

# Precarious employment at a young age and labor-market marginalization during middle-adulthood: A register-linked cohort study<sup>1</sup>

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1. *Supplementary material*

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Supplementary table 1. Baseline characteristics of the individuals included and excluded in the analytical sample

|                             | Included<br>n(%) | Excluded<br>n(%) | P- value |
|-----------------------------|------------------|------------------|----------|
| Total                       | 365 702 (77.5)   | 106 469 (22.6)   |          |
| Sex                         |                  |                  |          |
| Male                        | 192 008 (52.5)   | 48 246 (45.3)    | <0.001   |
| Female                      | 173 694 (47.5)   | 58 223 (54.7)    |          |
| Country of birth            |                  |                  |          |
| Sweden                      | 330 614 (90.4)   | 61 539 (57.8)    | <0.001   |
| Outside of Sweden           | 35 088 (9.6)     | 44 930 (42.2)    |          |
| Birth year                  |                  |                  |          |
| 1973                        | 95 937 (26.2)    | 25 778 (24.2)    | <0.001   |
| 1974                        | 95 930 (26.2)    | 26 598 (25.0)    |          |
| 1975                        | 89 270 (24.4)    | 27 392 (25.7)    |          |
| 1976                        | 84 565 (23.1)    | 26 701 (25.1)    |          |
| Age at baseline (mean±SD)   | 24.3±3.5         | 24.7±3.7         |          |
| Education                   |                  |                  |          |
| Primary                     | 28 770 (7.9)     | 10 796 (10.1)    | <0.001   |
| Secondary                   | 195 156 (53.4)   | 33 673 (31.6)    |          |
| University                  | 141 776 (38.8)   | 32 042 (30.1)    |          |
| Missing                     | 0                | 29 958 (28.1)    |          |
| Prior psychiatric diagnosis | 9651 (2.6)       | 5001 (4.7)       | <0.001   |

Parental education

|                      |                |               |        |
|----------------------|----------------|---------------|--------|
| Primary              | 52 883 (14.5)  | 8 172 (7.7)   | <0.001 |
| Secondary            | 169 909 (46.5) | 28 249 (26.5) |        |
| University           | 116 611 (31.9) | 28 639 (26.9) |        |
| Missing              | 26 299 (7.2)   | 41 409 (38.9) |        |
| Parental SES         |                |               |        |
| Non-manual           | 185 584 (50.8) | 36 638 (36.3) | <0.001 |
| Manual               | 122 119 (33.4) | 18 764 (17.6) |        |
| Self-employed/farmer | 14 505 (4.0)   | 2194 (2.1)    |        |
| Not classified       | 43 494 (11.9)  | 46 873 (44.0) |        |

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SES: socioeconomic status

Supplementary Table 2: Crude Relative risk ratio (RRR) with 95% confidence intervals (CI) for the bivariate association between each covariate and later labor market marginalization.

