

BMJ Open

BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email info.bmjopen@bmj.com

BMJ Open

The relationship between early working life patterns, in publicly and privately owned companies, and the course of future sickness absence due to mental disorders.

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-040480
Article Type:	Original research
Date Submitted by the Author:	17-May-2020
Complete List of Authors:	Ayala-Garcia, Amaya; Pompeu Fabra University Faculty of Health and Life Sciences, Centre for research in Occupational Health Serra, Laura; Pompeu Fabra University Faculty of Health and Life Sciences, Centre for research in Occupational Health (CiSAL); University of Girona, Research Group on Statistics, Econometrics and Health (GRECS) Ubalde López, M; Barcelona Institute for Global Health
Keywords:	MENTAL HEALTH, EPIDEMIOLOGY, PUBLIC HEALTH

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3 **The relationship between early working life patterns, in publicly and privately owned**
4 **companies, and the course of future sickness absence due to mental disorders.**

5 Amaya Ayala-García^{1,2,3}, Laura Serra-Saurina^{1,2,3,4}, Monica Ubalde-Lopez⁵
6
7

8 (1) Center for Research in Occupational Health (CiSAL), University Pompeu Fabra,
9 Barcelona, Spain

10 (2) CIBER of Epidemiology and Public Health (CIBERESP), Spain

11 (3) IMIM – Parc Salut Mar, Barcelona, Spain

12 (4) Research Group on Statistics, Econometrics and Health (GRECS), University of
13 Girona, Spain

14 (5) Barcelona Institute for Global Health (ISGlobal), Spain
15
16
17
18
19

20 Corresponding author information:
21

22 Full name: Amaya Ayala-García

23 Address: Center for Research in Occupational Health (CiSAL). PRBB Building. Dr. Aiguader, 88.
24 08003 Barcelona

25 Email: amaiaayalagarcia@gmail.com
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

ABSTRACT:

Objectives: To assess the relationship between early working life patterns, in privately and publicly held companies, and the course of sickness absence (SA) due to mental disorders.

Methods: Cohort study of workers aged 18-28, affiliated with the Spanish Social Security system, living in Catalonia, who had at least one episode of SA due to mental disorders between 2012-2014. Individual prior working life trajectories were reconstructed by applying sequence analysis. An optimal matching analysis identified patterns of early working life by clustering similar individual trajectories. SA trajectories were identified by using latent class growth modelling analysis. Finally, the relationship between the patterns of early working life and later SA trajectories was assessed by applying multinomial logistic regression models.

Results: Among women an increasing permanent employment pattern at early working life was related with a decrease in accumulated days on SA over time (aOR 2.08 [95% CI: 1.18-3.66]). In men, a trend towards a middle stable accumulation of SA days was found in fluctuating (aOR 1.25[95% CI: 0.57-2.74]) or delayed entry into the labour market (aOR 1.79 [95% CI: 0.59-5.41]). In both sexes, an early working life in big companies showed a relationship with a more favourable SA trajectory.

Conclusions: Early labour market participation patterns characterized by a lack of stability - high number of transitions between temporary contracts, unemployment and lack of social security coverage- are related to a worse SA course due to mental diagnosis in the future.

Key words: sickness absence, mental disorders, young working population, early working life, company size, public company, private company.

STRENGTHS AND LIMITATIONS OF THIS STUDY:

- This register-based study comes from a large, administrative database that guarantees representativeness of the sample of the Spanish workforce linked with sickness absence registers, allowing us select diagnosis subgroups with a considerable sample size over an extended 10-year time window.
- It is a novel approach to assess the future potential effect on health of prior working life transitions considering as employment status: type of contract, unemployment and lack of coverage by social security periods.
- This longitudinal study provides a life course approach to precarious working life and also to its effect on sickness absence due to mental disease future course.
- A potential classification bias may occur since individuals that might shift among categories of explanatory and adjustment variables over the follow-up period, were assigned to the category in which they spent most of the time during the follow up.
- We lack on information about prior health status, which effect on future sickness absence or on the eligibility to more precarious employment would be worth to considering.

INTRODUCTION:

According to the Eurostat, from the 90's Spain is one of the European countries with the lowest employment rate (<70%). The gap between the European and the Spanish employment rate average is bigger in young working population (20% vs. 34% respectively). In addition, in 2017 Spain had the highest proportion of persons having a temporary contract, and one of the highest rates of precarious employment (having a work contract only of up to 3 months) compared to European average (1).

The phenomenon of globalization, continuous incorporation of women into the labour market, technology developments, organizational requirements, outsourcing and population ageing, have also contributed to a process of deregulation towards a more flexible labour market and employment relations. Thus, the recovery of employment rates has been grounded on temporary and partial employments, together with nonstandard employment forms (i.e., informal employment without social security coverage or any type of contract) (2).

Spain has historically had a core of publicly held companies characterized for providing permanent and secure job contracts, worker's protection and trade union membership agreements. However, labour market fluctuations have led to a reflection of practices inherent to privately held companies, such as revising staffing, contracting and expanding on expenses of production. Following the economic crisis in 2008, private rates of temporary contracts were overcome by public companies in 2009 (25.5% vs 26.5%), both matching in 2014 (24%) (3–6). The young working force has therefore delayed the onset of their working life and entered mainly employed with temporary contracts and low salaries (7).

Sickness absence (SA) is defined as an absence from work due to a medically certified health-related problem. It's a global measure of health and can be understood as a tool of social protection that recognizes economic (i.e., SA benefits) and medical support from the National Healthcare System during the episode (8). In industrialised countries, SA represents a huge impact on the health care system, social and economic expenditures (9–11), accounting for 6.6 billion of euros in Spain in 2018 (12). The most frequent causes of SA are musculoskeletal disorders and mental disorders (13).

Various studies have proved the relation between having a temporary contract and specific mortality (14), stress and poor self-rated health, which is directly related to mental health (15). However, due to the cumulative nature of the exposure there is a need to apply a life course approach that would shed light to how transitions during working life affect the course of future health. The aim of this study is to explore the relation between labour market participation trajectories at the beginning of working life, in public and private companies, and the course of future SA due to mental disorders.

METHODS:

Cohort study of 1,379 young workers (aged 18-28 in 2002) included in the Spanish WORKss cohort (16) who were affiliated with the Social Security, living in Catalonia and had at least one episode of SA due to a mental diagnosis between 2012 and 2014. Individuals included in the WORKss cohort belong to the Continuous Working Life Sample (CWLS). Age gap -18 to 28 years- was selected according to the objective of the study which was capturing young population at the beginning of their working life.

1
2
3 On the one hand, the CWLS, starting in 2004, contains an annual cross-sectional representative
4 sample of a 4% of the population affiliated to the Spanish Social Security. Data available on the
5 CWLS allows to reconstruct working life, based on data related to occupational level,
6 employment status/conditions (i.e., employment, unemployment, type of contract, salary and
7 working time), social benefits (i.e., unemployment, permanent disability and retirement),
8 other work-related variables (i.e., company ownership and size) and date of death. On the
9 other hand, SA registries were provided by the Catalan Institute for Medical and Health
10 Evaluations (ICAM by its acronym in Spanish), and included information related to the
11 diagnosis causing the SA episode (coded according to 10th edition of the International Codex of
12 Diseases), as well as the starting and closing date.
13
14
15

16 Early working life trajectories were reconstructed, back in time from 2002 to 2011 based on
17 transitions between 4 work-related states: permanent, temporary contract, unemployment
18 and without social security coverage. The secondary explicative variables were: i) early working
19 life trajectory, ii) company ownership (private or public), iii) and company size (small/medium
20 [up to 100 employees] or big [>100 employees]). Individuals were assigned ownership and
21 company size based on the category on which they spent most of their early working life.
22
23

24 SA was measured as the number of days accumulated per year due to any medically certified
25 mental disorder between 2012-2014 and constituted the basis of the SA trajectory analysis.
26 Employment conditions during the SA follow up period were included as potential
27 confounders: occupational category (non-manual skilled, non-manual non-skilled, manual
28 skilled, manual non-skilled), working time (full or part-time), type of contract (permanent or
29 temporary) and annual income (low, medium or high). As workers might change across
30 categories over time, they were assigned the category on which the worker spent most of the
31 follow up period.
32
33
34

35 *Patient and Public Involvement statement*

36
37 The study was designed and carried out from secondary administrative records. These records
38 come from the Spanish social security system and Catalan Institute for Medical and Health
39 Evaluations. Patients were not involved in any stage of the study. Confidentiality was
40 maintained in both databases. Authors received data already anonymised as specified in a
41 record linkage agreement between Spanish social security, the Catalan Institute for Medical
42 and Health Evaluations and the Centre for Research in Occupational Health-Pompeu Fabra
43 University.
44
45
46

47 *Statistical analysis*

48
49 Sequence Analysis, based on transitions among the four working life states described above,
50 was used to reconstruct individual working life. Then, after applying an Optimal Matching
51 Analysis, groups of workers who share similar working life trajectories were identified (i.e.,
52 labour market participation-LMP patterns) (17).
53

54 Latent Class Growth Analysis was the statistical technique to identify SA trajectories. This
55 methodology, considering an indicator of interest across time points, allows to identify
56 homogeneous subgroups that share similar characteristics. Trajectories can be estimated
57 assuming they follow either a linear quadratic function or any expression, including more
58
59
60

1
2
3 complex elements. However, it is always recommended to apply the criterion of parsimony
4 and use the simplest expression to obtain similar results (18).
5

6 Finally, in order to study the association between LMP patterns and SA trajectories a
7 multinomial logistic regression was applied. All the analyses were stratified by sex.
8

9 The analysis were carried out with R Statistical Software –sequence analysis and optimal
10 matching-, Stata –multinomial regression models- and MPLus – latent class analysis-.
11
12
13

14 **RESULTS:**

15 *Labour Market Participation-LMP patterns*

16
17
18 Four LMP patterns were identified in both women and men: “Stable Permanent Employment”
19 (45.6% and 43.6% of workers, respectively), “Increasing Permanent Employment” (23.7%,
20 20.6%), “Fluctuating Employment” (18.9%, 24.2%) and “Delayed Employment” (11.8%, 11.6%)
21 (Table 1, Figure 1).
22

23 The “Delayed Employment” patterns were composed by the youngest workers in both sexes
24 (mean age 21.9 years for women and 22.1 for men), whereas “Stable Permanent Employment”
25 included the highest ages (24 years and 23.8, respectively). “Stable Permanent Employment”
26 and “Increasing Permanent Employment” patterns showed the highest proportion of workers
27 with high and medium income, especially among men.
28
29

30 In both sexes, the “Stable Permanent Employment” pattern, showed a steady proportion of
31 about 90% of workers with permanent contracts (Figure 1). In women, this pattern showed the
32 lowest proportion of workers employed in publicly owned companies (7.2%), part-time jobs
33 (10%) and manual non-skilled occupations (5.5%) compared to the other patterns.
34
35

36 The “Increasing Permanent Employment” pattern was composed of a half of workers on
37 temporary contracts who slowly switched to permanent contracts over time reaching up to
38 90% by the end of follow up (Figure 1). This pattern consisted of a higher proportion of women
39 (38.5%) and men (30.1%) employed in big companies, as well as women in part-time jobs
40 (18.3%) compared to the rest of patterns, and less skilled occupations among men (20.4%)
41 compared to women (6.3%).
42

43 Within the “Delayed Employment” pattern, we identified a group of young workers who
44 entered gradually into the labour market with permanent (up to 40% of individuals) and
45 temporary contracts (20%) (Figure 1). Women in this pattern showed the lowest proportion
46 working on big companies (30.8%), the greatest proportion of marginal part-time jobs (2.9%)
47 and manual non-skilled jobs (15.4%). Men had the highest proportion of partial jobs (8.6%) and
48 the lowest proportion of men working on publicly owned companies (3.5%).
49
50

51 Finally, “Fluctuating Employment” pattern presented an unsteady working life switching from
52 a high proportion of temporary contracts (40%) to unemployment (15%) and periods without
53 social security coverage (40%) (Figure 1). In both women and men this pattern had the highest
54 proportion of young workers employed by publicly owned companies (22.3% and 7.4%
55 respectively), on manual non-skilled occupations (16.9% and 27.3%) and with the lowest salary
56 levels (51.5% and 43.8%).
57
58
59
60

Table 1 Distribution of salaried workers living in Catalonia across labour market participation patterns (2002-2011) by employment-related characteristics.

