**Appendix 1**. Search strategy for scoping review

|  |
| --- |
| PubMed: 968 results  ((((three-generation cohort study[Title/Abstract]) OR (intergenerational cohort study[Title/Abstract])) OR (multigenerational cohort study[Title/Abstract])) OR (transgenerational cohort study[Title/Abstract])) OR ("birth cohort"[Title/Abstract] AND generation\*[Title/Abstract]) |
| EMBASE: 1021 results  'three-generation cohort study':ti,ab OR 'intergenerational cohort study':ti,ab OR 'multigenerational cohort study':ti,ab OR 'transgenerational cohort study':ti,ab OR ('birth cohort':ti,ab AND generation\*:ti,ab) |
| Web of Science: 763 results   1. (TI=("three-generation cohort study")) OR AB=("three-generation cohort study") 2. (TI=("intergenerational cohort study")) OR AB=("intergenerational cohort study") 3. (TI=("multigenerational cohort study")) OR AB=("multigenerational cohort study") 4. (TI=("transgenerational cohort study")) OR AB=("transgenerational cohort study") 5. (TI=("birth cohort" AND generation\*)) OR AB=("birth cohort" AND generation\*) 6. #1 OR #2 OR #3 OR #4 OR #5 |

**Appendix 2.** Study characteristics of included multigenerational cohort studies a

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Datasets | Study design | Country | Sample size | Time range of F2 | Follow-up frequency | Participants |
| Framingham Heart Study (FHS) – Gen3 | Population-based cohort extended three generation cohort | USA | 4,095 | 2002-present 20 years | Every 3-5 years | At least one parent in the FHS offspring cohort, or one grandparent in the FHS cohort |
| Respiratory Health in Northern Europe, Spain and Australia (RHINESSA) Cohort | Population-based cohort extended three generation cohort | Norway, Denmark, Sweden, Iceland, Estonia, Spain, Australia | F0 NG F1 n=6,045 F2 n=8,260 | 2014-present  8 years | Every 5-8 years | The cohort RHINE’s and ECRHS’s participants and offspring |
| Diet, Cancer and Health-Next Generations (DCH-NG) Cohort | Population-based cohort extended three generation cohort | Denmark | 44,869 | Establishes in 2015-2019 NG | NG | Danes aged 50–64 years and living in the greater areas of Copenhagen and Aarhus, their children, children’s spouses, and their grandchildren |
| Australian Temperament Project Generation 3 Study (ATPGen3) | Population-based cohort extended three generation cohort | Australia | F0 n=2,443 F1 n=703 F2 n=1,167 | 2012-present 10 years | Biannually | The participants of cohort ATP and their offspring |
| Cebu Longitudinal Health and Nutrition Survey (CLHNS) | Population-based cohort extended three generation cohort | Filipino | 3,327 | 2009-present 13 years | F0, F1: In 1991-92, 1994-95, 1998-99, 2002, 2005  F0, F1, F2: In 2009 and 2018 | Filipino women who gave birth between 01/05/1983 and 30/04/ 1984, their children and grandchildren |
| NCI Combined DES Cohort Follow-up Study (NCI-DES) | Population-based cohort extended three generation cohort | USA | 21,000 | 2001-present 21 years | F0, F1: In 1994, 1997  F0, F1, F2: In 2001, 2006, 2011, and 2016 | Diethylstilbestrol exposed and unexposed mothers and their descendants |
| National Longitudinal Survey of Youth (NLSY79) | Population-based cohort extended three generation cohort | USA | 12,686 | 2010-present 12 years | Annually until 1994 and biennially since then | Men and women born in the USA between 1957 and 1964 who were aged 14 to 22 when first interviewed in 1979, and their offspring |
| Panel Study of Income Dynamics (PSID), Child Development Supplement (CDS) (PSID-CDS) | Population-based cohort extended three generation cohort | USA | 1,642 | 1997-2008 11 years | Every five years | The cohort PSID’s participants and their offspring |
| French E4N Cohort (E4N) | Population-based cohort extended three generation cohort | France | n=98,995 | 2016-present  6 years | Every 2–3 years | Women who had been born between 1925 and 1950, their spouses, children, and grandchildren |
| Isle of Wight Birth Cohort (IOW 3rd Gen) | Birth cohort extended three generation cohort | UK | F0 n=1,536 F1 n=1,456 F2 n=530 | 2010-present 12 years | F1: 1, 2, 4, 10, 18 and 26 years F2: 0, 3, 6, 12, 24, 36, 60, 72 months | Mothers who gave birth on the Isle of Wight between 01/01/1989 and 28/02/1990, their partners, children, and grandchildren |
| Uppsala Birth Cohort Multigenerational Study (UBCoS Multigen) | Birth cohort extended three generation cohort | Sweden | 140,000 | 2005-2010 5 years | NA | 14,192 males and females born in Uppsala from 1915-1929 and their descendants |
| Avon Longitudinal Study of Parents and Children-Generation 2 (ALSPAC-G2) | Birth cohort extended three generation cohort | UK | F0 n=14,541 F1 n=14,901 F2 n=810 | 2012-present 10 years | First 7–15 days, 6 months, 12 months, annually up to 7 years, and then at 9 and 11 years, every 2 years up to the age of 21 of F2. | Women who were resident in the former county of Avon and who were expected to deliver between 01/04/1991 and 31/12/1992 and their offspring |
