**Supplement material 1 Risk of Bias tool**

**Table S1 Risk of Bias tool for 56 included studies**

| Study | Methods | How large was the sample size? | Were the methods sufficient described to enable them to be repeated? | Were valid methods used to determine ASD diagnosis? | Results | Are sample characteristics clearly described? | Are complete results reported? | Were most common potential confounding factors (gender/age/ASD type) accounted for? | Risk of bias score |
|-------|---------|-------------------------------|-------------------------------------------------|---------------------------------------------|--------|-----------------------------------|-----------------------------|-------------------------------------------------|------------------|
| 1      | Bravo Oro et al. (2012) | - | + | 0 | + | - | + | + | + | ++++++ |
| 2      | Idring et al. (2012) | - | + | 0 | + | - | + | 0 | + | +++ |
| 3      | Thomas et al. (2012) | - | + | 0 | + | - | 0 | 0 | + | +++ |
| 4      | Ververi et al. (2012) | - | + | 0 | + | - | 0 | 0 | + | +++ |
| 5      | Begeer et al. (2013) | - | 0 | 0 | ++ | - | + | 0 | 0 | +++ |
| 6      | Frenette et al. (2013) | - | + | 0 | 0 | - | + | 0 | + | +++ |
| 7      | Hinkka-Yli-Salomäki et al. (2013) | - | ++ | 0 | 0 | - | + | 0 | 0 | +++ |
| 8      | Magaña et al. (2013) | - | + | + | ++ | - | 0 | 0 | + | +++++ |
| 9      | Masri et al. (2013) | - | ++ | 0 | + | - | + | + | ++ | ++++++ |
| 10     | U.S. Department of Health and Human Services (2014) | - | 0 | 0 | + | - | 0 | 0 | 0 | + |
| 11     | Lagunju et al. (2014) | - | ++ | 0 | + | - | + | 0 | + | +++ |
| 12     | Mazurek et al. (2014) | - | 0 | 0 | 0 | - | 0 | 0 | + | + |
| 13     | Mishal et al. (2014) | - | 0 | 0 | 0 | - | 0 | 0 | + | + |
| 14     | Bent et al. (2015) | - | 0 | 0 | + | - | + | 0 | + | +++ |
| 15     | Bickel et al. (2015) | - | 0 | 0 | 0 | - | 0 | + | + | ++ |
| 16     | Christensen (2015) | - | 0 | 0 | + | - | 0 | 0 | + | + |
| 17     | Jo et al. (2015) | - | 0 | 0 | ++ | - | 0 | + | + | +++ |
| 18     | Larsen (2015) | - | + | 0 | 0 | - | 0 | 0 | 0 | + |
| 19     | Miodovnik et al. (2015) | - | 0 | 0 | ++ | - | 0 | 0 | + | +++ |
| 20     | Salomone et al. (2015) | - | - | - | - | - | - | - | - | - |
| Portugal | - | + | + | ++ | - | + | 0 | + | +++++ |
| Italy | - | ++ | + | ++ | - | + | 0 | + | +++++ |
| Spain | - | + | + | ++ | - | + | 0 | + | +++++ |
| Romania | - | ++ | + | ++ | - | + | 0 | + | +++++ |
| Poland | - | ++ | + | ++ | - | + | 0 | + | +++++ |
| Mecedonia | - | ++ | + | ++ | - | + | 0 | + | +++++ |
| Czech Republic | - | ++ | + | ++ | - | + | 0 | + | +++++ |
| Norway | - | ++ | + | ++ | - | + | 0 | + | +++++ |
| Iceland | - | ++ | + | ++ | - | + | 0 | + | +++++ |
| France | - | + | + | ++ | - | + | 0 | + | +++++ |
| UK | - | ++ | + | ++ | - | + | 0 | + | +++++ |
| Country                 | Code | ++ | + | ++ | - | + | 0 | + | ++++++++ |
|-------------------------|------|----|---|----|---|---|---|---|----------|
| Finland                 |      | +  | 0 | +  | 0 | + | 0 | + | ++       |
| Belgium                 |      | +  | + | ++ | - | + | 0 | + | ++++++++ |
| Ireland                 |      | +  | + | ++ | - | + | 0 | + | ++++++++ |