	Labour market participation patterns									
	Women (N=879)					Men (N=500)				
	Stable Permanent Employment (45.6%)	Increasing Permanent Employment (23.7%)	Delayed Employment (11.8%)	Fluctuating Employment (18.9%)	P value	Stable Permanent Employment (43.6%)	Increasing Permanent Employment (20.6%)	Delayed Employment (11.6%)	Fluctuating Employment (24.2%)	P value
Age in 2002 (mean (SD))	24.0 (2.8)	23.0 (2.9)	21.9 (2.7)	22.6 (3.0)	<0.001 ^T	23.8 (3.0)	22.8 (2.9)	22.1 (2.9)	22.6 (2.9)	<0.001 ^T
2002-2011	N (%)	N (%)	N (%)	N (%)		N (%)	N (%)	N (%)	N (%)	
Company size										
Small-medium (≤ 100 workers)	267 (66.6)	128 (61.5)	72 (69.2)	109 (65.7)	0.271	157 (72.0)	72 (69.9)	41 (70.7)	97 (80.2)	0.513
Big (>100 workers)	134 (33.4)	80 (38.5)	32 (30.8)	57 (34.3)		61 (28.0)	31 (30.1)	17 (29.3)	24 (19.8)	
Company ownership										
Private	353 (88.0)	175 (84.1)	87 (83.7)	123 (74.1)	0.775	192 (88.1)	95 (92.2)	54 (93.1)	108 (89.3)	<0.001 ^T
Public	29 (7.2)	22 (10.6)	12 (11.5)	37 (22.3)		15 (6.9)	6 (5.8)	2 (3.5)	9 (7.4)	
2012-2014										
Working time (%weekly hours)										
Full-time (>87.5%)	355 (88.5)	169 (81.3)	82 (78.9)	142 (85.5)	0.148	210 (96.3)	98 (95.2)	53 (91.4)	115 (95.0)	0.039 ^T
Part-time (50%-87.5%)	40 (10.0)	38 (18.3)	17 (16.4)	21 (12.7)		8 (3.7)	4 (3.9)	5 (8.6)	4 (3.3)	
Short part-time (37.5%-49%)	2 (0.5)	-	2 (1.9)	1 (0.6)		-	1 (1.0)	-	-	
Marginal part-time (≤37.5%)	4 (1.0)	1 (0.5)	3 (2.9)	2 (1.2)		-	-	-	2 (1.6)	
Occupational category										
Non-manual skilled	50 (12.5)	43 (20.7)	29 (27.9)	38 (22.9)	0.002 ^T	16 (7.3)	13 (12.6)	8 (13.8)	13 (10.7)	<0.001 ^T
Non-manual non-skilled	265 (66.1)	122 (58.7)	41 (39.4)	75 (45.2)		67 (30.7)	33 (32.0)	19 (32.8)	31 (25.6)	
Manual skilled	64 (16.0)	30 (14.4)	18 (17.3)	25 (15.1)		112 (51.4)	36 (35.0)	25 (43.1)	44 (36.4)	
Manual non-skilled	22 (5.5)	13 (6.3)	16 (15.4)	28 (16.9)		23 (10.6)	21 (20.4)	6 (10.3)	33 (27.3)	
Income in tertiles										
High	129 (32.2)	70 (33.7)	29 (27.9)	40 (24.2)	<0.001 ^T	113 (51.8)	38 (36.9)	14 (24.1)	26 (21.5)	<0.001 ^T
Medium	135 (33.7)	80 (38.5)	27 (26.0)	40 (24.2)		74 (33.9)	39 (37.9)	22 (37.9)	42 (34.7)	
Low	137 (34.2)	58 (27.9)	48 (46.2)	85 (51.5)		31 (14.2)	26 (25.2)	22 (37.9)	53 (43.8)	
Total	401	208	104	166		218	103	58	121	

SD, standard deviation; ^T, statistically significant ($p < 0,05$)

1
2
3 *Sickness Absence Trajectories:*
4

5 We identified different SA trajectories due to mental disorders for men and women. Among
6 women, four SA trajectories were found: "Low Stable" (40.6% of workers), "Low Decreasing"
7 (27.5%), "Decreasing" (14.7%) and "Increasing" (17.2%) of accumulated days per year on SA.
8 The "Low Stable" SA trajectory was characterized by the lowest accumulation of days in the
9 follow-up period (Median duration- MD- ranging between 6-15 days), but the highest
10 proportion of episodes (38.2%). "Decreasing" trajectory, although having the lowest number of
11 episodes (16.4%) it accumulated a high number of days annually (MD among 97-38.5 days). In
12 contrast, "Increasing" trajectory stood out for the large proportion of women with
13 temporary contracts (25.8 %) who generated the 28.1% of episodes (Table 2).
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Table 2 Distribution of salaried women living in Catalonia across sickness absence trajectories (2012-2014) by employment-related characteristics.

Women (N=879)	Sickness absence trajectories												P values	
	Low Stable (40.6%)			Low Decreasing (27.5%)			Decreasing (14.7%)			Increasing (17.2%)				
Age in 2002 (mean (SD))	23.2 (2.9)			23.3 (2.9)			23.2 (3.0)			23.2 (2.9)			0.9864	
2002-2011	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)	p value N	p value Episodes
Company size														
Small-medium (≤ 100 workers)	215 (60.2)	240 (59.1)	8 (3;11)	164 (67.8)	208 (69.6)	40 (26; 55.5)	97 (75.2)	123 (70.7)	108 (85;141)	100 (66.2)	123 (66.5)	47.5 (21.5;130.5)	0.02 [‡]	0.009 [‡]
Big (>100 workers)	142 (39.8)	166 (40.9)	7 (3;11)	78 (32.2)	91 (30.4)	36 (24; 60)	32 (24.8)	51 (29.3)	138.5 (97;182)	51 (33.8)	62 (33.5)	56 (19;115)		
Company ownership														
Private	309 (86.6)	353 (87.0)	7 (3;11)	195 (80.6)	239 (79.9)	38 (25;53)	108 (83.7)	147 (84.5)	115 (90;156.5)	126 (83.4)	153 (82.7)	55 (21;128)	0.67	0.363
Public	34 (9.5)	38 (9.4)	8 (4;11)	34 (14.1)	44 (14.7)	40 (31;64)	15 (11.6)	20 (11.5)	122 (86;226)	17 (11.3)	23 (14.4)	28 (19;115)		
2012-2014														
Working time (%weekly hours)														
Full-time (>87.5%)	301 (84.3)	343 (84.5)	8 (3;11)	203 (83.9)	248 (82.9)	39 (26;57)	119 (92.3)	159 (91.4)	117 (86;156)	125 (82.8)	152 (82.2)	55 (22;119)	0.44	0.387
Part-time (50%-87.5%)	51 (14.3)	58 (14.3)	7 (2;10)	35 (14.5)	45 (15.1)	36 (25;46)	8 (6.2)	13 (7.5)	114 (96.5;152)	22 (14.6)	29 (15.7)	44.5 (18;134)		
Short part-time (37.5%-49%)	1 (0.3)	1 (0.3)	15 (15;15)	1 (0.4)	3 (1)	135 (135;135)	1 (0.8)	1 (0.6)	103 (103;103)	2 (1.3)	2 (1.1)	49.5 (24;75)		
Marginal part-time (≤37.5%)	4 (1.1)	4 (1)	9 (6;10.5)	3 (1.2)	3 (1)	43 (21;56)	1 (0.8)	1 (0.6)	81 (81;81)	2 (1.3)	2 (1.1)	17.5 (17;18)		
Occupational category														
Non-manual skilled	65 (18.2)	70 (17.2)	8 (4;12)	45 (18.6)	53 (17.7)	39 (25;63)	21 (16.3)	27 (15.5)	97 (86;127)	29 (19.2)	39 (21.2)	61 (22;159)	0.96	0.901
Non-manual non-skilled	200 (56.0)	232 (57.1)	8 (3;11)	141 (58.3)	176 (58.9)	38 (26;53)	80 (62.0)	108 (62.1)	113 (83.5;154.5)	82 (54.3)	100 (54.1)	56.5 (20;133)		
Manual skilled	60 (16.8)	65 (16.0)	6 (2.5;10)	33 (13.6)	41 (13.7)	42 (29;51)	18 (14.0)	26 (14.9)	144.5 (106;183)	26 (17.2)	29 (15.7)	42.5 (22;85)		
Manual non-skilled	32 (9.0)	39 (9.6)	8 (3;10)	23 (9.5)	29 (9.7)	45 (25;60)	10 (7.8)	13 (7.5)	109.5 (96;121)	14 (9.3)	17 (9.2)	27 (24;30)		
Income in tertiles														
High	114 (31.9)	125 (30.8)	7 (3;12)	77 (31.8)	100 (33.4)	39 (25;56)	30 (23.4)	38 (22.1)	97 (78;127)	47 (31.1)	64 (34.6)	65 (26; 167)	0.21	0.104
Medium	103 (28.9)	117 (28.8)	8 (3;11)	85 (35.1)	94 (31.4)	39 (26;54)	50 (39.1)	64 (37.2)	120.5 (82;156)	44 (29.1)	53 (28.7)	62 (20;139.5)		
Low	140 (39.2)	164 (40.4)	7 (3;10)	80 (33.1)	105 (35.1)	39.5(26;58)	48 (37.5)	70 (40.7)	115.5 (97;154.5)	60 (39.7)	68 (36.8)	27.5 (19.5;58.5)		
Type of contract														
Permanent contract	290 (81.2)	327 (80.5)	8 (3;11)	195 (80.6)	236 (78.9)	39 (25;56)	106 (82.2)	141 (81.0)	116.5 (91;157)	112 (74.17)	133 (71.9)	56.5 (19;126)	0.27	0.09
Temporary contract	67 (18.8)	79 (19.5)	7 (3;10)	47 (19.4)	63 (21.1)	42 (31;59)	23 (17.8)	33 (19.0)	103 (70;146)	39 (25.8)	52 (28.1)	31 (22;115)		
Total	357	406 (38.2)		242	299 (28.1)		129	174 (16.4)		151	185 (17.4)			

* Sickness absence closed episodes due to mental disorders regardless of its duration between 2012-2014; SD, standard deviation; MD, median duration; P25, percentile 25; P75, percentile 75; [‡], statistically significant (p <0,05)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

In men, three trajectories were identified: “Low Stable” (55.2% workers), “Middle Stable” (31%) and “High Stable” (13.8%). The “Low Stable” trajectory showed the lowest proportion of manual non-skilled occupations (14.5%), a larger proportion of workers with high income levels (40.9%), and a lower proportion of temporary contracts (14.5%) compared to the other two SA trajectories. This trajectory had the lowest annual accumulation of days on SA (MD among 6-11 days), but the highest proportion of episodes (52.1%). It contrasts with the “High Stable” trajectory, with a high proportion of workers in low income levels (44.9%). “High Stable” trajectory showed the lowest number of episodes (13.9%) but the highest accumulated days (MD among 123.5-194 days) (Table 3).