|                             | <b><u>Long-term unemployed</u></b><br><b>Crude</b><br><b>RRR (95%CI)</b> | <b><u>Precarious employment</u></b><br><b>Crude</b><br><b>RRR (95%CI)</b> | <b><u>Long-term SA/DP</u></b><br><b>Crude</b><br><b>RRR (95%CI)</b> | <b><u>Combined LMM</u></b><br><b>Crude</b><br><b>RRR (95%CI)</b> |
|-----------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------|
| Sex                         |                                                                          |                                                                           |                                                                     |                                                                  |
| Male (ref)                  | 1.00                                                                     | 1.00                                                                      | 1.00                                                                | 1.00                                                             |
| Female                      | 0.83 (0.79- 0.86)                                                        | 1.13 (1.10- 1.16)                                                         | 1.99 (1.93-2.06)                                                    | 1.27 (1.19- 1.35)                                                |
| Country of birth            |                                                                          |                                                                           |                                                                     |                                                                  |
| Sweden (ref)                | 1.00                                                                     | 1.00                                                                      | 1.00                                                                | 1.00                                                             |
| Outside of Sweden           | 2.44 (2.31-2.58)                                                         | 1.38 (1.32-1.43)                                                          | 1.26 (1.20-1.32)                                                    | 1.75 (1.59-1.92)                                                 |
| Birth year                  |                                                                          |                                                                           |                                                                     |                                                                  |
| 1973 (ref)                  | 1.00                                                                     | 1.00                                                                      | 1.00                                                                | 1.00                                                             |
| 1974                        | 0.94 (0.89-1.00)                                                         | 1.01 (0.97-1.04)                                                          | 1.02 (0.97-1.06)                                                    | 1.01 (0.92, 1.11)                                                |
| 1975                        | 0.98 (0.93-1.04)                                                         | 0.97 (0.94-1.01)                                                          | 0.87 (0.84-0.91)                                                    | 0.98 (0.89-1.07)                                                 |
| 1976                        | 0.83 (0.78-0.89)                                                         | 1.00 (0.97-1.04)                                                          | 0.82 (0.78-0.86)                                                    | 0.82 (0.78-0.86)                                                 |
| Education                   |                                                                          |                                                                           |                                                                     |                                                                  |
| Primary                     | 8.27 (7.66-8.93)                                                         | 4.73 (4.53-4.99)                                                          | 7.21 (6.84-7.59)                                                    | 7.78 (6.99-8.71)                                                 |
| Secondary                   | 3.73 (3.51-3.97)                                                         | 2.37 (2.30-2.45)                                                          | 2.63 (2.52-2.74)                                                    | 3.25 (2.97-3.56)                                                 |
| University (ref)            | 1.00                                                                     | 1.00                                                                      | 1.00                                                                | 1.00                                                             |
| Prior psychiatric diagnosis | 1.78 (1.58, 2.00)                                                        | 1.50 (1.39-1.62)                                                          | 6.14 (5.82-6.49)                                                    | 3.77 (3.32-4.28)                                                 |
| Parental education          |                                                                          |                                                                           |                                                                     |                                                                  |
| Primary                     | 2.25 (2.10-2.41)                                                         | 1.51 (1.45-1.57)                                                          | 1.79 (1.70-1.88)                                                    | 2.01 (1.81-2.23)                                                 |
| Secondary                   | 1.66 (1.57-1.76)                                                         | 1.28 (1.24-1.32)                                                          | 1.47 (1.70-1.88)                                                    | 1.66 (1.52-1.80)                                                 |
| University (ref)            | 1.00                                                                     | 1.00                                                                      | 1.00                                                                | 1.00                                                             |
| Parental SES                |                                                                          |                                                                           |                                                                     |                                                                  |
| Non-manual (ref)            | 1.00                                                                     | 1.00                                                                      | 1.00                                                                | 1.00                                                             |
| Manual                      | 1.85 (1.76-1.94)                                                         | 1.34 (1.30-1.38)                                                          | 1.63 (1.58-1.69)                                                    | 1.70 (1.58-1.83)                                                 |
| Self-employed/farmer        | 1.11 (0.97-1.26)                                                         | 1.33 (1.24-1.41)                                                          | 1.14 (1.04-1.25)                                                    | 1.24 (1.03-1.49)                                                 |
| Not classified              | 3.11 (2.94-3.30)                                                         | 1.59 (1.52-1.65)                                                          | 1.83 (1.75-1.92)                                                    | 2.41 (2.19-2.64)                                                 |

SES: socioeconomic status, SA: sickness absence, DP: disability pension, LMM: labor market marginalization, combined LMM: having two or more of the outcomes during the same year of the follow-up

Supplementary Table 3. Complete case analyses excluding 26 299 individuals with missing information on covariates, crude and adjusted Relative risk ratio (RRR) with 95% confidence intervals (CI) for the association between labor market establishment and later labor market marginalization ten years after graduating from school.