| 1993 Pelotas (Brazil) Birth Cohort (93Cohort-II) | Birth cohort extended three generation cohort | Brazil | F0 NG  F1 n=5,249 F2 n=1,212 | 2016-present 6 years | At ages 11, 15, 18, 22 years of F1 | Mothers who lived in the urban area of Pelotas and gave birth in 1993 and their offspring |
| Nova Scotia 3G Multigenerational Cohort (Nova Scotia 3G) | Birth cohort extended three generation cohort | Canada | F0 n=14,978 F1 n=16,766 F2 n=28,638 | 1996-2018 22 years | Annually | Women who gave birth from 1980 onward in the Canadian province of Nova Scotia and their offspring |
| Dunedin Multidisciplinary Health and Development Study (Dunedin Cohort) | Birth cohort extended three generation cohort | New Zealand | 8,000 | 2003-present 19 years | At ages 3, 5, 7, 9, 11, 13, 15, 18, 21, 26, 32, 38, 45 years of F0 | Mothers who gave born of 1037 babies between 01/04/1972 and 31/03/1973 at Queen Mary Maternity Hospital, Dunedin, New Zealand and their offspring |
| 1958 National Child Development Study (NCDS) | Birth cohort extended three generation cohort | UK | 17,415 | 1991-present 31 years | At ages 7, 11, 16, 23, 33, 42, 44, 46, 50, 55, 62 years of F0 | All those born in England, Scotland and Wales in one particular week in March 1958 and their offspring |
| Dutch Famine Birth Cohort (DFBC) | Birth cohort extended three generation cohort | Netherlands | 2,414 | 2008-present  14 years | F0, F1: In 1994-1996, 2002-2004  F0, F1, F2: In 2008-2009, 2012-2013, 2018-2019, 2019-2020 | Men and women born in the Wilhelmina Gasthuis between November 1943 and February 1947 and their offspring |
| Adolescent to Adult Health (Add Health) | Birth cohort extended three generation cohort | USA | 20,745 | 2001-2018 17 years | F0, F1: In 1994-1995, 1996  F0, F1, F2: 2001-02, 2008-09, 2016-18 | Adolescents aged 12–19 in the USA in 1994–95, their parents and children |
| Illawarra Born cross-generational health study (Illawarra Born) | Birth cohort extended three generation cohort | Australia | 41 | Established in 2014 NG | Baseline: 22 weeks’ gestation of F0 Waves2: 30 weeks’ gestation of F0 Waves3: 7-10 post-partum of F0 Waves4: 6 months post-partum of F0 | Pregnant women in Wollongong Hospital, their partner, children and grandmother |
| Jerusalem Perinatal Family Follow-Up Study (JPS-FUS) | Birth cohort extended three generation cohort | Israel | F0 n=2366  F1 n=1,473  F2 NG | 2007-2012 5 years | In 2007-09, 2011-12 | The JPS participants and their offspring |
| Mater-University of Queensland Study of Pregnancy (MUSP) | Birth cohort extended three generation cohort | Australia | 8,556 | 2016-2018 2 years | At 6 months, age 5, 14, 21, 27, 30, 35 years of F1 | Women who gave born between 1981 and 1984 at the Mater Misericordiae Hospital, their children and grandchildren |
| ACROSSOLAR Study | Birth cohort extended three generation cohort | Germany | 2,051 | 2009-present  13 years | Bi-annually | SOLAR II participants and their children and parents |
| GINIplus Birth Cohort | Birth cohort extended three generation cohort | Germany | 5,991 | 1995-present  27 years | At children’s birth and age 1, 2, 3, 4, 6, 10, 15, 20 years | Healthy, term newborns with and without family history of allergy and their parents and grandparents |
| LISAplus Birth Cohort | Birth cohort extended three generation cohort | Germany | 3,097 | 1997-present  25 years | At children’s birth and age 3 months, 6 months, 1 year, 1.5, 2, 4, 6, and 10 years. | Healthy, mature newborns with German parents and a birthweight > 2,500g who were born between 1997 and 1999 and their parents and grandparents |
| LifeLines Cohort | Three generation cohort | Netherlands | 167,729 | 2006-present 16 years | Questionnaire: every 1.5 years Biosamples, measurements and tests: every five years | Inhabitants of the northern part of the Netherlands and their families |
| Lifeways Cross-Generation Cohort | Three generation cohort | Ireland | F0 n=1,604  F1 n=1,638  F2 n= 1,114 | 2001-present 21 years | At age 3, 5, 10 years of F2 | Mothers consented in the Coombe Hospital Dublin and University College Hospital Galway between Oct 2001 and Jan 2003, their husbands, children, and parents |
| Pathways to Adulthood Study (PAS) | Three generation cohort | USA | F0 n=2,307 F1 n=2,694  F2 NG | 1990-1994  4 years | NG | Pregnant women who consented at Johns Hopkins Hospital from 1960 to 1964, their children and parents |
| TMM BirThree Cohort | Integrated birth and three generation cohort | Japan | 73,529 | 2013-present 9 years | <5 years old: 6, 12, 24, 36, 42, 48 and 60 months old ≥5 years old: annually | Pregnant women who are residing in Miyagi Prefecture, and their parents and relatives, newborn babies and their siblings |