For peer review only

Table 3: Distribution of salaried men living in Catalonia across sickness absence trajectories (2012-2014) by employment-related characteristics.

Men (N=500)	Sickness absence trajectories									P values	
	Low Stable (55.2%)			Middle Stable (31%)			High Stable (13.8%)			p value N	p value Episodes
Age (mean (SD))	23.2 (3.0)			23.1 (2.9)			22.8 (3.0)				
2002-2011	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)		
Company size											
Small-medium (≤ 100 workers)	203 (73.6)	233 (71.3)	9 (4;16)	115 (74.2)	151 (70.6)	50 (34;67)	49 (71.0)	58 (66.7)	130 (103;155)	0.881	0.705
Big (>100 workers)	73 (26.5)	94 (28.8)	6 (2;13)	40 (25.8)	63 (29.4)	52 (41;64)	20 (29.0)	29 (33.3)	123.5 (101;179)		
Company ownership											
Private	250 (90.6)	296 (90.5)	9 (3;16)	140 (90.3)	195 (91.1)	50 (36.5;64)	59 (85.5)	76 (87.4)	128 (103;183)	0.368	0.43
Public	14 (5.1)	17 (5.2)	6 (3;8)	12 (7.7)	15 (7.0)	60.5 (42.5;72.5)	6 (8.7)	7 (8.1)	131 (95;164)		
2012-2014											
Working time (%weekly hours)											
Full-time (>87.5%)	263 (95.3)	311 (95.1)	9 (3;15)	148 (95.5)	201 (93.9)	51 (37;66)	65 (94.2)	83 (95.4)	128 (102;164)	0.661	0.454
Part-time (50%-87.5%)	12 (4.3)	14 (4.3)	6.5 (2.5;12)	6 (3.9)	12 (5.6)	50 (48;52)	3 (4.4)	3 (3.5)	125 (103;132)		
Short part-time (37.5%-49%)	1 (0.4)	2 (0.6)	11 (11;11)	-	-	-	-	-	-		
Marginal part-time (≤37.5%)	-	-	-	1 (0.7)	1 (0.5)	46 (46;46)	1 (1.5)	1 (1.2)	194 (194;194)		
Occupational category											
Non-manual skilled	27 (9.8)	29 (8.9)	11 (5;17)	15 (9.7)	23 (10.8)	54 (32;68)	8 (11.6)	9 (10.3)	131.5 (97;149)	0.859	0.189
Non-manual non-skilled	86 (31.2)	96 (29.4)	6.5 (4;11)	46 (29.7)	58 (27.1)	47 (37;62)	18 (26.1)	24 (27.6)	130.5 (108;194)		
Manual skilled	123 (44.6)	156 (47.7)	10 (3;16)	64 (41.3)	84 (39.3)	53 (37.5;68)	30 (43.5)	37 (42.5)	124.5 (94;170)		
Manual non-skilled	40 (14.5)	46 (14.1)	6.5 (3;17)	30 (19.4)	49 (22.9)	49.5 (34;61)	13 (18.8)	17 (19.5)	120 (103;155)		
Income in tertiles											
High	113 (40.9)	139 (42.5)	9 (5;16)	54 (34.8)	74 (34.6)	54.5 (38;67)	24 (34.8)	31 (35.6)	130 (105.5;158.5)	0.001 ^T	<0.0001 ^T
Medium	107 (38.8)	127 (38.8)	8 (3;13)	56 (36.1)	69 (32.2)	46.5 (34.5;66.5)	14 (20.3)	19 (21.8)	124.5 (98;132)		
Low	56 (20.3)	61 (18.7)	11 (4;16.5)	45 (29.0)	71 (33.2)	50 (38;64)	31 (44.9)	37 (42.5)	124 (102;188)		
Type of contract											
Permanent contract	236 (85.5)	283 (86.5)	9 (3;16)	124 (80.0)	165 (77.1)	51 (37;66)	58 (84.1)	75 (86.2)	130 (103;164)	0.332	0.012 ^T
Temporary contract	40 (14.5)	44 (13.5)	6.5 (4;13.5)	31 (20.0)	49 (22.9)	47 (34;66)	11 (15.9)	12 (13.8)	124 (102;183)		
Total	276	327 (52.1)		155	214 (34.1)		69	87 (13.9)			

* Sickness absence closed episodes due to mental disorders regardless of its duration between 2012-2014; SD, standard deviation; MD, median duration; P25, percentile 25; P75, percentile 75; ^T, statistically significant (p < 0,05)

1
2
3 *The association between early LMP patterns and SA trajectories:*
4

5 As all the sample suffered from a mental disease at some point, probabilities have to be interpreted
6 in accordance. Increasing or decreasing of risk assume a more favourable, though never desirable SA
7 trajectory. In table 4, the multinomial logistic regression analysis showed that women who had an
8 "Increasing Permanent Employment" LMP pattern were more likely to decrease the risk of
9 accumulating days on future SA due to mental disorders, compared to those with a stable permanent
10 LMP pattern (aOR 2.08 [95% CI: 1.18-3.66]). Being employed most of the time in a big company,
11 compared to a small-medium one, increased the probability of developing a future low stable SA
12 trajectory rather than a low decreasing (aOR 0.64 [95% CI:0.45-0.93]) or a decreasing (aOR 0.46 [95%
13 CI:0.28-0.74]) course. Also, an early working life mainly developed within publicly owned companies
14 were related to a future "Low decreasing" SA trajectory (aOR 1.81 [95% CI: 1.01-3.25]) than in
15 privately owned companies.
16
17
18

19 Results for men showed that being in a "Delayed Employment" LMP comparing to a "Stable
20 Employment" LMP, involved a higher probability of having a low stable accumulation of days rather
21 than a high stable course (aOR 0.13[95% CI: 0.02-0.84]). Low salary levels were strongly related to a
22 higher probability for a future high stable SA trajectory (aOR 3.86 [95% CI: 1.73-8.58]). Men with a
23 middle stable SA trajectory showed a similar trend, even if it is not statistically significant (aOR 1.66
24 [95% CI: 0.90-3.07]).
25
26
27

28 Additionally, type of contract that women spent most of their working life during the SA follow up
29 period, showed that those mainly employed with temporary jobs had a higher probability of
30 increasing accumulated days on SA than those in permanent jobs (aOR 1.98 [95% CI:1.10-3.55])
31 (Table 4).
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Table 4 Association between labour market participation patterns and sickness absence trajectories in salaried workers.

	Women			Men	
	Low Decreasing vs Low Stable aOR (95% CI)	Decreasing vs Low Stable aOR (95% CI)	Increasing vs Low Stable aOR (95% CI)	Middle Stable vs Low Stable aOR (95% CI)	High Stable vs Low Stable aOR (95% CI)
2002-2011					
Labour market participation patterns					
Stable Permanent	1	1	1	1	1
Increasing Permanent	1.03 (0.64-1.64)	2.08 (1.18-3.66) ^T	1.05 (0.61-1.81)	1.21 (0.67-2.17)	0.80 (0.36-1.76)
Delayed Employment	1.47 (0.66-3.27)	2.61 (0.95-7.12)	1.03 (0.39-2.73)	1.79 (0.59-5.41)	0.13 (0.02-0.82) ^T
Fluctuating Employment	1.06 (0.52-2.16)	2.41 (1.01-5.75) ^T	0.79 (0.35-1.80)	1.25 (0.57-2.74)	0.62 (0.21-1.85)
Company size					
Small-medium (≤ 100 workers)	1	1	1	1	1
Big (>100 workers)	0.64 (0.45-0.93) ^T	0.46 (0.28-0.74) ^T	0.72 (0.47-1.10)	0.94 (0.57-1.55)	1.24 (0.62-2.49)
Company ownership					
Private	1	1	1	1	1
Public	1.81 (1.01-3.25) ^T	1.55 (0.73-3.27)	1.10 (0.53-2.23)	1.78 (0.73-4.35)	2.24 (0.72-6.94)
2012-2014					
Working time (%weekly hours)					
Full-time (>87.5%)	1	1	1	1	1
Part-time (50%-87.5%)	1.14 (0.70-1.86)	0.39 (1.17-0.86)	1.10 (0.63-1.94)	0.91 (0.32-2.60)	0.81 (0.20-3.33)
Short part-time (37.5%-49%)	1.41 (0.08-24.23)	2.67 (0.15-46.40)	5.06 (0.43-59.11)	-	-
Marginal part-time (≤37.5%)	1.19 (0.25-5.58)	0.58 (0.06-5.52)	1.45 (0.25-8.37)	-	-
Occupational category					
Non-manual skilled	1	1	1	1	1
Non-manual non-skilled	1.19 (0.72-1.98)	1.09 (0.57-2.07)	0.93 (0.52-1.68)	0.89 (0.42-1.91)	0.57 (0.21-1.53)
Manual skilled	0.95 (0.50-1.82)	0.78 (0.94-1.77)	1.03 (0.50-2.12)	0.9 (0.42-1.94)	0.68 (0.25-1.85)
Manual non-skilled	1.29 (0.61-2.74)	0.70 (0.26-1.90)	0.99 (0.41-2.38)	1.10 (0.45-2.66)	0.51 (0.16-1.66)
Income in tertiles					
High	1	1	1	1	1
Medium	1.16 (0.74-1.80)	1.86 (1.05-3.30)	1.04 (0.61-1.76)	1.17 (0.70-1.94)	0.80 (0.37-1.75)
Low	0.73 (0.44-1.19)	1.50 (0.79-2.83)	1.01 (0.58-1.79)	1.66 (0.90-3.07)	3.86 (1.73-8.58) ^T
Type of contract					
Permanent contract	1	1	1	1	1
Temporary contract	0.90 (0.53-1.52)	0.66 (0.34-1.29)	1.98 (1.10-3.55) ^T	1.12 (0.58-2.13)	0.83 (0.32-2.12)

a OR: adjusted odds ratio for the rest of the variables included in the model; ^T, statistically significant ($p < 0,05$)

DISCUSSION:

The study assessed the role of the early labour market participation patterns in the later course of SA due to a mental diagnosis in a sample of salaried workers. Women who had an early working life that followed an increasing permanent employment pattern were more likely to decrease accumulated days over time. Among men, an early increasing permanent, fluctuating or delayed employment pattern showed a trend towards a middle-stable future accumulation of SA days rather than a low stable pattern. Women showed that an early working life mainly developed in big companies was associated with a more favourable course of future SA. On the contrary, being employed in public companies increased the risk for an adverse course for mental health related absence.

The patterns of labour market participation found are in line with what we would expect for a working population at the beginning of their working life. On the one hand, young adults tend to enter the labour market lacking both work experience and appropriate working opportunities (19). The entrance might be held up because of extended training periods that correspond with younger ages. On the other hand, we found a fluctuating pattern that shows constant transitions that young adults experience switching between temporary contracts, unemployment and periods without social security coverage. On the contrary, stable and increasing permanent employment patterns corresponded to the most aged workers who had a high proportion of permanent contracts.

The labour market participation patterns obtained showed that part time jobs were more prevalent among women compared to men. This higher prevalence in women has long been characteristic in older adults (20). Moreover, higher proportions were found in workers that have a delayed entrance or steadily get permanent employments, so the extension to younger population of part time employment could be a result of the combination of studying and working. The literature points out at voluntariness and social class as determinants of the potential harmful effect on mental health (15,20) due to the reduction of income it implies. In Spain, more than a half of part-time jobs are claimed to be involuntary (2).