|                         | <b><u>Long-term unemployed</u></b> |                            | <b><u>Precarious employment</u></b> |                            | <b><u>Long-term SA/DP</u></b> |                            | <b><u>Combined LMM</u></b> |                            |
|-------------------------|------------------------------------|----------------------------|-------------------------------------|----------------------------|-------------------------------|----------------------------|----------------------------|----------------------------|
|                         | Crude<br>RRR<br>(95%CI)            | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI)             | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI)       | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI)    | Adjusted<br>RRR<br>(95%CI) |
| <i>All</i>              |                                    |                            |                                     |                            |                               |                            |                            |                            |
| PER                     | 2.91<br>(2.69- 3.14)               | 2.29<br>(2.12- 2.48)       | 3.33<br>(3.20- 3.47)                | 2.81<br>(2.69- 2.93)       | 1.77<br>(1.67- 1.87)          | 1.41<br>(1.33- 1.50)       | 3.91<br>(3.49- 4.39)       | 3.07<br>(2.74- 3.46)       |
| Long-term<br>unemployed | 6.08<br>(5.65-6.54)                | 4.04<br>(3.75- 4.35)       | 3.14<br>(2.99- 3.30)                | 2.41<br>(2.29- 2.53)       | 2.90<br>(2.74- 3.07)          | 2.08<br>(1.96- 2.21)       | 5.96<br>(5.30- 6.71)       | 4.15<br>(3.68- 4.69)       |
| SSER                    | 1.67<br>(1.56-1.79)                | 1.52<br>(1.42- 1.63)       | 1.84<br>(1.78- 1.92)                | 1.73<br>(1.67- 1.80)       | 1.23<br>(1.17- 1.29)          | 1.13<br>(1.08- 1.18)       | 2.01<br>(1.81- 2.24)       | 1.83<br>(1.64- 2.03)       |
| SER                     | Ref                                | Ref                        | Ref                                 | Ref                        | Ref                           | Ref                        | Ref                        | Ref                        |
| Other                   | 4.51<br>(4.17-4.87)                | 2.81<br>(2.59- 3.04)       | 3.12<br>(2.98- 3.27)                | 2.24<br>(2.13- 2.35)       | 5.19<br>(4.95- 5.44)          | 3.13<br>(2.97-3.30)        | 6.06<br>(5.40- 6.80)       | 3.77<br>(3.34- 4.25)       |

Adjusted RRR: adjusted for country of birth, year of birth, age at baseline, highest levels of education, prior psychiatric diagnosis, highest level of parents' educational attainment and SES

Using multinomial logistic regression, those with no LMM were used as the base category

PER: Precarious employment relation, SSER: sub-standard employment relation, SER: standard employment relation, SA: Sickness absence, DP: disability pension, LMM: labor market marginalization, combined LMM: having two or more of the outcomes during the same year of the follow-up, Ref: reference category

Supplementary Table 4. Crude and adjusted Relative risk ratio (RRR) with 95% confidence intervals (CI) for the association between labor market establishment and later labor market marginalization ten years after graduating from school, for all and stratified by level of education.

