



1 Climate change, concern, and children: A systematic review exploring
2 the intersection of climate change, mental health, and reproductive
3 decision-making

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12 **Short Title:** A systematic review on climate change, mental health, and reproductive decisions

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22

23 Abstract

24

25 The impact of climate change on reproductive decision-making is becoming a significant
26 issue, with anecdotal evidence indicating a growing number of people factoring their
27 concerns about climate change into their childbearing plans. Although empirical research has
28 explored climate change and its relationship to mental health, as well as the motivations
29 behind reproductive decision-making independently, a gap in the literature remains that
30 bridges these topics at their nexus. This review endeavours to fill this gap by synthesising the
31 available evidence connecting climate change-related concerns with reproductive decision-
32 making and exploring the reasons and motivations behind this relationship.

33

34 A systematic review using six databases was conducted to identify relevant literature.
35 Included published and unpublished studies reported quantitative, qualitative, and mixed-
36 methods data related to: (1) climate change, (2) mental health and wellbeing concerns, and
37 (3) reproductive decision-making. Findings were synthesised narratively using a parallel-
38 results convergent synthesis design and the quality of studies was appraised using three
39 validated assessment tools.

40

41 Four hundred and forty-six documents were screened using pre-defined inclusion criteria,
42 resulting in the inclusion of thirteen studies. The studies were conducted between 2012 and
43 2022 primarily in Global North countries (e.g., USA, Canada, New Zealand, and European
44 countries). Climate change concerns were typically associated with less positive attitudes
45 towards reproduction and a desire and/or intent for fewer children or none at all. Four

46 themes explaining this relationship were identified: uncertainty about the future of an
47 unborn child, environmentalist views centred on overpopulation and overconsumption,
48 meeting family subsistence needs, and environmental and political sentiments.

49

50 The current evidence reveals a complex relationship between climate change concerns and
51 reproductive decision-making, grounded in ethical, environmental, livelihood, and political
52 considerations. Further research is required to better understand and address this issue with
53 an intercultural approach, particularly among many highly affected Global South populations,
54 to ensure comparability and generalisable results.

55

56

57 1. Introduction

58

59 Climate change is often regarded as “*the biggest global health threat of the 21st century*” [1]
60 [p.1693] due to the direct threat of rising average temperatures and climatic hazards,
61 paralleled with indirect effects including water and food insecurity and changes to disease
62 epidemiology. At the same time, tackling climate change is also posited as “*the greatest*
63 *global health opportunity of this century*” [2] [p.1861], as mitigation and adaptation
64 responses can reduce disease burdens, alleviate poverty, and confront global inequity.

65 Climate change is already having a ubiquitous impact on human health, with adverse effects
66 projected to increase even further, albeit with a degree of heterogeneity between countries
67 and populations [3]. A recent emergence of studies and policy are exploring the link between
68 climate change and mental health. This came to the fore with the coining of new concepts

69 such as ‘eco-anxiety’, fast becoming a buzzword in public discourse as it describes the
70 “*chronic fear of environmental doom*” [4] [p.29] that continues to proliferate in the minds of
71 individuals worldwide [5]. Other analogous terms have also emerged including climate
72 trauma [6], ecological grief [7], and solastalgia [8], which all describe a form of emotional
73 response towards ecological issues associated with climate change.

74 Over the last decade, a novel connection has been formed between these psychological
75 effects of climate change and human reproductive decision-making. Anecdotal evidence from
76 news outlets, surfacing largely from countries in the Global North, has revealed a growing
77 number of individuals reconsidering their reproductive decisions in light of their concerns
78 about climate change [9] [10]. Yet, empirical research studying the intersection of climate
79 change, mental health and wellbeing, and reproductive decision-making remains a nascent
80 endeavour. It is important to note that although the Global North and Global South divide is
81 critiqued for being oversimplistic [11], the terms are referred to throughout this review in
82 favour of the ‘developed’ and ‘developing’ dichotomy that implies an inherent hierarchical
83 nature.

84 This study aims to fill this gap by synthesising the current empirical evidence investigating the
85 relationship between climate change-related concern and reproductive decision-making. As
86 the health effects of climate change become ever more pervasive, it is logical to assume that
87 these concerns will continue to diffuse among populations and potentially influence
88 reproductive decisions [12]. Consequently, this matter has far-reaching implications across
89 multiple disciplines including public health policy and environmental politics, emphasising the
90 immediacy of this research. A systematic review was conducted and a total of thirteen
91 studies were identified for inclusion (Fig 1).

92

93 Fig 1. PRISMA diagram of study selection

94

95 1.1 Climate Change

96 The United Nations Framework Convention on Climate Change (UNFCCC) defines climate
97 change as being, “*attributed directly or indirectly to human activity that alters the*
98 *composition of the global atmosphere and which is in addition to natural climate variability*
99 *observed over comparable time periods*” [13] [p.7]. Despite ongoing debates in the media
100 regarding the anthropogenic nature of climate change, the Intergovernmental Panel on
101 Climate Change (IPCC) reported with 95% certainty that human activity is the primary cause
102 [14], leading to a consensus that it is “*marked by human influence*” [15] [p.119]. Human
103 activities, notably the burning of fossil fuels, have led to a significant increase in greenhouse
104 gas (GHG) emissions, and consequently, the global surface temperature is currently averaging
105 1.2°C warmer compared to pre-industrial times (1850-1900) [3] [16]. With this alarming rise,
106 climate change has been inextricably tied to the intensification and increased frequency of
107 climatic hazards worldwide such as heatwaves, storms, drought, and flooding. Together with
108 indirect effects including food and water insecurity and increased air pollution, climate
109 change is having a detrimental impact on the social and environmental determinants of
110 human health [17].

111

112 1.2 Climate Change and Mental Health

113 Climate change has been expedited to one of the top priorities on the international political
114 agenda over the last few decades following scientific evidence connecting it with adverse

115 health outcomes [18]. These health effects are continuing to unfold across the globe with
116 reported rises in premature deaths, infectious diseases, non-communicable diseases, and
117 mental illnesses all attributed to climate change [2]. Whilst causality cannot be easily inferred
118 as drivers of poor health are often complex and intertwined, the empirical evidence
119 undoubtedly shows that climate change is a contributory exacerbating factor.

120

121 Whilst impacts to physical health have historically been the focus of academic inquiry,
122 climate change also impacts mental health both directly, from exposure to climatic hazards,
123 and via numerous indirect pathways including loss of livelihood, displacement and forced
124 migration, and armed conflict and interpersonal violence [19] [20]. These risk factors can lead
125 to the onset of mental health conditions and adverse psychosocial outcomes such as
126 depression, anxiety, substance use, and suicidal actions, or have a compounding effect for
127 those already living with these conditions [21]. Moreover, these effects are experienced
128 disproportionately by the most disadvantaged members of society including people with pre-
129 existing chronic disease(s) and/or disability as well as minority groups, people with low-
130 incomes, and women and children. Adopting an intersectionality lens, which considers the
131 systems of privilege and oppression resulting from the intersection of an individual's multiple
132 social identities [22], serves as a reminder that many people occupy a combination of these
133 marginalised identities which may work in tandem to further increase their vulnerability to
134 climate change [23].