We hypothesised that the more the transitions during early working life the higher risk of a more adverse course of SA due to mental disorders. We found differences between men and women. Men with early fluctuating or delayed employment patterns tended to a middle stable rather than a low stable future accumulation of SA days, whereas in women the tendency was towards decreasing days on SA. Nevertheless, the delayed entry to the labour market in men, showed a later protective effect towards having a trajectory of a high number of SA days. This finding could be related to the fact that a delayed entry into the labour market didn't expose them to such a precarious situation, entering with higher education level and probably accessing to more favourable contracts. However, this hypothesis is not confirmed in women. Hence, there might also be a gender explanation in terms of access to better contracts.

To our knowledge, there is a lack of prior evidence on how transitions during early working life affect the course of future mental health. Some studies claim that being employed with a temporary contract is more a choice based on previous mental health status other show a relation between employment-unemployment transitions and poor mental health (15,21,22). Return to work expectations were also lower among workers with mental conditions compared to those with physical limitations due to its symptoms (i.e., hopelessness, low self-efficacy, insecurity (23), stigmatization or lack of support at work (24)).

These studies mostly use self-reported health measures, a cross-sectional approach or assess poor mental health on future employment. There are few longitudinal studies assessing the effect of

1
2
3 ageing, family trajectories or occupational category on work attachment (25). However, the potential
4 effect of transitions within the labour market on future sickness absence remains unexplored.
5

6 Workers who had a working life mainly employed in publicly owned companies were more likely to
7 accumulate a higher number of SA days later. It could be related to the fact that workers feel more
8 confident to use such benefits and supported when asking for the SA or less pressured to prematurely
9 return to work. Some studies claim that it could be driven by the selection of low motivational workers
10 or people with health-related problems, or limitations into this sector because of the believe that
11 working conditions are better suited for them (26–28).
12
13

14 Trajectories of SA that accumulated fewer days were more likely to have workers from big companies
15 than small-medium. This could lead to think that big companies could be a more facilitating and less
16 stigmatizing context when claiming a sickness absence. Also, in smaller companies, people tend to
17 have specific roles that can't be easily replaced due to reliance and shortage of resources to replace
18 staff. In addition, sense of compromise is stronger (29).
19

20 The disparate results could be attained to the fact that the study coincide with the economic crisis
21 which led to structural changes in the labour market. This context could have favoured future
22 presentism. Also, there could be a selection bias in terms of healthy worker, aggravated, as well, by
23 the economic recession (30). On this basis, the fear of not being renewed or not finding a new job
24 throughout the working life in the most transitional patterns could be related to a later high
25 accumulation of SA days.
26
27

28 A strong body of evidence on determinants of sickness absence among workers with mental
29 disorders has been mostly focused on Northern European countries, and studies on Southern
30 European working population are lesser (24,31,32). Socioeconomic and cultural contexts in both
31 countries differ, and so does the security in the labour market. These countries are characterized by
32 a *flexicurity* that ensures reemployment after unemployment due to training, mediation and
33 reintegration programs, in addition to a generous income replacement (33).
34
35

36 Also, literature shows a diverse amalgam of approaches to the relation between health and
37 employment in terms of prevention of SA due to mental diagnosis. Research has been focused on
38 working conditions, psychosocial factors, lifestyle factors, specific worker groups or employment
39 status and contracts (24,34,35). These studies considered an exposure and its relation to an outcome
40 from occupational or psychosocial epidemiology research.
41
42

43 The main limitation of the study is the assignment of individuals to the explanatory variables and to
44 the categories of the adjustment variables. Individuals might shift among categories over the follow-
45 up period and we assigned them to the category in which they spent most of the time during the
46 follow up. This could lead to a misclassification bias that might underestimate accumulation of SA
47 days in other categories. Furthermore, we were not able to account for the effect of prior health
48 status on the course of SA as this information was not available, overestimating results as people
49 with worse mental health could be more prone to have developed worse labour market participation
50 trajectories. Nevertheless, results do not represent the whole public sector because in Spain civil
51 servants with permanent contracts follow different healthcare schemes.
52
53

54 Nevertheless, our study relies upon some strengths. It counts with a large, administrative database
55 that guarantees representativeness of the sample allowing us to select diagnosis subgroups with a
56 considerable sample size and a great time window of 10 years. Also, it is a novel approach to
57 consider the employment status as type of contract (temporary and permanent), unemployment and
58 lack of coverage by social security periods, and to assess transitions between them. Diagnoses
59
60

1
2
3 causing sickness absence episodes were medically certified by primary doctors rather than self-
4 reported, enhances the validity of the results. Moreover, the changes in public sector can't be
5 overlooked and we give an insight to the differences with private sector.
6

7 Thus, we aimed to contribute to the understanding of this relation through a life course perspective
8 that could help explore how different LMP patterns can affect the different courses of mental SA.
9

10 11 12 **CONCLUSION:**

13
14 Our study contributes with an insight on how this situation could affect the entrance of young
15 working population into the labour market and how it could affect their future mental health.
16

17 Early working lives characterized by patterns with transitions between contract types,
18 unemployment and lack of social security coverage are related to a worse future course of SA due to
19 mental diagnosis. Future public health policies should consider how a precarious labour market can
20 shape the course of mental health in young working populations, and to aim on addressing and
21 preventing sickness absence in the long term.
22
23

24 25 26 **ACKNOWLEDGEMENTS:**

27 This work wouldn't have been possible without Spanish National Social Security Institute and the
28 Catalanian Institute for Medical Evaluations.
29
30

31 32 33 **ETHICAL ASPECTS:**

34 This study was performed under the standards of Good Clinical Practice and the principles of the
35 Declaration of Helsinki. Also, it guarantees the fulfilment of Regulation (EU) 2016/679 of the
36 European Parliament and the Council of 27 April 2016 on the protection of natural persons regarding
37 the processing of personal data and the free movement of such data. It fulfils the Spanish Organic
38 Law 3/2018 of December 5th on the Protection of Personal Data and the Guarantee of Digital Rights.
39

40 This study was approved by the Parc de Salut Mar Ethics Committee in Barcelona (Research Protocol
41 nº 2019/8506/I).
42

43 The research team commits itself to the strict use of data for the present study. Also, a linkage
44 protocol agreement between the Center for research in Occupational Health at the Pompeu Fabra
45 University, the National Social Security Institute and the Catalanian Institute for Medical Evaluations
46 warranted confidentiality providing the identified datasets to the authors.
47
48
49

50
51 **CONTRIBUTORS:** All listed authors fulfil authorship criteria. MU-L and LS participated in the
52 conception and design of the study. LS and AA-G performed the data management and data analysis.
53 AA-G, MU-L and LS interpreted the data. AA-G drafted the first version of the manuscript with close
54 help from MU-L. MU-L and LS made subsequent revisions, and all of the authors revised the final
55 version, agreed with the text and findings and approved this final version. The corresponding author
56 certifies that all listed authors meet authorship criteria. AA-G is the guarantor.
57
58
59
60

FUNDING: The study was financed by the State Plan for Investigation, Development and Innovation, 2013- 2016, by the Health Institute Carlos III – Subdirection General of Evaluation and Promotion of Investigation (Grants FIS PI17/00220).

DATA SHARING STATEMENT: Data may be obtained from a third party and are not publicly available.

COMPETING INTERESTS: None declared.

REFERENCES:

1. eurostat. Temporary and part-time jobs on the rise - Product - Eurostat [Internet]. Products Eurostat News. 2018 [cited 2018 Nov 22]. Available from: <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/WDN-20180813-1>
2. OIT. Non-standard employment around the world: Understanding challenges, shaping prospects [Internet]. 2016. 374 p. Available from: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_534326.pdf
3. Pitxer Campos J V, Sánchez Velasco A, Lorente Campos Adoración Guamán Hernández R. La dinámica de la temporalidad en el mercado laboral español en las dos últimas crisis: cambios normativos, modelo productivo y prácticas empresariales [Internet]. Valladolid; 2014 [cited 2018 Oct 22]. Available from: http://webs.ucm.es/info/ec/jec14/comunica/A_EL/A_EL_2.pdf
4. Fernández Gutiérrez M. Empleo público y temporalidad: ¿es el sector público parte del problema? Temas Laborales, Cons Andaluz Relac Laborales [Internet]. 2009;102:51–87. Available from: http://www.academia.edu/5505972/Empleo_público_y_temporalidad._Es_el_sector_público_parte_del_problema
5. Virtanen P, Siukola A, Lipiäinen L, Liukkonen V, Pentti J, Vahtera J. Trajectory analyses of sickness absence among industrial and municipal employees. *Occup Med (Chic Ill)*. 2017;67(2):109–13.
6. Instituto Nacional de Estadística. (National Statistics Institute) [Internet]. [cited 2019 Apr 30]. Available from: <http://www.ine.es/dynt3/inebase/index.htm?padre=982&capsel=985>
7. Dirección de Estadística y Análisis Sociolaboral. Informe Jóvenes y Mercado de Trabajo [Internet]. 2018 [cited 2018 Oct 22]. Available from: http://www.empleo.gob.es/es/sec_trabajo/analisis-mercado-
8. Delclós J, García S, López JC, Sampere M, Serra C, Plana M, et al. Duración de la incapacidad temporal por contingencia común por grupos diagnósticos DURATION OF NON WORK-RELATED SICKNESS ABSENCE BY CLINICAL DIAGNOSIS. *Arch Prev Riesgos Labor*. 2010;13(134):180–7.
9. OCDE. Factsheet on Promoting Mental Health [Internet]. 2018 [cited 2019 Apr 22]. Available from: <http://www.oecd.org/health/health-systems/OECD-Factsheet-Mental-Health-Health-at-a-Glance-Europe-2018.pdf>
10. Gabbay M, Taylor L, Sheppard L, Hillage J, Bambra C, Ford F, et al. NICE guidance on long-term

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

sickness and incapacity. *Br J Gen Pract* [Internet]. 2011 Mar [cited 2019 Apr 22];61(584):e118-24. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21375894>