|                            | <b><u>Long-term unemployed</u></b> |                            | <b><u>Precarious employment</u></b> |                            | <b><u>Long-term SA/DP</u></b> |                            | <b><u>Combined LMM</u></b> |                            |
|----------------------------|------------------------------------|----------------------------|-------------------------------------|----------------------------|-------------------------------|----------------------------|----------------------------|----------------------------|
|                            | Crude<br>RRR<br>(95%CI)            | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI)             | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI)       | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI)    | Adjusted<br>RRR<br>(95%CI) |
| <i>Primary education</i>   |                                    |                            |                                     |                            |                               |                            |                            |                            |
| PER                        | 1.14<br>(0.93- 1.39)               | 1.42<br>(1.16- 1.74)       | 2.33<br>(2.97- 2.62)                | 2.30<br>(2.03- 2.61)       | 1.67<br>(1.41- 1.96)          | 1.77<br>(1.49-2.10)        | 1.75<br>(1.30- 2.36)       | 1.77<br>(1.30- 2.42)       |
| Long-term<br>unemployed    | 2.17<br>(1.85- 2.55)               | 2.52<br>(2.13- 2.98)       | 2.01<br>(1.78- 2.27)                | 2.00<br>(1.77- 2.27)       | 2.26<br>(1.94- 2.62)          | 2.30<br>(1.96-2.68)        | 2.95<br>(2.28- 3.82)       | 2.86<br>(2.19- 3.74)       |
| SSER                       | 1.12<br>(0.94- 1.32)               | 1.25<br>(1.05- 1.48)       | 1.69<br>(1.51- 1.89)                | 1.68<br>(1.50- 1.88)       | 1.49<br>(1.29- 1.73)          | 1.54<br>(1.32-1.79)        | 1.66<br>(1.27- 2.16)       | 1.66<br>(1.26- 2.17)       |
| SER                        | Ref                                | Ref                        | Ref                                 | Ref                        | Ref                           | Ref                        | Ref                        | Ref                        |
| Other                      | 1.52<br>(1.31- 1.76)               | 1.75<br>(1.49- 2.05)       | 1.83<br>(1.65- 2.03)                | 1.78<br>(1.59- 1.99)       | 5.17<br>(4.59- 5.81)          | 5.09<br>(4.48-5.77)        | 2.43<br>(1.93- 3.08)       | 2.29<br>(1.78- 2.95)       |
| <i>Secondary education</i> |                                    |                            |                                     |                            |                               |                            |                            |                            |
| PER                        | 2.52<br>(2.31- 2.76)               | 2.32<br>(2.12- 2.54)       | 2.46<br>(2.34- 2.59)                | 2.41<br>(2.29- 2.54)       | 1.45<br>(1.36- 1.55)          | 1.33<br>(1.24-1.42)        | 3.13<br>(2.74- 3.59)       | 2.87<br>(2.50- 3.29)       |
| Long-term<br>unemployed    | 4.52<br>(4.15- 4.94)               | 4.26<br>(3.91- 4.66)       | 2.17<br>(2.05- 2.31)                | 2.15<br>(2.03- 2.28)       | 2.21<br>(2.07- 2.37)          | 2.17<br>(2.03-2.32)        | 4.12<br>(3.57- 4.75)       | 4.00<br>(3.47- 4.62)       |

|                             |                      |                      |                      |                      |                      |                     |                      |                      |
|-----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|----------------------|----------------------|
| SSER                        | 1.60<br>(1.48- 1.74) | 1.56<br>(1.43- 1.69) | 1.59<br>(1.52- 1.66) | 1.58<br>(1.51- 1.65) | 1.08<br>(1.02- 1.14) | 1.05<br>(0.99-1.11) | 1.75<br>(1.54- 1.99) | 1.69<br>(1.48- 1.92) |
| SER                         | Ref                  | Ref                  | Ref                  | Ref                  | Ref                  | Ref                 | Ref                  | Ref                  |
| Other                       | 3.99<br>(3.65- 4.37) | 3.26<br>(2.97- 3.58) | 2.15<br>(2.02- 2.28) | 2.03<br>(1.91- 2.16) | 2.80<br>(2.62- 2.98) | 2.31<br>(2.16-2.47) | 4.33<br>(3,76- 4.99) | 3.66<br>(3.17- 4.24) |
| <i>University education</i> |                      |                      |                      |                      |                      |                     |                      |                      |
| PER                         | 3.41<br>(2.83- 4.11) | 3.21<br>(2.66- 3.87) | 4.80<br>(4.42, 5.20) | 4.71<br>(4.34- 5.10) | 1.43<br>(1.25- 1.63) | 1.38<br>(1.21-1.58) | 4.78<br>(3.68- 6.21) | 4.57<br>(3.51- 5.95) |
| Long-term unemployed        | 9.31<br>(7.77- 11.2) | 8.25<br>(6.86- 9.93) | 4.03<br>(3.59, 4.53) | 4.08<br>(3.63- 4.59) | 2.08<br>(1.77- 2.45) | 2.30<br>(1.94-2.72) | 7.10<br>(5.22- 9.64) | 6.86<br>(5.03- 9.36) |
| SSER                        | 1.89<br>(1.62- 2.19) | 1.85<br>(1.59- 2.15) | 2.16<br>(2.01, 2.31) | 2.12<br>(1.98- 2.27) | 1.26<br>(1.16- 1.38) | 1.21<br>(1.11-1.32) | 2.53<br>(2.03- 3.16) | 2.46<br>(1.97- 3.07) |
| SER                         | Ref                  | Ref                  | Ref                  | Ref                  | Ref                  | Ref                 | Ref                  | Ref                  |
| Other                       | 4.88<br>(4.05- 5.86) | 3.81<br>(3.15- 4.62) | 3.07<br>(2.77, 3.41) | 2.92<br>(2.62- 3.24) | 2.86<br>(2.55- 3.21) | 2.88<br>(2.56-3-25) | 5.91<br>(4.50- 7.74) | 5.25<br>(3.87- 6.95) |