135

136 Mental health is broadly defined as *"a state of mental well-being that enables people to cope*
137 *with the stresses of life, realize their abilities, learn well and work well, and contribute to their*
138 *community"* [24] [para.1]. Under this comprehensive definition, contemporary climate

139 change research is also beginning to take heed of less pathological responses arising from an
140 awareness of the slow and gradual changes to environmental conditions [25]. This
141 phenomenon is now commonly referred to as ‘eco-anxiety’, which encompasses a range of
142 negative emotional responses including fear, anger, guilt, dread, and anxiety itself towards
143 the climate crisis and ensuing environmental deterioration [25]. Despite being a neologism,
144 this term is gaining traction within public discourse as many individuals begin to identify with
145 these feelings. Alternative terminology has also emerged to describe this affective dimension
146 of climate change including solastalgia, which describes “*the distress that is produced by*
147 *environmental change impacting on people while they are directly connected to their home*
148 *environment*” [8] [p.S95], and ecological trauma which is the “*experience of witnessing –*
149 *consciously or not – the pervasive abuse and destruction of the natural world*” [26] [para.2].
150
151 Attempting to quantify and measure emotional responses to climate change is not a simple
152 feat considering the diverse array of mental health outcomes. However, one framework is
153 prominent in the literature – the New Ecological Paradigm (NEP). The NEP is a widely
154 adopted measure of an ‘ecological worldview’ that uses a Likert-type scale containing fifteen
155 questions related to environmental concern [27]. This framework has been used to
156 investigate the relationship between climate change concern and shifts in individual and
157 collective behaviour as whilst some individuals may become paralysed by their feelings,
158 others are galvanised into action, and modify their behaviour accordingly [28]. These may
159 include changes to ‘everyday’ behaviours such as recycling, diet, or consumption patterns,
160 but potentially could influence behaviours of even greater magnitude, such as reproductive
161 decisions.

162

163 1.3 Reproductive Decision-Making

164 Reproductive decision-making “*involves decisions about parenthood (whether and when to be*
165 *a parent, and the number and spacing of children one wishes to have), including decisions*
166 *around contraceptive usage and fertility*” [29] [p.2]. These decisions are often multi-factorial,
167 in flux, and consequently made over time [30]. The T-D-I-B model is a theoretical framework
168 of reproductive decision-making, breaking down the process into a five-step psychological
169 sequence [31] [32] (Fig 2). These discrete steps are, however, often incorrectly used
170 interchangeably in analyses of environmental concern and reproductive decision-making,
171 particularly with ‘desire’ and ‘intention’. Whilst both terms describe psychological states,
172 desires represent what someone hopes or wishes for, whilst intentions represent desires
173 evaluated with respect to what is achievable in reality [31].

174

175 **Fig 2. A model of reproductive decision-making combining the T-D-I-B model with climate change**
176 **concerns**

177 Note. Adapted from: Miller (1994; 2011).
178 The dashed line represents the possibility of climate change-related concern acting as an intervening variable,
179 mediating the transition between traits and desires, and desires and intentions respectively.

180

181 Over the last half-century, changes in childbearing patterns, most noticeably observed in the
182 Global North, have seen a greater proportion of adults now choosing to abstain from
183 parenthood and remain voluntarily childfree [33]. These demographic shifts have been linked
184 to macro-level social changes such as the 1970s feminist movement that expanded women’s
185 reproductive rights, as well as individual-level decision-making, with many citing freedom
186 from childcare responsibility, and maintaining close relationships with their partner as
187 determinants of their decision to remain childfree [34]. These decisions are inherently

188 shaped by normative pressures and structural constraints that are culturally dependent, and
189 variation both within and between Global North and Global South contexts is therefore likely.

190

191 The term 'childfree' is isolated as a distinct concept from 'childless', where the former refers
192 to the ability to have children but choosing not to as a result of sociocultural shifts in societal
193 norms, whilst the latter simply refers to an inability to reproduce despite wishing to have
194 children [30]. This dichotomy is problematised as many describe feeling forced into the
195 decision due to their climate change concerns which does not resonate with the typically
196 voluntary nature of choosing to remain childfree [35]. This subset of individuals will therefore
197 be referred to using more specific nomenclature, 'environmentally childfree', defined as "*not*
198 *hav[ing] children or restrict[ing] reproduction... partly or fully out of environmental concerns*"
199 [36] [p.201].

200

201 1.3.1 Reproductive Decision-Making in Response to Climate Change

202 Opposing theoretical stances exist that posit the causal relationship between climate change
203 and childbearing decisions. Demand theories of fertility propose that a better quality of
204 immediate environment is conducive to larger populations due to an abundance of natural
205 resources [37]. This is reversed if the environment deteriorates, as in the case of climate
206 change, where limited availability of resources means that some people may opt to control
207 and limit their reproduction. However, critiques of this position propose a decline in
208 agricultural productivity will lead people to increase their crop cultivation to fulfil their
209 subsistence needs [38]. Consequently, families may decide to have more children to have a
210 larger labour force, leading to a 'vicious circle' that will further exacerbate the existing

211 pressures that climate change imposes on the environment [37]. Whilst the direction of the
212 links between climate change and reproductive decision-making is contested, less academic
213 attention has been paid to the role of mental health and wellbeing in shaping these
214 decisions.

215

216 1.4 The Current Study

217

218 1.4.1 Climate Change, Mental Health, & Reproductive Decision-Making at the 219 Nexus

220 The three broad themes of climate change, its impact on mental health and wellbeing, and
221 reproductive decision-making have been united as a topic garnering significant public
222 attention within media polls, blog posts and, more colloquially, in conversations amongst
223 friends and family [35]. In 2018, a nationally representative New York Times survey
224 distributed to 1,858 childfree American men and women aged 20-45 found that 33% of
225 participants selected the response ‘worried about climate change’ as a reason for remaining
226 childfree [39]. Perhaps most visibly, this nexus was spotlighted with the recent emergence of
227 three collectives: Conceivable Future in the United States (US), BirthStrike in the United
228 Kingdom (UK), and No Future No Children in Canada, comprised of individuals who are
229 reconsidering or refusing to have children due to the ongoing effects of climate change.
230 These activist interventions seek to ring an “*existential alarm*” [35] [p.1], by using their
231 reproductive power politically to galvanise governments into taking the necessary action for
232 climate change mitigation and adaptation.

233

234 1.4.2 The Research Gap

235 Despite becoming an advocacy priority, relevant empirical research on this topic is still in its
236 infancy. Given that climate change, mental health, and reproductive decisions affect
237 everyone, and that their nexus is attracting increasing attention in public discourse, further
238 empirical investigation is necessary. This phenomenon also has far-reaching implications for
239 environmental politics and public health policy. Firstly, the emergence of collectives including
240 BirthStrike moved this topic into the realm of politics by exerting pressure on governments to
241 prioritise climate change within their agendas. Within public health policy, greater resource
242 investment into global mental healthcare will be crucial as the continuing effects of climate
243 change predict a surge in common mental health disorders and feelings of eco-anxiety [40].
244 Consequently, this review enters the field at a critical juncture for gaining a greater
245 understanding of reproductive decision-making in response to climate change concerns.

246

247 1.4.3 Research Question, Aims, and Objectives

248 **Research Question:** *'How do climate change-related concerns affect individuals' reproductive*
249 *decision-making?'*

250

251 For the purposes of this review, 'concern' is defined as a worried or anxious feeling, rather
252 than its more neutral definition of a matter of interest or importance. Despite its ambiguity,
253 this word was chosen as it is used widely in the literature and allowed for more relevant
254 negative mental health emotions to be included. 'Climate change-related concern'
255 specifically refers to any negative emotional response towards events associated with the
256 anthropogenic root causes of climate change, in addition to previously witnessed and future

257 projected consequences of climate change. This phrase will be used interchangeably with
258 'environmental concern' in accordance with the literature and for the purposes of brevity.

259

260 **Aims:** To understand how climate change-related concerns are linked to reproductive
261 decision-making, and to explore the reasons and motivations behind this relationship.

