prefer not to say	Population sector	Region of England
Male/ Female/ other	Geographic region	Education
Male: Female ratio	Results by continent	Health Insurance (private/semiprivate, government subsidised, uninsured
All female sex	Geographic location	Number of people in household
All Male sex	Geographic region	Educational attainment
Boy/Girl	Race or ethnic group	Poverty Index ratio
Gender	Ethnicity	Mothers educational level/ Fathers educational level
Sex	Non-US born	Over 3 adults in household
M/F	Native to America	Employment status
	Native American	Hardship
	White race	SES (university education, married/living as married, work outside of home),
	Geographic origin	Household income
		Socioeconomic grade
		Highest educational or professional qualification
		Socioeconomic Index

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1 ('targeted' as we have adapted our approach)
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	As per BMJ Open
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	4-5
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	4-5
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.	5
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 confirming data from study investigators, and if applicable, details of automation tools used in the process.	4-5
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.	5
	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.	5
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.	n/a
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.	5-6
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)).	5-6
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	5-6
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	5-6
	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.	5-6
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	5-6
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	n/a
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	n/a
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.	6
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	5-6
Study characteristics	17	Cite each included study and present its characteristics.	Online suppl.
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	n/a
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.	n/a
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Online suppl.
	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.	5-6
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	5-6
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	5-6
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	n/a
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	n/a
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	7-8
	23b	Discuss any limitations of the evidence included in the review.	7-8
	23c	Discuss any limitations of the review processes used.	7-8
	23d	Discuss implications of the results for practice, policy, and future research.	7-9
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.	Not registered
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Agreed between authors but not made available publicly.

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	n/a
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	9
Competing interests	26	Declare any competing interests of review authors.	9
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.	Online Suppl.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71
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