11. WHO. European Health Information Gateway. Absenteeism from work due to illness, days per employee per year - European Health Information Gateway [Internet]. Updated 2018. [cited 2019 Apr 22]. Available from: https://gateway.euro.who.int/en/indicators/hfa_411-2700-absenteeism-from-work-due-to-illness-days-per-employee-per-year/
12. Ministerio de Trabajo MYSS. Sistema de la seguridad social. Resumen de Ejecución del Presupuesto. 2018.
13. Finnes A, Enebrink P, Ghaderi A, Dahl J, Nager A, Öst L-G. Psychological treatments for return to work in individuals on sickness absence due to common mental disorders or musculoskeletal disorders: a systematic review and meta-analysis of randomized-controlled trials. *Int Arch Occup Environ Health* [Internet]. 2019 Apr 24 [cited 2019 Apr 22];92(3):273–93. Available from: <http://link.springer.com/10.1007/s00420-018-1380-x>
14. Kivimäki M, Vahtera J, Virtanen M, Elovainio M, Pentti J, Ferrie JE. Temporary employment and risk of overall and cause-specific mortality. *Am J Epidemiol*. 2003;158(7):663–8.
15. Waenerlund AK, Hammarström A, Virtanen P. Is temporary employment related to health status? Analysis of the Northern Swedish Cohort. *Scand J Public Health*. 2011;39(5):533–9.
16. Gómez MAL, Durán X, Zaballa E, Sanchez-Niubo A, Delclos GL, Benavides FG. Cohort profile: The Spanish WORKing life social Security (WORKss) cohort study. *BMJ Open*. 2016;6(3).
17. Durán A. La Muestra Continua de Vidas Laborales de la Seguridad Social. *Rev del Minist Trab y Asuntos Soc* [Internet]. 2007 [cited 2018 Oct 24];10. Available from: http://www.mitramiss.gob.es/es/publica/pub_electronicas/destacadas/revista/numeros/ExtraSS07/Est09.pdf
18. Skrondal A, Rabe-Hesketh Sophia. Generalized Latent Variable Modeling Statistical Analysis of Shapes Clinical Trials in Oncology Second Edition Design and Analysis of Quality of Life Studies in Clinical Trials Dynamical Search Introduction To Measurement Error and Bayesian Adjustments St. New York. 2004.
19. Vancea M, Utzet M. How unemployment and precarious employment affect the health of young people: A scoping study on social determinants. *Scand J Public Health*. 2017;45(1):73–84.
20. Barnay T. Health, work and working conditions: a review of the European economic literature. *Eur J Heal Econ*. 2016;17(6):693–709.
21. Dawson C, Veliziotis M, Pacheco G, Webber DJ. Is temporary employment a cause or consequence of poor mental health? A panel data analysis. *Soc Sci Med* [Internet]. 2015;134:50–8. Available from: <http://dx.doi.org/10.1016/j.socscimed.2015.04.001>
22. Virtanen M, Kivimäki M, Joensuu M, Virtanen P, Elovainio M, Vahtera J. Temporary employment and health: A review. *Int J Epidemiol*. 2005;34(3):610–22.
23. Pedersen P, Lund T, Lindholdt L, Nohr EA, Jensen C, Sjøgaard HJ, et al. Labour market trajectories following sickness absence due to self-reported all cause morbidity - A longitudinal study. *BMC Public Health* [Internet]. 2016;16(1):1–10. Available from: <http://dx.doi.org/10.1186/s12889-016-3017-x>
24. de Vries H, Fishta A, Weikert B, Rodriguez Sanchez A, Wegewitz U. Determinants of Sickness Absence and Return to Work Among Employees with Common Mental Disorders: A Scoping

- 1
2
3 Review. *J Occup Rehabil* [Internet]. 2018;28(3):393–417. Available from:
4 <http://dx.doi.org/10.1007/s10926-017-9730-1>
5
- 6 25. Lu W, Benson R, Glaser K, Platts LG, Corna LM, Worts D, et al. Relationship between
7 employment histories and frailty trajectories in later life: Evidence from the English
8 Longitudinal study of ageing. *J Epidemiol Community Health*. 2017;71(5):439–45.
9
- 10 26. Mastekaasa A. Absenteeism in the Public and the Private Sector: Does the Public Sector
11 Attract High Absence Employees. *J Public Adm Res Theory*. 2019;1–17.
12
- 13 27. Böhm T, Riedel N. On selection into public civil service. *CESifo Econ Stud*. 2013;59(1):34–71.
14
- 15 28. Dur R, Zoutenbier R. Intrinsic Motivations of Public Sector Employees: Evidence for Germany.
16 *Ger Econ Rev*. 2015;16(3):343–66.
17
- 18 29. Alba Ramirez A. La incapacidad temporal para el trabajo: análisis económico de su incidencia y
19 su duración [Internet]. 2009 [cited 2019 May 5]. Available from: [http://www.seg-](http://www.seg-social.es/wps/wcm/connect/wss/f4e8cb57-4ff0-4c03-abbf-3003665f18a3/F9_07.pdf?MOD=AJPERES&CVID=)
20 [social.es/wps/wcm/connect/wss/f4e8cb57-4ff0-4c03-abbf-](http://www.seg-social.es/wps/wcm/connect/wss/f4e8cb57-4ff0-4c03-abbf-3003665f18a3/F9_07.pdf?MOD=AJPERES&CVID=)
21 [3003665f18a3/F9_07.pdf?MOD=AJPERES&CVID=](http://www.seg-social.es/wps/wcm/connect/wss/f4e8cb57-4ff0-4c03-abbf-3003665f18a3/F9_07.pdf?MOD=AJPERES&CVID=)
22
- 23 30. Leinonen T, Viikari-Juntura E, Husgafvel-Pursiainen K, Solovieva S. Cause-specific sickness
24 absence trends by occupational class and industrial sector in the context of recent labour
25 market changes: A Finnish panel data study. *BMJ Open*. 2018;8(4):1–11.
26
- 27 31. Norder G, Roelen CAM, Bültmann U, van der Klink JLL. Shift work and mental health sickness
28 absence: a 10-year observational cohort study among male production workers. *Scand J Work*
29 *Environ Health*. 2015;41(4):413–6.
30
- 31 32. Norder G, Roelen CAM, van der Klink JLL, Bültmann U, Sluiter JK, Nieuwenhuijsen K. External
32 Validation and Update of a Prediction Rule for the Duration of Sickness Absence Due to
33 Common Mental Disorders. *J Occup Rehabil*. 2017;27(2):202–9.
34
- 35 33. Wilthagen T, Tros F. The concept of ‘flexicurity’: a new approach to regulating employment
36 and labour markets. *Transf Eur Rev Labour Res* [Internet]. 2004;10(2):166–86. Available from:
37 <http://journals.sagepub.com/doi/10.1177/102425890401000204>
38
- 39 34. Virtanen M, Ervasti J, Head J, Oksanen T, Salo P, Pentti J, et al. Lifestyle factors and risk of
40 sickness absence from work: a multicohort study. *Lancet Public Heal* [Internet].
41 2018;3(11):e545–54. Available from: [http://dx.doi.org/10.1016/S2468-2667\(18\)30201-9](http://dx.doi.org/10.1016/S2468-2667(18)30201-9)
42
- 43 35. Amick BC, McLeod CB, Bültmann U. Labor markets and health: An integrated life course
44 perspective. *Scand J Work Environ Heal*. 2016;42(4):346–53.
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Figure 1 Early labour market participation-LMP patterns in salaried workers living in Catalonia (2002-2011).



Table 1 Sample distribution of salaried workers living in Catalonia (2002-2014) and their SA episodes due to mental disorders (2012-2014), according to employment related characteristics.

Age in 2002 (mean (SD))	Women (N=879)			Men (N=500)		
	23.2 (3.0)			23.1 (3.0)		
2002-2011	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)
Company size						
Small-medium (≤ 100 workers)	576 (65.5)	694 (65.2)	26 (9;72.5)	367 (73.4)	442 (70.4)	22 (9;55)
Big (>100 workers)	303 (34.5)	370 (34.8)	18 (8;58)	133 (26.6)	186 (29.6)	21 (6;58)
Company ownership						
Private	738 (84.0)	892 (83.8)	22 (8; 64)	449 (89.8)	449 (71.5)	22 (8;54)
Public	100 (11.4)	125 (11.7)	29 (10.5; 76)	32 (6.4)	39 (6.2)	35.5 (6;75.5)
2012-2014						
Working time (%weekly hours)						
Full-time (>87.5%)	748 (85.1)	902 (84.8)	24 (9; 66.5)	476 (95.2)	595 (94.7)	22 (8;57.5)
Part-time (50%-87.5%)	116 (13.2)	145 (13.6)	18 (8;45)	21 (4.2)	29 (4.6)	16 (6;50)
Short part-time (37.5%-49%)	5 (0.6)	7 (0.7)	75 (24;103)	1 (0.2)	2 (0.3)	11 (11;11)
Marginal part-time ($\leq 37.5\%$)	10 (1.1)	10 (0.9)	17.5 (10;43)	2 (0.4)	2 (0.3)	120 (46;194)
Occupational category						
Non-manual skilled	160 (18.2)	189 (17.8)	23 (10; 66.5)	50 (10)	61 (9.7)	23 (11;67)
Non-manual non-skilled	503 (57.2)	616 (57.9)	24 (9; 67)	150 (30)	178 (28.3)	16 (6;50)
Manual skilled	137 (15.6)	161 (15.1)	22 (7; 58)	217 (43.4)	277 (44.1)	21 (9;61)
Manual non-skilled	79 (9.0)	98 (9.2)	24 (8; 56)	83 (16.6)	112 (17.8)	28 (7;61)
Income in tertiles						
High	268 (30.5)	327 (30.7)	23 (8; 63)	191 (38.2)	244 (38.9)	19 (8;60)
Medium	282 (32.1)	328 (30.8)	27 (10; 78)	177 (35.4)	215 (34.2)	15 (6;46)
Low	328 (37.4)	407 (38.3)	21.5 (8;59)	132 (26.4)	169 (26.9)	37 (13.5;82)
Type of contract						
Permanent contract	701 (79.8)	837 (78.7)	23 (9; 67)	418 (83.6)	523 (83.3)	21 (8;58)
Temporary contract	178 (20.3)	227 (21.3)	26 (8.5; 61)	82 (16.4)	105 (16.7)	28 (7;55)
Total	879	1.064		500	628	

* Sickness absence closed episodes due to mental disorders regardless of its duration between 2012-2014; SD, standard deviation; MD, median duration; P25, percentile 25; P75, percentile 75

Figure 1 Sickness absence trajectories in salaried women living in Catalonia (2012-2014).