Adjusted RRR: adjusted for sex, country of birth, year of birth, age at baseline, prior psychiatric diagnosis, highest level of parents' educational attainment and SES

Using multinomial logistic regression, those with no LMM were used as the base category

PER: Precarious employment relation, SSER: sub-standard employment relation, SER: standard employment relation, , SA: Sickness absence, DP: disability pension, LMM: labor market marginalization, combined LMM: having two or more of the outcomes during the same year of the follow-up, Ref: reference category

Supplementary Table 5. Crude and adjusted Relative risk ratio (RRR) with 95% confidence intervals (CI) for the association between labor market establishment and later labor market marginalization ten years after graduating from school, re-categorized individuals with any unemployment from the precarious employment group into the group ‘other’

|                         | <u>Long-term unemployed</u> |                            | <u>Precarious employment</u> |                            | <u>Long-term SA/DP</u>  |                            | <u>Combined LMM</u>     |                            |
|-------------------------|-----------------------------|----------------------------|------------------------------|----------------------------|-------------------------|----------------------------|-------------------------|----------------------------|
|                         | Crude<br>RRR<br>(95%CI)     | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI)      | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI) | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI) | Adjusted<br>RRR<br>(95%CI) |
| <i>All</i>              |                             |                            |                              |                            |                         |                            |                         |                            |
| PER                     | 1.68<br>(1.49- 1.90)        | 1.49<br>(1.32- 1.69)       | 3.28<br>(3.11- 3.46)         | 3.04<br>(2.88- 3.21)       | 1.42<br>(1.30- 1.54)    | 1.26<br>(1.15- 1.37)       | 2.78<br>(2.36- 3.27)    | 2.44<br>(2.07- 2.87)       |
| Long-term<br>unemployed | 6.15<br>(5.74- 6.60)        | 4.10<br>(3.82- 4.40)       | 3.16<br>(3.01- 3.31)         | 2.45<br>(2.33- 2.57)       | 2.91<br>(2.75- 3.08)    | 2.09<br>(1.97- 2.21)       | 5.92<br>(6.28- 6.62)    | 4.16<br>(3.70- 4.67)       |
| SSER                    | 1.70<br>(1.59- 1.82)        | 1.55<br>(1.45- 1.65)       | 1.86<br>(1.79- 1.93)         | 1.74<br>(1.68- 1.80)       | 1.24<br>(1.19- 1.30)    | 1.15<br>(1.10- 1.20)       | 2.03<br>(1.83- 2.25)    | 1.84<br>(1.66- 2.04)       |
| SER                     | Ref                         | Ref                        | Ref                          | Ref                        | Ref                     | Ref                        | Ref                     | Ref                        |
| Other                   | 4.37<br>(4.10- 4.65)        | 2.80<br>(2.63- 3.00)       | 3.20<br>(3.08- 3.32)         | 2.41<br>(2.32- 2.51)       | 3.48<br>(3.33- 3.63)    | 2.30<br>(2.19- 2.40)       | 5.25<br>(4.76- 5.79)    | 3.47<br>(3.13- 3.84)       |