262

263 **Objectives:**

264 1. To summarise the available quantitative, qualitative, and mixed-methods evidence
265 investigating how climate change-related concerns link to reproductive decision-
266 making

267 2. To explore the specific environmental concerns and factors shaping people's
268 reproductive attitudes and decisions

269 3. To make future recommendations for research, policy, and practice priorities in the
270 field

271

272

273 2. Methodology

274

275 2.1 Databases

276 The literature search was conducted on the 11th of July 2022 and the following
277 databases/platforms were searched to provide comprehensive coverage of the relevant
278 literature: Web of Science Core Collection (WOS) (1990 – present), ProQuest Central (1806 –
279 present), OvidSP Global Health (1973 – present), OvidSP PsycINFO (1967 – present), OvidSP

280 MEDLINE (1946 – present), and EBSCO GreenFILE (1913 – present). WOS and ProQuest
281 Central are multidisciplinary and include literature encompassing the cross-disciplinary
282 themes of climate change, mental health, and reproductive decision-making within the
283 research question. Global Health is a public health database which also includes articles
284 discussing these three themes. The final three databases were selected as they each
285 specialise in one of these disciplines: PsycINFO provides an index of literature from
286 psychology and was relevant to the mental health branch; MEDLINE is a biomedical database
287 exploring medicine and the healthcare system and provided insight into reproduction; and
288 finally, GreenFILE covers publications focussing on human impact on the environment.
289
290 Additional relevant papers were found by handsearching the reference lists of included
291 papers (backward snowballing) and reviewing publications that have cited them (forward
292 snowballing) [41]. Google Scholar was also used to search for both published and
293 unpublished grey literature in an effort to diminish publication biases.

294

295 **2.2 Search Strategy**

296 The initial search strategy was formulated on WOS and then adapted to fit the formatting
297 guidelines of the other databases. The search strategy consisted of three separate strands
298 that were combined together to identify studies that focussed on (1) climate change, (2)
299 mental health and wellbeing concerns, and (3) reproductive decision-making. On an initial
300 exploratory search, the search terms included neutral ‘mental health’ terms and broader
301 ‘climate’ and ‘environment’ synonyms. However, upon finding a large quantity of unrelated
302 articles, these were refined to ensure the search had a narrower focus, specific to the

303 research question. As well as synonyms, the search also incorporated Boolean terms,
304 wildcards, truncations, and medical subject headings (MeSH) to ensure that all appropriate
305 terminology was captured (S1 Table; S2 Table).

306

307 2.3 Eligibility Criteria

308 As research in this field is still incipient, exclusion criteria were not extensive (S3 Table).

309 Firstly, no limits were placed on geographical location to allow for critical reflection on any

310 discernible differences between countries or geographical gaps in current research. The

311 search was also not limited by study design resulting in a review with methodologically

312 triangulated data. Based on the population, exposure, outcome (PEO) framework, during

313 initial abstract screening, articles on plant or animal reproduction were excluded. At full-text

314 screening, literature exploring retrospective reproductive decision-making and/or the

315 intersection of climate change and fertility outcomes, without also addressing mental health

316 concerns, were also excluded. Primary studies, books, and book chapters were all eligible for

317 inclusion as long as they included empirical methodology and findings. Non-peer reviewed

318 publications including newspaper and magazine articles and blog posts were excluded. Peer-

319 reviewed journals are less likely to publish studies with null results, whilst the opposite is true

320 for statistically significant findings [42]; student theses were therefore also included to

321 mitigate this publication bias to some extent. As the lead author of this review only speaks

322 English, all papers that were published in a language other than English were excluded.

323 Additionally, any study that was not available as open access or accessible through university

324 library e-resources was excluded from analysis. Finally, no documents were excluded based

325 on date of publication as this may have unnecessarily restricted the scope of included
326 literature.

327

328 2.4 Data Extraction and Synthesis

329

330 Data from the included studies were identified and extracted into a detailed spreadsheet.

331 This included information on the article (first author, publication year, and title),

332 measurement tools, location, participant information (sample size and demographic

333 characteristics), reproductive focus, and key findings. Given the variation in exposure and

334 outcome measurement, a meta-analysis was not feasible, and findings were instead

335 described narratively in accordance with Popay et al.'s [43] guidance. Findings were analysed

336 using a parallel-results convergent synthesis design [44] in which the quantitative, qualitative,

337 and mixed-methods data were initially analysed independently before being consolidated in

338 the discussion and interpretation of the results.

339

340 2.5 Risk of Bias Assessment and Quality Appraisal

341

342 The quality of included studies was assessed using peer-reviewed checklists to inform the

343 final analysis and interpretation of the data (no studies were excluded based on quality).

344 Different checklists were used according to study design: the Joanna Briggs Institute (JBI)

345 Critical Appraisal Checklist for Analytical Cross-Sectional Studies [45], the Critical Appraisal

346 Skills Programme (CASP) Qualitative checklist [46], and the Mixed Methods Appraisal Tool
347 (MMAT) [47]. for the quantitative, qualitative, and mixed-methods studies respectively.

348

349 2.6 Ethical Considerations

350

351 Given primary data collection and/or secondary data analysis did not form part of this
352 project, ethics approval was not required. There were no interactions with human subjects,
353 hence no significant ethical considerations. As such, no risks were associated with reviewing
354 the literature.

355

356

357 3. Results

358

359 446 articles were identified and uploaded to EndNote for screening. 104 duplicates were
360 removed and a further 313 papers were excluded following screening of titles and abstracts
361 for relevance. Lastly, full texts of remaining papers were single screened for eligibility, leaving
362 a final total of 13 studies to be included within this review (Table 1).

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365

366

367 Table 1. Summary of characteristics from included studies

1 st Author (Year)	Title	Measurement Tools	Location	Participants	Reproductive Focus	Key Findings	Quality Appraisal
QUANTITATIVE RESULTS							
Arnocky, et al. (2012) [48]	Environmental concern and fertility intentions among Canadian university students	Cross-sectional survey (using NEP ¹ , PHC ² , and RAS ³)	Canada (Ontario)	N: 139 (undergraduate students) Women: 90, Men: 49 Aged 17-44 (mean = 20.26)	Reproductive intention (child-number) and attitudes	<ul style="list-style-type: none"> • General environmental concern ($r = -0.34^{**}$) and pollution-related health concern ($r = -0.25^{**}$) negatively correlated with pro-reproductive attitudes. • Pollution-related health concern negatively correlated ($r = -0.18^*$) with increased reproductive intention (mediated by attitude towards reproduction). 	Medium X Inclusion criteria not clearly defined
Davis et al. (2019) [38]	The Problem of Overpopulation: Proenvironmental Concerns and Behavior Predict Reproductive Attitudes	Cross-sectional survey (using NEP ¹ , ECS ⁴ , EBS ⁵ , and RAS ³)	Canada (Ontario)	N: 200 (undergraduate psychology students) Women: 167, Men: 30 Aged 18-48 (mean = 20.21)	Reproductive attitudes	<ul style="list-style-type: none"> • General environmental concern negatively correlated ($r = -0.31^{**}$) with pro-reproductive attitudes. • Egoistic ($r = 0.28^{**}$) and altruistic ($r = 0.27^{**}$) concerns positively correlated with pro-reproductive attitudes, whilst biospheric concern was inversely correlated ($r = -0.18^*$). 	High X Unclear is outcome measured in valid/reliable way