| Hungary                 |      | -  | + | ++ | - | + | 0 | + | ++++++++ |
| Germany                 |      | -  | + | ++ | - | + | 0 | + | ++++++++ |
| The Netherlands         |      | -  | ++ | +  | +  | + | 0 | + | ++++++++ |
| Denmark                 |      | -  | ++ | +  | ++ | - | 0 | + | ++++++++ |
| Christensen et al. (2016)| -    | 0  | 0 | +  | -  | 0 | 0 | 0 | + |
| Brett et al. (2016)     |      | -  | 0 | 0  | ++ | - | + | 0 | + | +++ |
| Crane et al. (2016)     |      | -  | ++ | 0  | +  | - | 0 | 0 | + | +++ |
| Darcy-Mahoney et al. (2016)| -    | +  | 0 | 0  | -  | 0 | 0 | 0 | + | ++ |
| Emerson et al. (2016)   |      | -  | 0 | 0  | ++ | - | 0 | 0 | + | +++ |
| Hrdlicka et al. (2016)  |      | -  | + | 0  | 0  | - | 0 | 0 | + | +++ |
| Mpaka et al. (2016)     |      | -  | + | 0  | 0  | - | 0 | 0 | + | ++ |
| Rutherford et al. (2016)|      | -  | + | ++ | - | + | 0 | + | +++ |
| Sicherman et al. (2016) |      | -  | + | ++ | - | + | 0 | + | ++++++ |
| Bello-Mojeed et al. (2017)| -    | ++ | + | ++ | - | 0 | 0 | 0 | + | ++++++ |
| Daniels et al. (2017)   |      | -  | - | -  | - | - | - | - | - |
| Albania                 |      | -  | + | 0  | ++ | - | 0 | 0 | + | +++ |
| Bulgaria                |      | -  | + | 0  | ++ | - | 0 | 0 | + | ++++++ |
| Croatia                 |      | -  | + | 0  | ++ | - | 0 | 0 | + | ++++++ |
| Turkey                  |      | -  | + | 0  | ++ | - | 0 | 0 | + | ++++++ |
| Goodwin (2017)          |      | -  | + | 0  | 0  | - | 0 | 0 | + | ++ |
| Hagberg & Jick (2017)   |      | -  | 0 | 0  | +  | - | 0 | 0 | + | +++ |
| Lo (2017)               |      | -  | + | 0  | +  | - | + | 0 | + | +++ |
| May et al. (2017)       |      | -  | + | 0  | ++ | - | 0 | 0 | + | +++ |
| Montiel-Nava (2017)     |      | -  | + | 0  | 0  | - | 0 | 0 | + | ++ |
| Ribeiro (2017)          |      | -  | ++ | +  | +  | - | 0 | 0 | + | ++++++ |
| Sheldrick (2017)        |      | -  | 0 | 0  | ++ | - | + | ++ | + | ++++++ |
| Zablotsky et al. (2017) |      | -  | 0 | 0  | ++ | - | 0 | 0 | + | +++ |
| Baio et al. (2018)      |      | -  | 0 | 0  | +  | - | 0 | 0 | + | + |
| Becerra-Culqui et al. (2018)| -    | 0  | 0 | +  | - | 0 | 0 | 0 | + | ++ |
| Berg et al. (2018)      |      | -  | 0 | 0  | ++ | - | 0 | 0 | + | ++ |
| Cawthorpe (2018)        |      | -  | 0 | +  | +  | - | + | 0 | + | +++ |
| Garrido et al. (2018)   |      | -  | ++ | +  | 0  | - | + | 0 | + | ++++++ |
| Hall-Lande et al. (2018)|      | -  | + | +  | +  | - | + | 0 | + | ++++++ |
| Hausman-Kedem et al. (2018)| -    | +  | 0 | 0  | -  | 0 | 0 | 0 | + | +++ |
| Kurasawa et al. (2018)  |      | -  | 0 | 0  | +  | - | 0 | 0 | + | ++ |
| Martinez et al. (2018)  |      | -  | + | 0  | ++ | - | 0 | 0 | 0 | + | +++ |
| Wei et al. (2018)       |      | -  | 0 | 0  | 0  | - | 0 | 0 | + | + |
| Carias & Wevrick (2019) |      | -  | 0 | +  | +  | - | + | 0 | + | +++ |
| Christensen et al. (2019)| -    | 0  | 0 | +  | - | 0 | 0 | 0 | + | ++ |
| Hofer et al. (2019)     |      | -  | + | 0  | 0  | - | 0 | 0 | 0 | + |
| Kentrou et al. (2019)   |      | -  | 0 | +  | ++ | - | 0 | 0 | 0 | + | +++ |
| Manohar et al. (2019)   |      | -  | ++ | +  | +  | - | 0 | 0 | + | +++++ |