Adjusted RRR: adjusted for country of birth, year of birth, age at baseline, highest levels of education, prior psychiatric diagnosis, highest level of parents’ educational attainment and SES

Using multinomial logistic regression, those with no LMM were used as the base category

PER: Precarious employment relation, SSER: sub-standard employment relation, SER: standard employment relation, SA: Sickness absence, DP: disability pension, LMM: labor market marginalization, combined LMM: having two or more of the outcomes during the same year of the follow-up, Ref: reference category

Supplementary Table 6. Crude and adjusted Relative risk ratio (RRR) with 95% confidence intervals (CI) for the association between labor market establishment and later labor market marginalization ten years after graduating from school, excluding individuals with missing information on the year of exam (n =49 357).

|                         | <u>Long-term unemployed</u> |                            | <u>Precarious employment</u> |                            | <u>Long-term SA/DP</u>  |                            | <u>Combined LMM</u>     |                            |
|-------------------------|-----------------------------|----------------------------|------------------------------|----------------------------|-------------------------|----------------------------|-------------------------|----------------------------|
|                         | Crude<br>RRR<br>(95%CI)     | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI)      | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI) | Adjusted<br>RRR<br>(95%CI) | Crude<br>RRR<br>(95%CI) | Adjusted<br>RRR<br>(95%CI) |
| <i>All</i>              |                             |                            |                              |                            |                         |                            |                         |                            |
| PER                     | 3.01<br>(2.78- 3.26)        | 2.34<br>(2.16- 2.54)       | 3.48<br>(3.34- 3.63)         | 2.94<br>(2.81- 3.07)       | 1.70<br>(1.60- 1.80)    | 1.37<br>(1.29- 1.45)       | 3.78<br>(3.37- 4.28)    | 3.00<br>(2.66- 3.39)       |
| Long-term<br>unemployed | 6.27<br>(5.80- 6.76)        | 4.23<br>(3.92- 4.58)       | 3.18<br>(3.02- 3.35)         | 2.49<br>(2.36- 2.62)       | 2.86<br>(2.69- 3.04)    | 2.17<br>(2.04- 2.30)       | 5.70<br>(5.04- 6.45)    | 4.06<br>(3.58- 4.61)       |
| SSER                    | 1.73<br>(1.61- 1.85)        | 1.55<br>(1.45- 1.67)       | 1.90<br>(1.83- 1.97)         | 1.77<br>(1.71- 1.84)       | 1.20<br>(1.14- 1.26)    | 1.10<br>(1.05- 1.15)       | 1.99<br>(1.79- 2.22)    | 1.81<br>(1.62- 2.02)       |
| SER                     | Ref                         | Ref                        | Ref                          | Ref                        | Ref                     | Ref                        | Ref                     | Ref                        |
| Other                   | 4.60<br>(4.24- 4.99)        | 3.07<br>(2.82- 3.34)       | 3.07<br>(2.92- 3.23)         | 2.33<br>(2.21- 2.46)       | 3.81<br>(3.61- 4.02)    | 2.64<br>(2.49- 2.79)       | 5.85<br>(5.19- 6.61)    | 3.95<br>(3.49- 4.48)       |

Adjusted RRR: adjusted for country of birth, year of birth, age at baseline, highest levels of education, prior psychiatric diagnosis, highest level of parents' educational attainment and SES

Using multinomial logistic regression, those with no LMM were used as the base category

PER: Precarious employment relation, SSER: sub-standard employment relation, SER: standard employment relation, SA: Sickness absence, DP: disability pension, LMM: labor market marginalization, combined LMM: having two or more of the outcomes during the same year of the follow-up, Ref: reference category