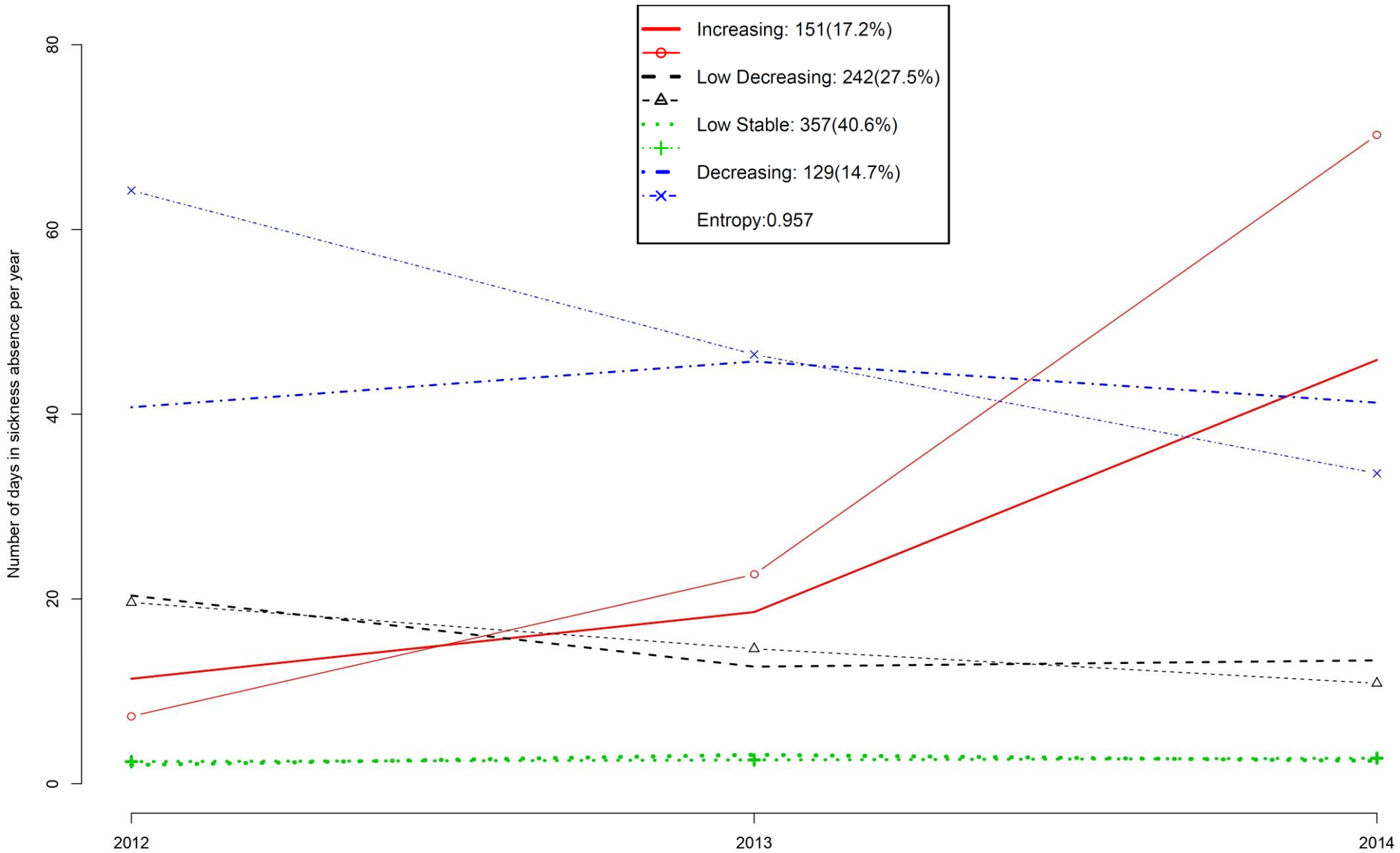
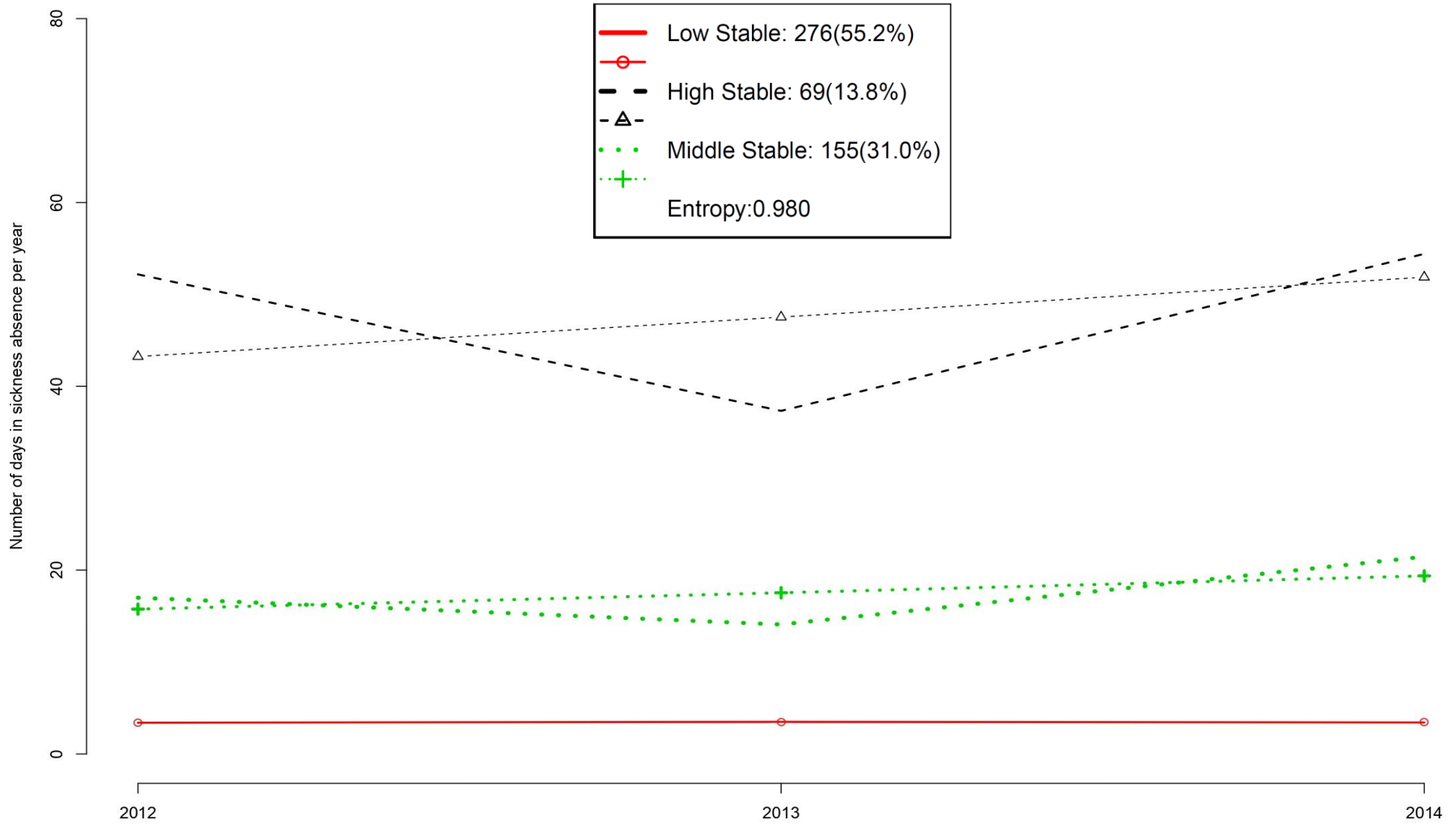


Figure 2 Sickness absence trajectories in salaried men living in Catalonia (2012-2014).



STROBE Statement—Checklist of items for the report of *cohort study* “The relationship between early working life patterns, in publicly and privately owned companies, and the course of future sickness absence due to mental disorders”

	Item No	Recommendation	Compliance (PAGE)
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	YES (2)
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	YES (2)
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	YES (4)
Objectives	3	State specific objectives, including any prespecified hypotheses	YES (4)
Methods			
Study design	4	Present key elements of study design early in the paper	YES (4-5)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	YES (4-5)
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	YES (4-5)
		(b) For matched studies, give matching criteria and number of exposed and unexposed	NA
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	YES (5)
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	NA
Bias	9	Describe any efforts to address potential sources of bias	YES (9)
Study size	10	Explain how the study size was arrived at	YES (4)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	YES (5)
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	YES (5)
		(b) Describe any methods used to examine subgroups and interactions	NA
		(c) Explain how missing data were addressed	NA
		(d) If applicable, explain how loss to follow-up was addressed	NA
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	YES (5)
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	YES (14)
		(b) Indicate number of participants with missing data for each variable of interest	NA
		(c) Summarise follow-up time (eg, average and total amount)	YES (4-5)
Outcome data	15*	Report numbers of outcome events or summary measures over time	YES (5)

1	Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	YES (5)
2				
3				
4			(b) Report category boundaries when continuous variables were categorized	YES (5)
5			(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
6				
7				
8	Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
9				
10				
11				
12				
13	Discussion			
14	Key results	18	Summarise key results with reference to study objectives	YES (6-7)
15	Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	YES (9)
16				
17				
18				
19	Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	YES (7-9)
20				
21				
22				
23	Generalisability	21	Discuss the generalisability (external validity) of the study results	YES (9)
24				
25	Other information			
26	Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	YES (10)
27				
28				
29				

*Give information separately for exposed and unexposed groups.

BMJ Open

Association between early working life patterns, in publicly and privately owned companies, and the course of future sickness absence due to mental disorders: a cohort study in Catalonia (Spain)

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-040480.R1
Article Type:	Original research
Date Submitted by the Author:	16-Dec-2020
Complete List of Authors:	Ayala-Garcia, Amaya; Pompeu Fabra University Faculty of Health and Life Sciences, Centre for research in Occupational Health Serra, Laura; Pompeu Fabra University Faculty of Health and Life Sciences, Centre for research in Occupational Health (CiSAL); University of Girona, Research Group on Statistics, Econometrics and Health (GRECS) Ubalde López, M; Barcelona Institute for Global Health
Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Mental health, Public health, Occupational and environmental medicine
Keywords:	MENTAL HEALTH, EPIDEMIOLOGY, PUBLIC HEALTH

SCHOLARONE™
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1
2
3 **Association between early working life patterns, in publicly and privately owned**
4 **companies, and the course of future sickness absence due to mental disorders: a**
5 **cohort study in Catalonia (Spain)**
6

7 Amaya Ayala-García^{1,2,3}, Laura Serra^{1,2,3,4}, Monica Ubalde-Lopez⁵
8

9 (1) Center for Research in Occupational Health (CiSAL), University Pompeu Fabra,
10 Barcelona, Spain
11

12 (2) CIBER of Epidemiology and Public Health (CIBERESP), Spain
13

14 (3) IMIM – Parc Salut Mar, Barcelona, Spain
15

16 (4) Research Group on Statistics, Econometrics and Health (GRECS), University of
17 Girona, Spain
18

19 (5) Barcelona Institute for Global Health (ISGlobal), Spain
20

21 Corresponding author information:
22

23 Full name: Amaya Ayala-García

24 Address: Center for Research in Occupational Health (CiSAL). PRBB Building. Dr. Aiguader, 88.
25 08003 Barcelona
26

27 Email: amaya.ayala01@estudiant.upf.edu
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

ABSTRACT

Objectives To assess the relationship between early working life patterns, at privately and publicly held companies, and the course of sickness absence (SA) due to mental disorders.

Methods: Cohort study of workers aged 18–28 years, affiliated with the Spanish social security system, living in Catalonia, who had at least one episode of SA due to mental disorders between 2012–2014. Individual prior working life trajectories were reconstructed through sequence analysis. Optimal matching analysis was performed to identify early working life patterns by clustering similar individual trajectories. SA trajectories were identified using latent class growth modelling analysis. Finally, the relationship between early working life patterns and subsequent SA trajectories was assessed via multinomial logistic regression models.

Results: Among both men and women, four LMP patterns were identified: Stable Permanent Employment (reference group), Increasing Permanent Employment, Fluctuating Employment, and Delayed Employment. Among women, an Increasing Permanent Employment pattern in early working life was related to a decrease of accumulated SA days over time (aOR 2.08; 95% CI: 1.18–3.66). In men, we observed a trend towards a middle stable accumulation of SA days in those with Fluctuating Employment (aOR 1.25 [95% CI: 0.57–2.74]) or Delayed Employment (aOR 1.79; 95% CI: 0.59–5.41). In both men and women, an early working life in big companies was related to a more favourable SA trajectory.

Conclusions: Early labour market participation patterns characterized by an increasing stability – decreased number of transitions between temporary contracts and lack of social security coverage towards permanent contracts - were related to a better future SA course due to mental diagnosis.

Keywords: sickness absence, mental disorders, young working population, early working life, company size, public company, private company.

STRENGTHS AND LIMITATIONS OF THIS STUDY:

- This register-based study was performed using a large administrative database, guaranteeing that the sample represents the Spanish workforce, linked with sickness absence registers, allowing the selection of diagnosis subgroups with a considerable sample size over a 10-year time period.
- It is a novel approach to assess how future health may be affected by prior working life transitions, considering employment status, type of contract, unemployment, and periods of lack of social security coverage.
- This longitudinal study takes a life-course approach to examining precarious working life, and its effects on future sickness absence due to mental disease.
- A potential classification bias may occur since individuals who shifted among categories of explanatory and adjustment variables over the follow-up period were assigned to the category in which they spent the most time during the follow-up.
- We lacked information regarding prior health status, which could potentially influence future sickness absence and/or eligibility for more precarious employment.

INTRODUCTION

According to Eurostat, since the 1990s, Spain has been among the European countries with the lowest employment rates (<70%). The gap between the European and the Spanish average employment rates is largest within the young working population (20% vs 34%, respectively). Moreover, in 2017, Spain had the highest proportion of persons working as temporary contract employees, and one of the highest rates of precarious employment (having a work contract of only ≤ 3 months) compared to the European average (1).