De Rose et al. (2013) [49]	Climate Change and Reproductive Intentions in Europe	Cross-sectional survey (from 2011) (using single item measures of environmental concern and reproductive intention)	European Union (EU) Member States (27 countries)	N: 8278 Gender balance unknown Aged 20-45 (mean = 33)	Reproductive intention (child-number)	<ul style="list-style-type: none"> Regardless of parity, climate change concerns were not significantly associated (at $\alpha = 0.05$) with additionally intended number of children. Weak evidence (at $\alpha = 0.10$) of a positive association amongst those with one existing child, for whom strong climate change concerns were associated with a (slightly) larger intended family size (+0.19 children in the fully adjusted model). 	Medium X Exposure not measured in valid/reliable way X Outcome not measured in valid/reliable way
Musialczyk (2020) [50]	Attitudes towards having Children in View of Climate Change	Cross-sectional survey (using NEP ¹ and RAS ³)	Ireland	N: 135 Women: 69, Men: 66 Aged 18-45 (mean = 30.33)	Reproductive attitudes	<ul style="list-style-type: none"> General environmental concern was negatively associated ($\beta = -0.38^{**}$) with pro-reproductive attitudes. 	High X Unclear if outcome measured in valid/reliable way
Szczuka (2022) [51]	Climate Change Concerns and the Ideal Number of Children: A Comparative Analysis of the V4 Countries	Cross-sectional survey (from 2011) (using single item measures of environmental concern and reproductive intention)	The Visegrád Four (V4) Countries (Czech Republic, Hungary, Poland, and Slovakia)	N: 2036 Women: 1006, Men: 1030 Aged 18-45 (estimated mean = 31.64)	Reproductive intention (child-number)	<ul style="list-style-type: none"> For families generally, climate change concerns were positively associated with decreased reproductive intention in Hungary ($\beta = 0.886^{**}$) but negatively associated in Slovakia ($\beta = -1.124^{**}$). For individuals personally, climate change concerns were negatively associated with increased reproductive intentions in Slovakia ($\beta = -0.748^{*}$), with weak evidence (at $\alpha = 0.10$) of a positive association in the Czech Republic ($\beta = 0.520$). 	Medium X Exposure not measured in valid/reliable way X Outcome not measured in valid/reliable way

QUALITATIVE RESULTS

Helm et al. (2021) [52]	No future, no kids—no kids, no future? An exploration of motivations to remain childfree in times of climate change	Content analysis and semi-structured interviews	NZ (Auckland and Christchurch) and US (Tucson)	Study 1 – N: 1157 (reader comments from topical online news articles) Study 2 – N: 24 Women: 17, Men: 4, Non-binary/Genderqueer: 3 Aged 19-35 (mean: 27.63)	Reproductive attitudes, desires, and intention (childbearing)	<ul style="list-style-type: none"> Participants were concerned about future children contributing to overpopulation and overconsumption: <i>“I don’t need to be adding another person into the world who would consume resources”</i> (p.118). Participants felt guilty about bringing a child into a world that is ‘doomed’ from climate change: <i>“it does feel like kind of a gamble bringing a very young person into a world that you really are very unsure about the future of”</i> (p.119). 	Medium X Relationship between researcher and participant not considered X Ethical issues not considered
Krähenbühl (2022) [53]	‘Environmental Childlessness?’: Reproduction and (Im)Possible Futures amidst Environmental Crises	Semi-structured in-depth interviews (IDIs) & private group discussions and one collective group discussion	Switzerland (Lausanne)	N: 14 Women: 7, Men: 6, Non-binary: 1 Aged 21-48 (mean: 29.07)	Reproductive intention (childbearing) and behaviour	<ul style="list-style-type: none"> Pathways towards ‘environmental childlessness’ were two-fold: <ul style="list-style-type: none"> Limiting ecological footprint: <i>“the decision not to have children is intertwined with... trying to minimise...our impact on the environment”</i> (n.p.) Uncertainty of child(ren)’s future: <i>“[W]hat is my responsibility to want to give life to someone who is going to struggle...?”</i> (n.p.) 	Medium X Ethical issues not considered X Can’t tell if recruitment strategy appropriate to aims & if results will help locally

Nakkerud (2021) [36]	‘There Are Many People Like Me, Who Feel They Want To Do Something Bigger’: An Exploratory Study of Choosing Not to Have Children Based on Environmental Concerns	Semi-structured interviews	Norway (Oslo, Agder, Innlandet, & Viken)	N: 20 (including 3 couples) Women: 7, Men: 12, Non-binary: 1 Aged 20-59 (mean unavailable – 55% aged 30-39)	Reproductive intention (childbearing) and behaviour	<ul style="list-style-type: none"> Two climate change-related concerns factoring into reproductive decisions: <ul style="list-style-type: none"> Ecological impact: <i>“the child would contribute to destroying biological diversity by being a consumer”</i> (p.204) Uncertain future: <i>“it could be dangerous for a child to grow up in a world where all species die, and the climate gets warm”</i> (p.204) 	High X Relationship between researcher and participant not considered
Rosen et al. (2021) [54]	“Burnt by the scorching sun”: climate-induced livelihood transformations, reproductive health, and fertility trajectories in drought-affected communities of Zambia	Semi-structured IDIs, key informant interviews and focus group discussions (FGDs)	Zambia (Chroma, Mazakuba, Mongu, Kalomo, & Senanga)	FGDs – N: 145 Women: 75, Men: 70 Age: 19-49 (median: 34) IDIs – N: 20 Women: 20 Aged 22-44 (median: 32) Informant interviews – N: 16 (stakeholders) Women: 7, Men, 9 Aged: 25-73 (median: 34)	Reproductive desire and intention (child-number)	<ul style="list-style-type: none"> Participants desired smaller families to meet their subsistence needs: <i>“The 6 children I desire to have may not have enough food to eat”</i> (p.8) This conflicted with recognition of children as a source of household support: <i>“My desire was to have 10 children so that some of them can help me because no one knows what the future holds”</i> (p.8). 	High X Relationship between researcher and participant not considered
Rovin et al. (2013) [55]	Linking Population, Fertility, and Family Planning with Adaptation to Climate Change: Perspectives from Ethiopia	Semi-structured IDIs and FGDs	Ethiopia (Oromia and Southern Nations, Nationalities and People’s Regions)	FGDs (12) – N: 96 Women: 48, Men: 48 (Age range unavailable) IDIs – N: 42 (community members, leaders, and policymakers)	Reproductive desire and intention (child-number)	<ul style="list-style-type: none"> Participants were concerned about their ability to subsist with large family sizes: <i>“everyone needs to have children based on the resources [they have], and I feel two to four children are enough”</i> (p.25) 	Medium X Relationship between researcher and participant not considered

							X Ethical issues not considered X Data analysis not sufficiently rigorous
Smith et al. (2022) [56]	Pregnancy Intentions of Youth in the Era of Climate Change: A Qualitative Auto-Photography Study	Auto-photography and IDIs	Canada (British Columbia)	N: 7 (nulliparous individuals with 33 photographs) Women: 7 (assigned female at birth) Aged 18-25 (mean unavailable)	Reproductive intention (childbearing) and behaviour	<ul style="list-style-type: none"> 6/7 participants stated that climate change has already or may affect their reproductive decision-making: <i>"I wouldn't want to have children... because of just the dire future that I'm predicting"</i> (p.5) Five themes in participants' narratives: planning for a 'dire future', experiencing anxiety, calls for systemic change, catalysing events, and feeling like an outlier. 	High X Can't tell if recruitment strategy appropriate to aims
MIXED-METHODS RESULTS							
Schneider-Mayerson (2022) [57]	The environmental politics of reproductive choices in the age of climate change	Survey (16 open-ended questions & 24-31 multiple choice questions) <i>(same data set as Schneider-Mayerson & Leong, 2020)</i>	US	N: 607 ('climate-concerned' individuals) Women: 446, Men: 131, Gender-diverse: 30 Aged 27-45 (mean unavailable)	Reproductive intention (childbearing) and behaviour	<ul style="list-style-type: none"> Parental investment in environmental politics and children as future environmentalists reported as reasons to have children, e.g. <i>"I thought about how I will raise my kids to be educated about climate change and how they can be a force for good, for fighting it"</i> (p.163). Opportunity cost of parenting and fertility as a socio-political tool reported as reasons not to have children, e.g. <i>"I am relieved that I did not have a child because this choice</i> 	High X Unclear if quantitative components adhere to quantitative quality criteria