2
Age at autism spectrum disorder diagnosis: a systematic review and meta-analysis from 2012 to 2019

|   | Nadeem et al. (2019) |   |   |   |   |   |   |   |
|---|---------------------|---|---|---|---|---|---|---|
| 55| -                   | ++| 0 | + | - | 0 | + | + |
| 56| -                   | + | 0 | + | - | + | 0 | + |

1 Small (0-100, ++)/medium (100-500, +)/Large (>500, 0)
2 No (+)/Yes (0)
3 No/ Parent of self-report (++), ASD screenings list or determined by DSM IV or 5 criteria (+) or, ADOS/ADIR/diagnostic interview (0)
4 None (++), one or two (+) or all (0).
### Table S2 Risk of Bias tool item origin and scoring

| Item | Based on JBI’s critical appraisal tool item |
|------|--------------------------------------------|
| **Methods** |  |
| 1. | How large was the sample size?  
| Item was scored based on the sample size on which the age at ASD diagnosis was based. Small (0-100, = ++)/medium (100-500, = +)/large (>500) |  
| 2. | Were the methods sufficient described to enable them to be repeated?  
| Item was scored if methods describe 1) county/city and period of measurement, 2) recruitment procedures (e.g. cohort name, database). Scoring: No (+)/Yes |  
| 3. | Were valid methods used to determine ASD diagnosis?  
| Item was scored on how the ASD diagnosis was determined. 1) No/ Parent of self-report (++, 2) ASD screenings list or determined by professional using ICD-10/DSM-IV or 5 criteria (+) or, 3)ADOS/ADI-R/diagnostic interview. |  
| **Results** |  |
| 4. | Are sample characteristics clearly described?  
| Item was scored on if % male/female and mean/median age of study sample was reported. Scoring: No (+)/Yes. If age at diagnosis was sample age items is scored as yes. |  
| 5. | Are complete results reported?  
| Item is scored if Mean (SD) of Median (range) of age at diagnosis was reported or could be calculated. Scoring: No (+)/Yes |  
| **Risk of bias score** |  
| Total risk of bias score was based on sum of scores item 1 to 6. |

**Used JBI checklist for RoB item development**

**JBI – Checklist for Prevalence Studies**

Munn Z, Moola S, Lisy K, Riihanto D, Tufanaru C. Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and incidence data. Int J Evid Based Healthc. 2015;13(3):147–153

**JBI - Checklist for analytical Cross Sectional Studies**

Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfetcu R, Currie M, Qureshi R, Mattis P, Lisy K, Mu P-F. Chapter 7: Systematic reviews of etiology and risk. In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis. JBI, 2020. Available from https://synthesismanual.jbi.global

**JBI – Checklist for Case Reports**

Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfetcu R, Currie M, Qureshi R, Mattis P, Lisy K, Mu P-F. Chapter 7: Systematic reviews of etiology and risk. In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis. JBI, 2020. Available from https://synthesismanual.jbi.global

**JBI – Checklist for Case Series**

Munn Z, Barker T, Moola S, Tufanaru C, Stern C, McArthur A, Stephenson M, Aromataris E. Methodological quality of case series studies, JBI Evidence Synthesis, doi: 10.11124/JBISRIR-D-19-00099

All JBI critical appraisal tools are available on https://joannabriggs.org/critical-appraisal-tools.