Spain has historically had a core of publicly held companies that are characterized as providing permanent and secure job contracts, workers' protection, and trade union membership agreements (2). However, the phenomena of globalization, continuous incorporation of women into the labour market, technological developments, organizational requirements, outsourcing, and population ageing have contributed to a process of deregulation towards a more flexible labour market and employment relations. Labour market fluctuations have led to alterations of practices inherent to privately held companies, such as revising staffing, contracting, and expanding on production expenses. Following the economic crisis in 2008, the recovery of employment rates has been largely based on temporary and partial employments, together with nonstandard forms of employment (i.e. informal employment without social security coverage or any type of contract) (3). In 2009, the rate of temporary contracts in private companies was exceeded by that in public companies (25.5% vs 26.5%), and both were equal in 2014 (24%) (2,4–6). Therefore, the young working force has largely delayed the onset of their working life, mainly entering employment with temporary contracts and low salaries (7).

Sickness absence (SA) is defined as an absence from work due to a medically certified health-related problem. It's a global measure of health, and can be understood as a tool of social protection in that economic (i.e. SA benefits) and medical support are provided from the National Healthcare System during the episode (8). In industrialised countries, SA has a huge impact on the healthcare system, with both social and economic expenditures (9–11), accounting for 6.6 billion euros in Spain in 2018 (12). The most frequent diagnoses behind SA are musculoskeletal disorders and mental disorders (13).

Several studies have reported that unemployment, temporary employment, and job insecurity are related to mental disorders, stress, and poor self-rated health (14,15). In 2017, a scoping study highlighted one mechanism that drives the effects of precarious employment and unemployment on mental disorders among young people—namely, the life-course perspective, suggesting a cumulative nature of the exposure (16). It has been projected that the frequency of mental disorders will increase, particularly affecting young adults (17). The body of evidence regarding SA determinants among workers with mental disorders has been mostly focused on Northern European countries, with fewer studies performed in the Southern European working population (18–20). The socioeconomic and cultural contexts differ between these regions, as does the security in the labour market, with the Northern European countries characterized by a *flexicurity* that ensures reemployment after unemployment based on training, mediation, and reintegration programs, in addition to generous income replacement (21).

Health outcomes and work participation clearly differ between men and women and among different age groups (22), highlighting the need for separate investigations of predictors of SA course. Regarding differences in work participation, precariousness is believed

1
2
3 to be a gendered phenomenon due to processes of family formation, gender segregation, and
4 wage discrimination, which contribute to an already unstable labour market context (23).
5 Existing literature has focused on whether public companies attract potentially absent
6 workers, due to worse health status and greater self-interest, compared to the presumed
7 more restrictive SA practices in the private sector (24–26). A study in Finland found that the
8 risk for more adverse SA trajectories did not differ between public and private employees (5).
9 However, the relationship between the potential effects of previous working life on SA
10 trajectories in the private and public sectors has generally been poorly studied.
11
12

13 The literature shows a diverse amalgam of approaches to the relationship between
14 health and employment in terms of the prevention of SA due to mental diagnosis. Past
15 research has mainly focused on working conditions, psychosocial factors, lifestyle factors,
16 specific worker groups, or employment status and contracts (18,27,28). Recent research has
17 applied the life-course perspective to labour-market trajectories to assess how working life
18 affects health outcomes, such as SA. Longitudinal analysis provides a more holistic perspective
19 of work participation due to the consideration of transitions, order, and duration of
20 employment statuses (14,29).
21
22

23 In the present study, we aimed to explore from a life-course perspective the
24 relationship between labour market participation trajectories at the start of working life, at
25 public and private companies, and the course of future SA due to mental disorders.
26
27

28 **METHODS**

29 We performed a register-based cohort study among 1379 young workers (aged 18–28 years in
30 2002) who were included in the Spanish WORKss cohort (30). All included persons were
31 affiliated with Spanish social security, living in Catalonia, and had at least one episode of SA
32 due to a mental diagnosis between 2012–2014. The individuals included in the WORKss cohort
33 are part of the Continuous Working Life Sample (CWLS). The age range of 18–28 years was
34 selected in accordance with the objective of the study, which was to evaluate the young
35 population at the start of their working life.
36
37
38

39 The CWLS was started in 2004, and includes an annual cross-sectional representative
40 sample of 4% of the population affiliated with Spanish social security. Data available from the
41 CWLS allows reconstruction of working life based on information related to occupational level,
42 employment status/conditions (i.e. employment, unemployment, type of contract, salary, and
43 working time), social benefits (i.e. unemployment, permanent disability, and retirement),
44 other work-related variables (i.e. company ownership and size), and date of death.
45 Additionally, SA registries were obtained from the Catalan Institute for Medical and Health
46 Evaluations (ICAM by its acronym in Spanish). The provided data included information related
47 to the diagnosis causing an SA episode (coded according to 10th edition of the International
48 Codex of Diseases), as well as the SA starting and ending date (31).
49
50
51

52 The acquired registry data were used to reconstruct early working life trajectories from
53 2002 to 2011, based on transitions between four work-related states: permanent, temporary
54 contract, unemployment, and without social security coverage. We also recorded the following
55 secondary explicative variables: early working life trajectory, company ownership (private or
56 public), and company size (small/medium: ≤100 employees; or big: >100 employees).
57 Individuals were assigned a company ownership and size based on the category in which they
58 spent most of their early working life.
59
60

1
2
3 For the SA trajectory analysis, we measured SA as the number of days accumulated per
4 year due to any medically certified mental disorder between 2012–2014. All mental and
5 behavioural disorders (ICD-10, chapter V, F00-F99) were included.
6

7 Employment conditions during the SA follow-up period were evaluated as potential
8 confounders. The recorded conditions included occupational category (non-manual skilled,
9 non-manual non-skilled, manual skilled, or manual non-skilled), working time (full, part-time,
10 short part-time, or marginal part-time), type of contract (permanent or temporary), and
11 annual income (low, medium, or high). Workers who changed across categories over time
12 were assigned the category in which they spent most of the follow-up period.
13
14

15 16 **Patient and public involvement statement**

17
18
19 This study was designed and conducted based on secondary administrative records, retrieved
20 from the Spanish social security system and the Catalan Institute for Medical and Health
21 Evaluations. Patients were not involved in any stage of the study. Confidentiality was
22 maintained in both databases. The authors received data that were already anonymised, as
23 specified in a record linkage agreement between Spanish social security, the Catalan Institute
24 for Medical and Health Evaluations, and the Centre for Research in Occupational Health-
25 Pompeu Fabra University.
26
27

28 29 **Statistical analysis**

30 Based on transitions among the above-described four working life states, sequence analysis
31 was performed to reconstruct individual working life. Next, optimal matching analysis was
32 applied, and we identified groups of workers who shared similar working life trajectories, i.e.
33 labour market participation (LMP) patterns (32). Average silhouette width was used to select
34 the optimal number of clusters.
35
36

37 SA trajectories were identified using the statistical technique of latent class growth
38 analysis. In this methodology, an indicator of interest is considered across time-points,
39 allowing the identification of homogeneous subgroups that share similar characteristics.
40 Trajectories can be estimated, assuming they follow either a linear quadratic function or any
41 other expression, including more complex elements. Notably, it is recommended to apply the
42 criterion of parsimony, and to use the simplest expression to obtain similar results (33). The
43 optimal number of trajectories was assessed considering the lower Bayesian information
44 criterion (BIC), and the Lo-Mendell-Rubin adjusted and bootstrap likelihood ratio tests. In cases
45 where the compared fit indexes had similar values, the one with the highest entropy was
46 preferentially chosen (34). The size of each class was dependent on the sample size and how
47 meaningful a small group was for the study aim.
48
49

50
51 Finally, to study the association between LMP patterns and SA trajectories, we applied
52 a multinomial logistic regression. All analyses were stratified by sex. R Statistical Software was
53 used for sequence analysis and optimal matching, Stata software for multinomial regression
54 models, and MPlus software for latent class analysis.
55
56
57

58 **RESULTS**

59
60

Labour market participation (LMP) patterns

Among both men and women, four LMP patterns were identified: Stable Permanent Employment (45.6% and 43.6% of workers, respectively), Increasing Permanent Employment (23.7%, 20.6%), Fluctuating Employment (18.9%, 24.2%), and Delayed Employment (11.8%, 11.6%) (table 1, figure 1). In both sexes, the Delayed Employment pattern included the youngest workers (mean age of 21.9 years for women and 22.1 for men), while the Stable Permanent Employment pattern included the oldest workers (mean age of 24 years for women and 23.8 for men). The Stable Permanent Employment and Increasing Permanent Employment patterns included the highest proportion of workers with high and medium incomes, especially among men.

In both sexes, the Stable Permanent Employment pattern comprised a steady proportion of about 90% of workers with permanent contracts (figure 1). Among women, this pattern included the lowest proportions of workers employed at publicly owned companies (7.2%), part-time jobs (10%), and manual non-skilled occupations (5.5%) compared to the other patterns.

Half of the individuals showing the Increasing Permanent Employment pattern were workers on temporary contracts who slowly switched to permanent contracts over time, reaching up to 90% by the end of follow-up (figure 1). Compared to other patterns, this pattern included higher proportions of women (38.5%) and men (30.1%) employed by large companies, and of women in part-time jobs (18.3%). The Increasing Permanent Employment pattern included less skilled occupations among men (20.4%) compared to women (6.3%).

Within the Delayed Employment pattern, we identified a group of young workers who gradually entered into the labour market with permanent (up to 40% of individuals) and temporary contracts (20%) (figure 1). Women in this pattern the greatest proportions of marginal part-time jobs (2.9%) and manual non-skilled jobs (15.4%), and men in this pattern had the highest proportion of part-time jobs (8.6%); however, these patterns were based on very small numbers of individuals.

Finally, the Fluctuating Employment pattern presented an unsteady working life, switching from a high proportion of temporary contracts (40%) to unemployment (15%) and periods without social security coverage (40%) (figure 1). Among both women and men, this pattern included the highest proportions of young workers employed by publicly owned companies (22.3% and 7.4% respectively), in manual non-skilled occupations (16.9% and 27.3%), and with the lowest salary levels (51.5% and 43.8%).