						<i>gives me more time to dedicate to political activities and activism” (p.164)</i>	
Schneider-Mayerson (2020) [58]	Eco-reproductive concerns in the age of climate change	Survey (16 open-ended questions & 24-31 multiple choice questions)	US	N: 607 ('climate-concerned' individuals) Women: 446, Men: 131, Gender-diverse: 30 Aged 27-45 (mean unavailable)	Reproductive intention (childbearing)	<ul style="list-style-type: none"> 96.5% of respondents 'extremely' or 'very' concerned about the impacts of climate change on their child(ren)'s health and wellbeing: <i>“I don't want to birth children into a dying world”</i> (p.12). 59.8% of respondents 'extremely' or 'very' concerned about the carbon footprint of reproduction: <i>“I cannot produce another person that will continue to destroy the planet, as they will inherit my first world lifestyle”</i> (p.9). 	High X Unclear if quantitative components adhere to quantitative quality criteria

368

369 Note. ¹New Environmental Paradigm (NEP); ²Pollution-related Health Concern (PHC); ³Reproductive Attitudes Scale (RAS); ⁴Environmental Concern Scale (ECS);

370 ⁵Environmental Behaviour Scale (EBS)

371 * p < 0.05, ** p < 0.01

372

373 **Fig 3. A map showing the geographical distribution of included studies**

374 Note. ¹The Brandt Line is *“a way of visualising the world that highlights the disparities and inequalities between the wealthy North and the poorer Global South”* [59] [p.85]. It
375 is critiqued for being outdated; however, it is still regarded as a useful way to visualise economic inequities in world politics.

376

377 3.1 Quantitative Results

378

379 3.1.1 Study Characteristics

380

381 Table 1 presents the study characteristics of five included quantitative studies. All studies
382 were cross-sectional, used surveys, and were conducted in denominated Global North
383 countries (Canada and 27 EU countries) (Fig 3). Measurement instruments were
384 heterogeneous, with four different tools, and one single-item measure used to assess
385 environmental concern. In total, 10,788 participants were included, none of whom identified
386 as gender-diverse, defined as *“people on the continuum between binary male and female”*
387 [60] [p.82] (although information on gender [was unattainable for one study [49]).

388

389 3.1.2 Quality Appraisal

390

391 Two studies were deemed high quality and three medium quality using the JBI Critical
392 Appraisal Checklist for Analytical Cross-Sectional Studies [45] (Table 1; S5 Table). The rigour
393 with which confounding factors were controlled for varied, ranging from two to seven
394 identified variables between studies. Limitations were described in every study with a key
395 commonality being the inability to infer causation owing to cross-sectional study designs.
396 Only one study [49] reported any acknowledgment of bias, yet all studies used self-report
397 surveys which are prone to social desirability bias and acquiescent responding [61].

398

399 3.1.3 Narrative Synthesis

400

401 A narrative synthesis was appropriate due to the heterogeneity in reported outcome
402 measures. The studies are categorised into those investigating reproductive intentions
403 (measured by ideal number of children) and reproductive attitudes (positive and negative
404 evaluations towards having children). One study [48] reported on both outcomes and thus
405 the findings were separated into both groups.

406

407 Reproductive Intentions

408 Three studies tested the relationship between environmental concerns and participants'
409 reproductive intentions, and the findings were contradictory. Arnocky, Dupois & Stroink [48]
410 reported that stronger pollution-related health concerns correlated with diminished
411 reproductive intentions, mediated by participants' attitude towards reproduction. However,
412 De Rose and Testa [49] found no significant association between climate change concerns
413 and (additionally) intended number of children, although weak evidence suggested an
414 association between stronger concerns for people with one existing child and a larger
415 intended family size. Finally, Szczuka's [51] findings were mixed in the fully-adjusted models;
416 for a family generally, stronger environmental concerns were positively associated with lower
417 reproductive intentions in Hungary, but negatively associated in Slovakia. For participants'
418 own preferred number of children, stronger environmental concerns were negatively
419 associated with increased reproductive intentions in Slovakia, with weak evidence of a
420 positive association in Czech Republic.

421

422 Reproductive Attitudes

423 Three studies explored the link between reproductive attitudes and climate change concerns.
424 Across all three studies, stronger concerns were significantly associated with less favourable
425 attitudes towards having children. Additional findings from Davis, Arnocky, & Stroink [38]
426 were unique to their research aims as they disaggregated environmental concern into three
427 subscales: egoistic (concern for the self), altruistic (concern for humanity), and biospheric
428 (concern for the environment). Higher egoistic and altruistic concern positively correlated
429 with pro-reproductive attitudes whilst an inverse correlation was found for biospheric
430 concern, meaning the concerns of participants with positive attitudes towards having
431 children were centred on the repercussions of climate change for themselves and their
432 community, rather than for the environment itself.

433

434 3.2 Qualitative Results

435

436 3.2.1 Study Characteristics

437

438 Table 1 presents the study characteristics of six included qualitative studies. Four studies
439 used IDIs and are therefore expected to have obtained richer data [62], but semi-structured
440 interviews were suitable to the studies' aims nonetheless. Supplementary tools were used in
441 three cases including focus group discussions (FGDs) and auto-photography, strengthening
442 the validity of the results by employing methodological pluralism [63]. Geographical location
443 was diverse, with data obtained from six different countries: four in the Global North, and
444 two in the Global South (Fig 3).

445

446 384 participants were recruited in total (in addition to 1,157 online comments), including 181
447 women, 140 men, and 5 gender-diverse participants (the gender of 58 participants is
448 unknown). Some studies recruited 'young adults' aged 18-35, whilst others included older
449 individuals, in one case up to 59-years-old. This difference might be partially explained by the
450 ambiguity surrounding the end of 'childbearing age', but relevant justification was provided
451 for the age ranges selected.

452

453 3.2.2 Quality Appraisal

454

455 Three studies were deemed high quality and three medium quality using the CASP Qualitative
456 Checklist [46] (Table 1; S6 Table). Only two authors [53] [56] engaged in a critical examination
457 of reflexivity and their potential to be biased throughout the research process. Given this
458 topic is conducive to highly subjective opinions, the four studies failing to include this
459 reflection were weakened as a result.

460

461 3.2.3 Thematic Synthesis

462

463 The qualitative findings all sought to understand the motivating factors behind participants'
464 reproductive decision-making in light of their climate change-related concerns. These were
465 synthesised, grouped into themes, and are discussed in turn below.

466

467 **Uncertainty of an Unborn Child's Future**

468 In four studies, participants were concerned about their child(ren)'s health and wellbeing in
469 an uncertain future, confronted by the effects of climate change. This was reflected in reader
470 comments from topical online news articles, with many predicting the quality of life for
471 unborn children as 'bleak' or 'doomed' [52]. Projections of a 'dire' future were expressed in
472 Smith et al. [56], with some participants feeling out of control of the future state of the
473 planet and disappointment that the ability to enjoy aspects of nature such as "*kayaking, or*
474 *hiking, or snowboarding*" [p.6] may no longer be accessible to future generations. In
475 Nakkerud [36] and Krähenbühl [53], participants were concerned that societies were heading
476 towards collapse and therefore did not want the responsibility of raising a child in their
477 envisioned uninhabitable world.

478

479 **Ecological Impact of Reproduction**

480 Three studies highlighted environmentalist concerns related to the ecological contributions
481 of reproduction to overpopulation and overconsumption. In Helm, Kemper, and White [52], a
482 number of commentators believed that refraining from having children was the best course
483 of action for reducing one's carbon footprint. Participants in Krähenbühl [53] differentiated
484 between concerns of the direct (overpopulation) and indirect (overconsumption) impacts of
485 children on the environment, with the latter situated in their rejection of capitalist society
486 and its materialist values. A unique finding in Nakkerud [36] was participants' concerns for
487 the "*flourishing of non-human species*" [p.203], aside from the environment as a whole.