a: F0: Generation 1/grandparents; F1: Generation 2/parents; F2: Generation 3/children.

**Appendix 3.** Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

| **SECTION** | **ITEM** | **PRISMA-ScR CHECKLIST ITEM** | **REPORTED ON PAGE #** |
| --- | --- | --- | --- |
| **TITLE** | | | |
| Title | 1 | Identify the report as a scoping review. | #1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives. | #3 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach. | #6 |
| Objectives | 4 | Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives. | #7 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number. | #8 |
| Eligibility criteria | 6 | Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale. | #9-10 |
| Information sources\* | 7 | Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed. | #9, 11 |
| Search | 8 | Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated. | #9 |
| Selection of sources of evidence† | 9 | State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review. | #9-10 |
| Data charting process‡ | 10 | Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators. | #11 |
| Data items | 11 | List and define all variables for which data were sought and any assumptions and simplifications made. | #11 |
| Critical appraisal of individual sources of evidence§ | 12 | If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate). | NA |
| Synthesis of results | 13 | Describe the methods of handling and summarizing the data that were charted. | #11 |
| **RESULTS** | | | |
| Selection of sources of evidence | 14 | Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram. | #12 |
| Characteristics of sources of evidence | 15 | For each source of evidence, present characteristics for which data were charted and provide the citations. | #12 |
| Critical appraisal within sources of evidence | 16 | If done, present data on critical appraisal of included sources of evidence (see item 12). | NA |
| Results of individual sources of evidence | 17 | For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives. | #13-18 |
| Synthesis of results | 18 | Summarize and/or present the charting results as they relate to the review questions and objectives. | #12 |
| **DISCUSSION** | | | |
| Summary of evidence | 19 | Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups. | #19 |
| Limitations | 20 | Discuss the limitations of the scoping review process. | #24 |
| Conclusions | 21 | Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps. | #25 |
| **FUNDING** | | | |
| Funding | 22 | Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review. | #26 |