488

489 **Meeting Family Subsistence Needs**

490 In Zambia [54] and Ethiopia [55], participants' concerns centred around their families' ability
491 to subsist in a context of seasonal droughts and dependence on rain-fed agriculture. The
492 dominant narrative in both studies was that smaller families are better positioned to support
493 themselves during adverse environmental conditions, meaning participants desired fewer
494 children to meet their household's essential needs. This led to heightened demand for family
495 planning services in these areas. However, the direction of this relationship was diametric in
496 Rosen et al. [54] as some respondents noted that a greater number of children is an asset as
497 they provide agricultural and pastoral labour that can be used to acquire more resources.
498 This emerged as a secondary theme with only a few male participants still holding this view.

499

500 3.3 Mixed-Methods Results

501

502 3.3.1 Study Characteristics

503

504 Table 1 presents the study characteristics of two included mixed-methods studies. Both
505 studies utilised the same dataset from the US, albeit for responding to different research
506 aims, and thus the characteristics are homogeneous aside from the reproductive focus and
507 key findings. Participants were disproportionately represented by women (n=446), followed
508 by men (n=131), and gender-diverse people (n=30).

509

510 3.3.2 Quality Appraisal

511

512 Mixed-methods studies were appraised using the MMAT [47] and both deemed high quality
513 (Table 1; S7 Table). Mixed-methods were appropriate as the quantitative multiple-choice
514 questions captured discrete answers, whilst the open-ended qualitatively designed questions
515 provided further detail for answering the research question. A key limitation was the non-
516 randomised selection of participants, resulting in an inability to generalise findings to all
517 Americans factoring climate change into their reproductive plans. Additionally, the use of
518 self-report measures leads to the same response biases as previously discussed [61].

519

520 3.3.3 Narrative Synthesis

521

522 Given only two mixed-methods studies were acquired, it was not necessary to categorise
523 them into distinct groups. However, the findings are discussed in turn due to heterogeneous
524 research aims and findings. Participants in Schneider-Mayerson and Leong [58] were
525 primarily concerned about the impacts of climate change on the health and wellbeing of their
526 existing and/or hypothetical children, with concerns related to the carbon footprint of
527 procreation emerging as a secondary finding. In Schneider-Mayerson [57], findings were
528 divided between respondents who were already parents and/or planning to have children
529 versus those who were environmentally childfree or undecided. The former group believed
530 that parents are more invested in environmental politics due to their connections to a distant
531 future, on the part of their children, and viewed their (future) parenting as contributing to a
532 better world through supporting their children to become environmentalists. On the other
533 hand, the latter group commented on the opportunity cost of parenting, meaning the energy
534 required for raising a child would be taken “*from the project of fighting climate change*”

535 [p.164]. Additionally, reproduction was viewed as a socio-political tool that could be
536 leveraged to influence environmental attitudes among family members specifically.

537

538

539 4. Discussion

540

541 4.1 Summary of Evidence

542

543 Thirteen studies detailing how climate change-related concerns link to reproductive decision-
544 making were narratively synthesised. The majority of studies (12/13) reported that stronger
545 environmental concerns are associated with less favourable reproductive attitudes and a
546 diminished desire and intention to have children. However, weaker evidence from four
547 studies suggested climate change concerns may be associated with *increased* reproductive
548 intention for some. Four key areas of concern were identified: uncertainty of an unborn
549 child's future, ecological impact of reproduction, meeting family subsistence needs, and
550 contributing to environmental politics. The qualitative, quantitative, and mixed-methods
551 findings are consolidated in this section, and contextualised in relation to other literature, to
552 answer the research question and objectives of this review.

553

554 4.2 Complex Relationship between Climate Change Concerns and 555 Reproductive Decision-Making

556

557 The findings revealed a complex relationship between climate change-related concerns and
558 reproductive decision-making. In all but one study, stronger concerns were associated with a
559 desire for a smaller number of children or simply none at all. This accords with a recent cross-
560 country study [64] involving 10,000 18–25-year-olds reporting that four in ten participants
561 were hesitant to have children as a result of climate change. Additionally, these concerns
562 sparked the inception of political movements such as BirthStrike, with Blythe Pepino, the
563 founder of this collective stating, “*we feel too afraid to have kids because we feel that we’re*
564 *heading toward civilization breakdown as a result of the environmental crisis*” [35] [p.2].

565

566 However, results were mixed; two quantitative studies in EU countries [49] [51] suggested
567 that climate change concern may be associated with an *increased* desire for children for
568 some. These studies, however, used a single item measure of concern as opposed to the
569 NEP, and dichotomised environmental concern on a binary scale from ‘strong concerns’ to
570 ‘no strong concerns’. This ignores the continuous nature of mental health issues and meant a
571 considerable amount of this variable’s information was lost, reducing its statistical power
572 [65]. However, one qualitative study [54] found that some Zambian men desire more children
573 during times of environmental degradation, and in one mixed-methods study [57]
574 environmental concerns were justified as a reason to *have* children. To explain these
575 contradictory findings, it is important to discuss the various concerns that motivate these
576 shifts in reproductive decision-making.

577

578 4.3 Explanations for Factoring Climate Change Concerns into

579 Reproductive Decision-Making

580

581 Participants' climate change concerns factoring into their reproductive decisions are divided
582 into four themes. Firstly, participants worried about the quality of their child(ren)'s life in a
583 future affected by climate change. These are altruistic environmental concerns, according to
584 Davis, Arnocky, and Stroink [38], as they consider the impacts to others, in this case one's
585 children, and embody a "*degree of nature-self overlap*" [p.95] by placing them within an
586 interdependent environment. This narrative is echoed in Dow's [66] conceptualisation of an
587 ecological ethic of reproduction which encourages prospective parents to look beyond their
588 individual nuclear family to the broader environment, representing the conditions into which
589 a child will be born.

590

591 Dow's [66] theory also naturally intersects with the second theme, participants' concerns of
592 their ecological impact, as it proposes a reconsideration of "*bring[ing] future generations into*
593 *a world with stretched and unequally distributed resources*" [p.653]. Participants feared that
594 having children would contribute to overpopulation and overconsumption, which
595 corresponds to recent calculations of the ecological cost of reproduction. Wynes and
596 Nicholas [67], for example, concluded that having one fewer child is the highest impact
597 action one can take to reduce personal emissions. Interestingly however, these concerns
598 were not expressed by participants in the Global South, which may reflect their relatively
599 negligible involvement in overconsumption practices [1]. Whilst the fertility rate in many
600 Global South countries has historically been higher than their Global North counterparts,

601 focussing on overpopulation discourses has been critiqued as reductive and racist as
602 consumption, aggravated by a capitalist way of living, is considered the primary
603 anthropogenic driver of climate change [68].

604

605 The third and fourth themes were reported to a lesser extent, in two studies each. In Zambia
606 and Ethiopia, participants desired fewer children to meet subsistence needs during periods of
607 declining agricultural productivity. However, this competed with the lived reality of shortages
608 in contraception provision which epitomises the distinction between ‘desire’ and ‘intention’
609 in Miller’s [31] T-D-I-B model. Given this finding was unique to the studies from the Global
610 South, this may imply that the transition from desires to intentions is more challenging in
611 these countries with generally weaker sexual and reproductive health (SRH) service provision,
612 and where reproductive rights is, at times, still a taboo subject [69]. Contextualising this
613 within broader discourses of reproductive freedom, it is important to remember that many
614 people may not have the ability or privilege to choose whether, or how many children they
615 have. Consequently, this highlights the highly situated nature of environmentally childfree
616 behaviour as organised along social class hierarchies that are prevalent both within and
617 between Global North and Global South settings [53].

618

619 The final theme explored environmental political concerns in some individuals’ decisions to
620 restrict their reproduction. Participants in Schneider-Mayerson [57] believed that the energy
621 required for parenting would detract from their personal endeavours to mitigate climate
622 change. This parallels Blackstone’s [34] research suggesting that childfree individuals wish to
623 “*leave a legacy*” [p.76] by making a positive mark on the world through philanthropic work,
624 civic engagement, and in this case, climate change activism. Reproduction was also seen as a

625 socio-political tool in participants' private lives, although interestingly only two participants
626 across all studies reported their refusal to have children on a more public scale, as a method
627 of 'striking' until systemic change was enacted. This is surprising given the prominence of
628 BirthStrike, Conceivable Future, and No Future No Children that had this notion at the very
629 core of their movements.

630

631 These final two themes were also articulated in participants' intentions for a greater number
632 of children within two studies. Firstly, participants in Zambia were concerned about their
633 ability to support their family without the household labour provided by additional children.

634 This idea supports demand theories of fertility previously mentioned and is observed in other
635 Global South countries including Bangladesh and Nepal where children are seen as "*helping*
636 *hands during difficult times*" [70] [p.105] to support with domestic work as well as water and
637 fuel wood collection [71]. These concerns may also be reasonably linked to demographic
638 theories of 'insurance' births, whereby women in unfavourable environmental conditions
639 have more children to compensate for the risks to child mortality [72]. Regarding
640 environmental politics, participants responses were reflective of a political fertility gap in the
641 US, with statistics from the 2006 General Social Survey highlighting a 41% increase in
642 numbers of children had by 'conservative' adults than 'liberal' adults [73]. Participants feared
643 that this gap would widen if they, as liberal and environmentally conscious individuals, chose
644 to have fewer children which could further exacerbate the climate crisis.

645

646 These studies have therefore highlighted a complex and multidimensional relationship
647 between climate change concerns and reproductive decision-making. This contrasts with an
648 oversimplified depiction of this relationship within the media that has typically only

649 highlighted people's concerns of the quality of a child's life in a climate-changed future as a
650 factor in their reproductive decisions. Additionally, important distinctions were found
651 between, as well as within, Global North and Global South countries, adding further
652 complexity to the relationship as climate change concerns and their impact on reproductive
653 decision-making were not generalisable on a global scale.

654

655 4.4 Recommendations

656

657 4.4.1. Recommendations for Research

658

659 Due to the incipient nature of this topic, this review has a number of suggestions for future
660 research directions. Firstly, greater attention should be paid to the impact of climate change
661 concerns on reproductive timing to provide a comprehensive view on reproductive decision-
662 making as a whole according to the T-D-I-B model. Given concerns of overpopulation
663 featured as a dominant theme, age at first birth as well as birth spacing may be an additional
664 reproductive consideration, warranting further inquiry. Secondly, this topic ought to be
665 investigated further within Global South settings. Differences in structural constraints from
666 the Global North have been highlighted and are expected to predict heterogeneous
667 responses to environmental concerns and reproductive decisions between, as well as within,
668 this binary geographical divide. Additionally, greater efforts to recruit and retain gender-
669 diverse participants are needed as they are particularly vulnerable to both the effects of
670 climate change and adverse mental health [74] [75]. Finally, with respect to study design,

671 longitudinal cohort studies would be advantageous to explore causality of this relationship
672 and whether it is subject to change over an individual's life course.

673

674 4.4.2 Recommendations for Policy and Practice

675

676 The wider implications of this review highlight some important recommendations for policy
677 and practice. Firstly, evidence has shown that public concern towards climate change in the
678 UK has grown considerably over the last decade [76] [77]. Acknowledging this suggests an
679 evident need for increased resource investment into mental health service provision and
680 policymakers should endeavour to use co-production methods that consult mental health
681 service users and acknowledge their lived experience expertise. Additionally, greater
682 prioritisation of climate change within political agendas may help mitigate public anxiety and
683 relieve some of the burden on mental healthcare providers. Further research is required to
684 explore the trend in public concern towards climate change in countries outside of the UK.
685 Secondly, promotion of family planning services coupled with subsidised, readily available
686 access to contraception presents a key opportunity for fostering climate resilience within the
687 Global South, allowing individuals to control their own reproductive trajectories. Finally, as
688 researchers and policymakers continue to seek ways to curb the environmental
689 consequences of climate change, understanding the reasons why some people choose to
690 adjust their reproductive intentions may prove instrumental for shaping public policy. At the
691 very least, this review underscores a need for collaboration among policymakers to
692 incorporate local-level environmental concerns within national and international climate
693 change, mental health, and SRH policies.

694

695 4.5 Limitations

696

697 This review has identified a gap in the literature and provided key recommendations to be
698 taken forward into the field, however, some limitations remain. Firstly, only English language
699 papers were eligible for inclusion meaning relevant studies may have been omitted.

700 Additionally, the inclusion of different study designs resulted in inconsistencies in the quality
701 appraisal as three separate tools had to be used. However, not limiting by study design was
702 justified as it facilitated methodological pluralism which is useful for viewing a singular
703 phenomenon through different lenses [78]. The narrative synthesis approach is often

704 critiqued for lacking transparency [79] and an in-depth description of the process was beyond
705 the scope of this review. However, synthesis was conducted in line with Popay et al. [43] and
706 we have provided detailed information on the review's methods to ensure utmost
707 transparency and reproducibility of findings. This detail was also provided to offset the risk of
708 selection bias resulting from the single screening of articles as much as possible [80].

709

710 The included studies were all appraised as either high (n=7) or medium quality (n=6),
711 enhancing the strengths of the conclusions drawn. However, there was significant variability
712 in sample sizes with three qualitative studies recruiting only 7, 14, and 20 participants,
713 resulting in low statistical power. All quantitative studies were cross-sectional, leading to an
714 inability to infer a temporal relationship or to evaluate any changes prospectively. However,
715 confounding factors were identified and adjusted for, and the qualitative and mixed-methods
716 studies supported a directional relationship from climate change concern (exposure) to

717 reproductive decision-making (outcome), making it unlikely that the inverse was true for the
718 quantitative studies. Finally, there was significant geographical homogeneity in the data, with
719 85% (n=11) of studies conducted in Global North countries, limiting the generalisability of
720 these findings to the Global South.

721

722

723 5. Conclusions

724

725 This review has revealed a complex relationship between climate change-related concerns
726 and reproductive decision-making. The findings support anecdotal evidence that climate
727 change is factoring into people's reproductive decision-making, with the majority of studies
728 suggesting that many people are choosing to forego childbearing or reduce the number of
729 children they have as a result. However, a relatively simplistic overview of this relationship,
730 grounded in environmental ethics, is illuminated in public discourse. This review has revealed
731 a more intricate account of how and why people are beginning to reconsider their
732 childbearing and child-number decisions based on their climate change concerns. Whilst
733 many participants' narratives were rooted in ethical considerations, including concern for
734 their child(ren) in an uncertain future and the ecological impact of reproduction, other
735 considerations that do not appear so readily in public discourse were environmental political
736 considerations and meeting family subsistence needs. These two concerns were also
737 justified, albeit to a lesser degree, as reasons for a *greater* number of children, further
738 complicating the relationship. The lack of Global South representation in the literature is
739 highlighted as one among a number of gaps still remaining in the field with others including a

740 relative absence of gender-diverse participants' voices and no consideration of the effect of
741 climate change concern on reproductive timing. Given the multidisciplinary implications of
742 this research for public health policy and environmental politics, these all represent
743 necessary avenues for future research. This review therefore serves as a call to action for
744 greater research into the climate change, mental health, and reproductive decision-making
745 nexus.

746

747

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754

755

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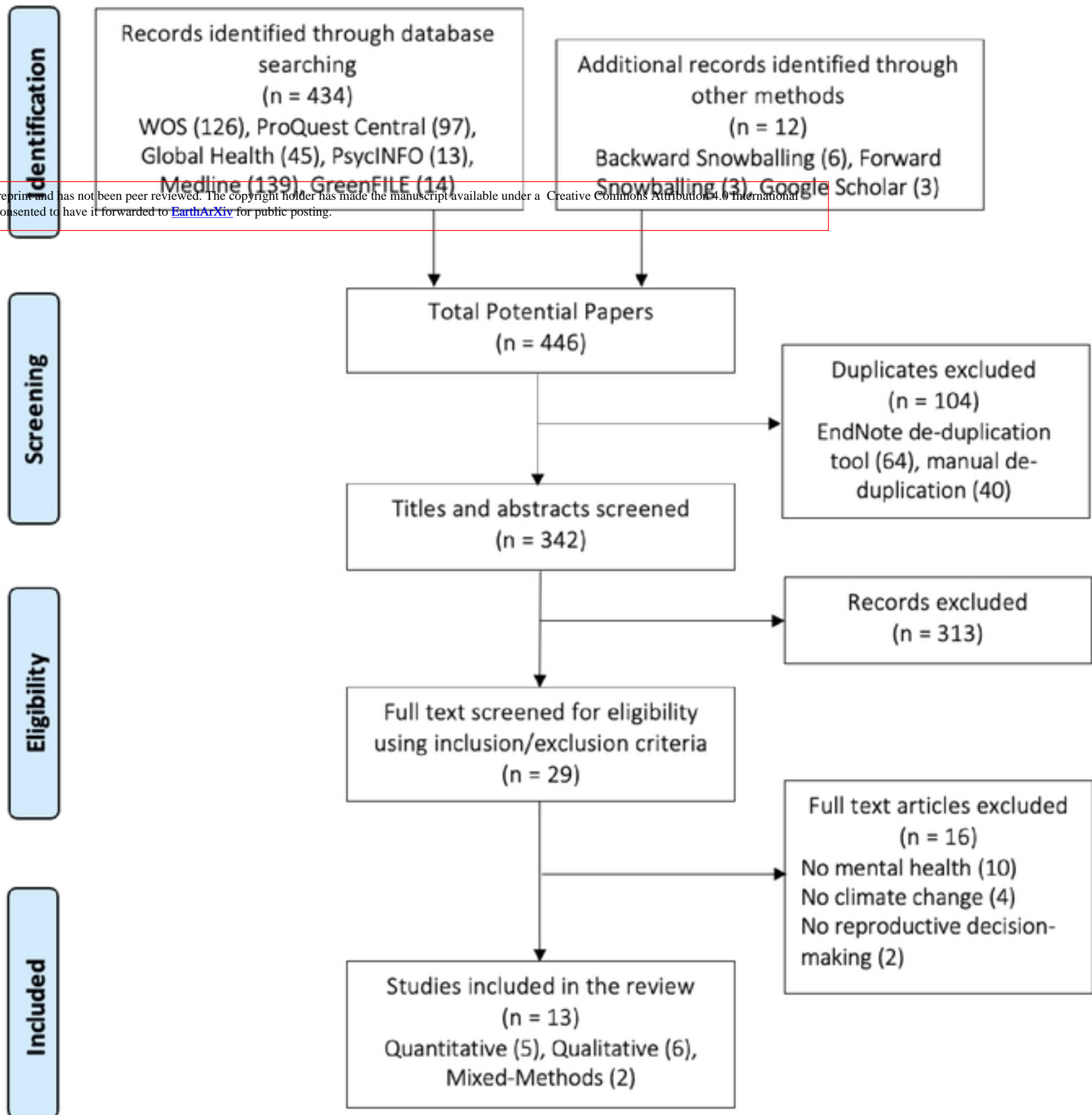
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1067 Supporting Information

- 1068 S1 Table. Search terms for search strategy conducted on WOS database
- 1069 S2 Table. MeSH terms used for search strategy
- 1070 S3 Table. Inclusion/exclusion criteria for study selection
- 1071 S4 Table. PRISMA Checklist 2009
- 1072 S5 Table. Quality appraisal for quantitative studies using the JBI Critical Appraisal Checklist for
1073 Analytical Cross-Sectional Studies
- 1074 S6 Table. Quality appraisal for qualitative studies using the CASP Qualitative Checklist
- 1075 S7 Table. Quality appraisal for mixed-methods studies using the MMAT

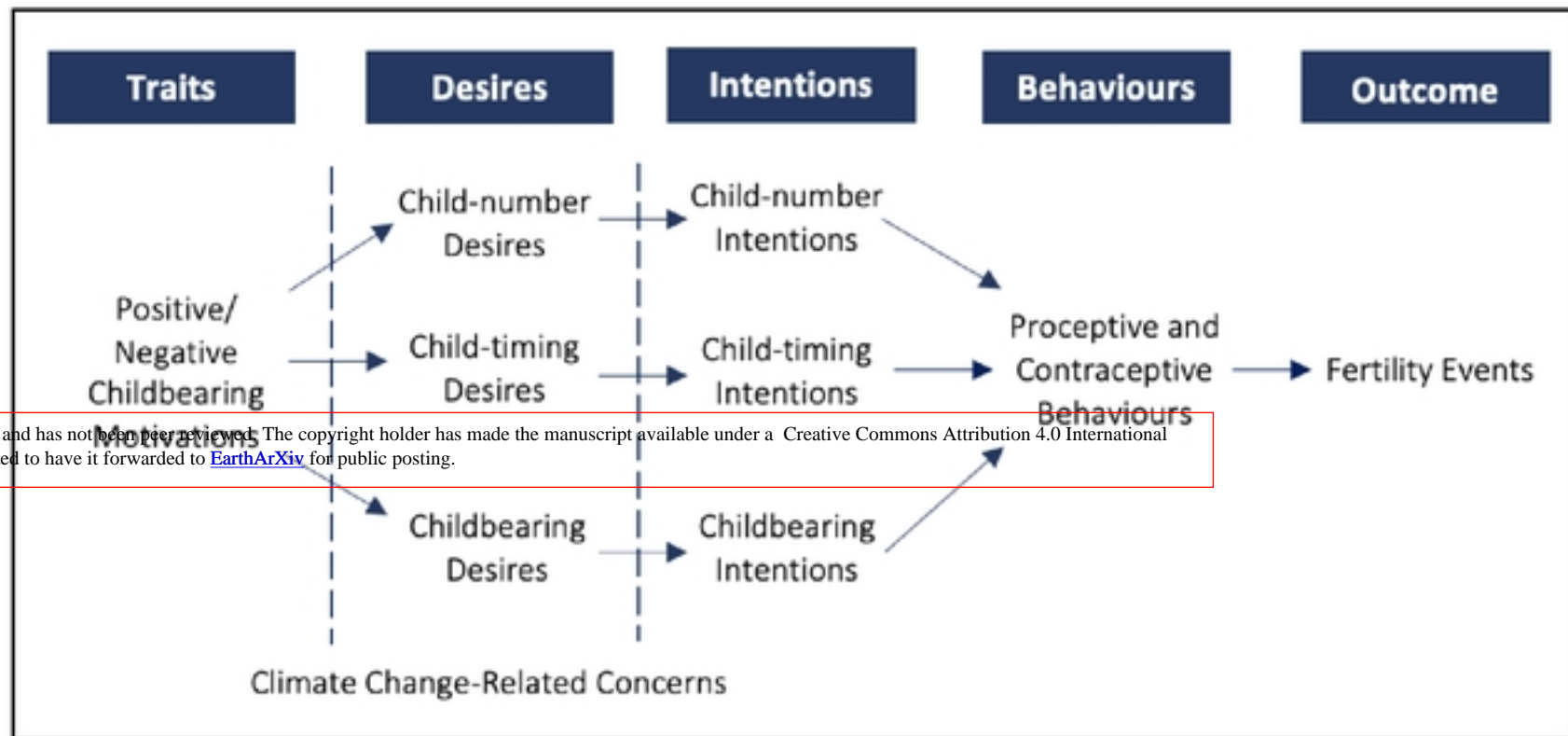
Figures for Dissertation Publication

Fig 1. PRISMA diagram of study selection



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Fig 2. A model of reproductive decision-making combining the T-D-I-B model with climate change concerns (modified from Miller, 1994; 2011)



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