Table 1 Employment-related characteristics of salaried workers living in Catalonia across labour market participation patterns (2002–2011)

	Labour market participation patterns									
	Women (N=879)					Men (N=500)				
	Stable Permanent Employment (45.6%)	Increasing Permanent Employment (23.7%)	Delayed Employment (11.8%)	Fluctuating Employment (18.9%)	p value	Stable Permanent Employment (43.6%)	Increasing Permanent Employment (20.6%)	Delayed Employment (11.6%)	Fluctuating Employment (24.2%)	p value
Age in 2002, mean (SD)	24.0 (2.8)	23.0 (2.9)	21.9 (2.7)	22.6 (3.0)	<0.001 [†]	23.8 (3.0)	22.8 (2.9)	22.1 (2.9)	22.6 (2.9)	<0.001 [†]
2002–2011	N (%)	N (%)	N (%)	N (%)		N (%)	N (%)	N (%)	N (%)	
Company size										
Small-medium (≤100 workers)	267 (66.6)	128 (61.5)	72 (69.2)	109 (65.7)	0.271	157 (72.0)	72 (69.9)	41 (70.7)	97 (80.2)	0.513
Big (>100 workers)	134 (33.4)	80 (38.5)	32 (30.8)	57 (34.3)		61 (28.0)	31 (30.1)	17 (29.3)	24 (19.8)	
Company ownership										
Private	353 (88.0)	175 (84.1)	87 (83.7)	123 (74.1)	0.775	192 (88.1)	95 (92.2)	54 (93.1)	108 (89.3)	<0.001 [†]
Public	29 (7.2)	22 (10.6)	12 (11.5)	37 (22.3)		15 (6.9)	6 (5.8)	2 (3.5)	9 (7.4)	
2012–2014										
Working time (% weekly hours)										
Full-time (>87.5%)	355 (88.5)	169 (81.3)	82 (78.9)	142 (85.5)	0.148	210 (96.3)	98 (95.2)	53 (91.4)	115 (95.0)	0.039 [†]
Part-time (50–87.5%)	40 (10.0)	38 (18.3)	17 (16.4)	21 (12.7)		8 (3.7)	4 (3.9)	5 (8.6)	4 (3.3)	
Short part-time (37.5–49%)	2 (0.5)	-	2 (1.9)	1 (0.6)		-	1 (1.0)	-	-	
Marginal part-time (≤37.5%)	4 (1.0)	1 (0.5)	3 (2.9)	2 (1.2)		-	-	-	2 (1.6)	
Occupational category										
Non-manual skilled	50 (12.5)	43 (20.7)	29 (27.9)	38 (22.9)	0.002 [†]	16 (7.3)	13 (12.6)	8 (13.8)	13 (10.7)	<0.001 [†]
Non-manual non-skilled	265 (66.1)	122 (58.7)	41 (39.4)	75 (45.2)		67 (30.7)	33 (32.0)	19 (32.8)	31 (25.6)	
Manual skilled	64 (16.0)	30 (14.4)	18 (17.3)	25 (15.1)		112 (51.4)	36 (35.0)	25 (43.1)	44 (36.4)	
Manual non-skilled	22 (5.5)	13 (6.3)	16 (15.4)	28 (16.9)		23 (10.6)	21 (20.4)	6 (10.3)	33 (27.3)	
Income in tertiles										
High	129 (32.2)	70 (33.7)	29 (27.9)	40 (24.2)	<0.001 [†]	113 (51.8)	38 (36.9)	14 (24.1)	26 (21.5)	<0.001 [†]
Medium	135 (33.7)	80 (38.5)	27 (26.0)	40 (24.2)		74 (33.9)	39 (37.9)	22 (37.9)	42 (34.7)	
Low	137 (34.2)	58 (27.9)	48 (46.2)	85 (51.5)		31 (14.2)	26 (25.2)	22 (37.9)	53 (43.8)	
Total	401	208	104	166		218	103	58	121	

SD, standard deviation.

[†] Statistically significant (p<0.05).

Sickness absence trajectories

Men and women exhibited different SA trajectories due to mental disorders. Among women, we identified four trajectories of accumulated days of SA per year: Low Stable (40.6% of workers), Low Decreasing (27.5%), Decreasing (14.7%), and Increasing (17.2%) (Supplementary file, figure 1). The Low Stable SA trajectory was characterized by the lowest accumulation of days during the follow-up period (median duration: 6–15 days), but the highest proportion of episodes (38.2%). The Decreasing trajectory showed the lowest number of episodes (16.4%) and represented the smallest proportion of workers (14.7%), but accumulated a high number of days annually (median duration: 38.5–97 days). In contrast, the Increasing trajectory stood out as including a large proportion of women with temporary contracts (25.8%), who generated 28.1% of episodes (table 2).

For peer review only

Table 2 Employment-related characteristics among salaried women living in Catalonia, across sickness absence trajectories (2012–2014)

Women (N=879)	Sickness absence trajectories												p values	
	Low Stable (40.6%)			Low Decreasing (27.5%)			Decreasing (14.7%)			Increasing (17.2%)			p value N	p value Episodes
Age in 2002, mean (SD)	23.2 (2.9)			23.3 (2.9)			23.2 (3.0)			23.2 (2.9)			0.9864	
2002–2011	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)	p value N	p value Episodes
Company size														
Small-medium (≤100 workers)	215 (60.2)	240 (59.1)	8 (3; 11)	164 (67.8)	208 (69.6)	40 (26; 55.5)	97 (75.2)	123 (70.7)	108 (85; 141)	100 (66.2)	123 (66.5)	47.5 (21.5; 130.5)	0.02 ^T	0.009 ^T
Big (>100 workers)	142 (39.8)	166 (40.9)	7 (3; 11)	78 (32.2)	91 (30.4)	36 (24; 60)	32 (24.8)	51 (29.3)	138.5 (97; 182)	51 (33.8)	62 (33.5)	56 (19; 115)		
Company ownership														
Private	309 (86.6)	353 (87.0)	7 (3; 11)	195 (80.6)	239 (79.9)	38 (25; 53)	108 (83.7)	147 (84.5)	115 (90; 156.5)	126 (83.4)	153 (82.7)	55 (21; 128)	0.67	0.363
Public	34 (9.5)	38 (9.4)	8 (4; 11)	34 (14.1)	44 (14.7)	40 (31; 64)	15 (11.6)	20 (11.5)	122 (86; 226)	17 (11.3)	23 (14.4)	28 (19; 115)		
2012–2014														
Working time (% weekly hours)														
Full-time (>87.5%)	301 (84.3)	343 (84.5)	8 (3; 11)	203 (83.9)	248 (82.9)	39 (26; 57)	119 (92.3)	159 (91.4)	117 (86; 156)	125 (82.8)	152 (82.2)	55 (22; 119)	0.44	0.387
Part-time (50–87.5%)	51 (14.3)	58 (14.3)	7 (2; 10)	35 (14.5)	45 (15.1)	36 (25; 46)	8 (6.2)	13 (7.5)	114 (96.5; 152)	22 (14.6)	29 (15.7)	44.5 (18; 134)		
Short part-time (37.5–49%)	1 (0.3)	1 (0.3)	15 (15; 15)	1 (0.4)	3 (1)	135 (135; 135)	1 (0.8)	1 (0.6)	103 (103; 103)	2 (1.3)	2 (1.1)	49.5 (24; 75)		
Marginal part-time (≤37.5%)	4 (1.1)	4 (1)	9 (6; 10.5)	3 (1.2)	3 (1)	43 (21; 56)	1 (0.8)	1 (0.6)	81 (81; 81)	2 (1.3)	2 (1.1)	17.5 (17; 18)		
Occupational category														
Non-manual skilled	65 (18.2)	70 (17.2)	8 (4; 12)	45 (18.6)	53 (17.7)	39 (25; 63)	21 (16.3)	27 (15.5)	97 (86; 127)	29 (19.2)	39 (21.2)	61 (22; 159)	0.96	0.901
Non-manual non-skilled	200 (56.0)	232 (57.1)	8 (3; 11)	141 (58.3)	176 (58.9)	38 (26; 53)	80 (62.0)	108 (62.1)	113 (83.5; 154.5)	82 (54.3)	100 (54.1)	56.5 (20; 133)		
Manual skilled	60 (16.8)	65 (16.0)	6 (2.5; 10)	33 (13.6)	41 (13.7)	42 (29; 51)	18 (14.0)	26 (14.9)	144.5 (106; 183)	26 (17.2)	29 (15.7)	42.5 (22; 85)		
Manual non-skilled	32 (9.0)	39 (9.6)	8 (3; 10)	23 (9.5)	29 (9.7)	45 (25; 60)	10 (7.8)	13 (7.5)	109.5 (96; 121)	14 (9.3)	17 (9.2)	27 (24; 30)		
Income in tertiles														
High	114 (31.9)	125 (30.8)	7 (3; 12)	77 (31.8)	100 (33.4)	39 (25; 56)	30 (23.4)	38 (22.1)	97 (78; 127)	47 (31.1)	64 (34.6)	65 (26; 167)	0.21	0.104
Medium	103 (28.9)	117 (28.8)	8 (3; 11)	85 (35.1)	94 (31.4)	39 (26; 54)	50 (39.1)	64 (37.2)	120.5 (82; 156)	44 (29.1)	53 (28.7)	62 (20; 139.5)		
Low	140 (39.2)	164 (40.4)	7 (3; 10)	80 (33.1)	105 (35.1)	39.5(26; 58)	48 (37.5)	70 (40.7)	115.5 (97; 154.5)	60 (39.7)	68 (36.8)	27.5 (19.5; 58.5)		
Type of contract														
Permanent contract	290 (81.2)	327 (80.5)	8 (3; 11)	195 (80.6)	236 (78.9)	39 (25; 56)	106 (82.2)	141 (81.0)	116.5 (91; 157)	112 (74.17)	133 (71.9)	56.5 (19; 126)	0.27	0.09
Temporary contract	67 (18.8)	79 (19.5)	7 (3; 10)	47 (19.4)	63 (21.1)	42 (31; 59)	23 (17.8)	33 (19.0)	103 (70; 146)	39 (25.8)	52 (28.1)	31 (22; 115)		
Total	357	406 (38.2)		242	299 (28.1)		129	174 (16.4)		151	185 (17.4)			

* Sickness absence episodes due to mental disorders, regardless of duration, between 2012–2014.

SD, standard deviation; MD, median duration; P25, 25th percentile; P75, 75th percentile.

^T Statistically significant (p<0.05).

1
2
3 Among men, three SA trajectories were identified: Low Stable (55.2% workers), Middle Stable
4 (31%), and High Stable (13.8%) (Supplementary file, figure 2). Compared to the other two SA
5 trajectories, the Low Stable trajectory included a larger proportion of workers with high income
6 levels (40.9%), the lowest proportion of manual non-skilled occupations (14.5%), and a lower
7 proportion of temporary contracts (14.5%). This trajectory had the lowest annual accumulation of
8 days on SA (median duration: 6–11 days), but the highest proportion of episodes (52.1%). In contrast,
9 the High Stable trajectory included 13.8% of workers and represented the highest proportion of low-
10 income levels (44.9%). The High Stable trajectory showed the lowest number of episodes (13.9%) but
11 the highest accumulated days (median duration: 123.5–194 days) (table 3).
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

For peer review only

Table 3 Employment-related characteristics among salaried men living in Catalonia, across sickness absence trajectories (2012–2014)

Men (N=500)	Sickness absence trajectories									p values	
	Low Stable (55.2%)			Middle Stable (31%)			High Stable (13.8%)			p value N	p value Episodes
	Age, mean (SD)	23.2 (3.0)		23.1 (2.9)		22.8 (3.0)		0.6136			
2002–2011	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)		
Company size											
Small-medium (≤100 workers)	203 (73.6)	233 (71.3)	9 (4; 16)	115 (74.2)	151 (70.6)	50 (34; 67)	49 (71.0)	58 (66.7)	130 (103; 155)	0.881	0.705
Big (>100 workers)	73 (26.5)	94 (28.8)	6 (2; 13)	40 (25.8)	63 (29.4)	52 (41; 64)	20 (29.0)	29 (33.3)	123.5 (101; 179)		
Company ownership											
Private	250 (90.6)	296 (90.5)	9 (3; 16)	140 (90.3)	195 (91.1)	50 (36.5; 64)	59 (85.5)	76 (87.4)	128 (103; 183)	0.368	0.43
Public	14 (5.1)	17 (5.2)	6 (3; 8)	12 (7.7)	15 (7.0)	60.5 (42.5; 72.5)	6 (8.7)	7 (8.1)	131 (95; 164)		
2012–2014											
Working time (% weekly hours)											
Full-time (>87.5%)	263 (95.3)	311 (95.1)	9 (3; 15)	148 (95.5)	201 (93.9)	51 (37; 66)	65 (94.2)	83 (95.4)	128 (102; 164)	0.661	0.454
Part-time (50–87.5%)	12 (4.3)	14 (4.3)	6.5 (2.5; 12)	6 (3.9)	12 (5.6)	50 (48; 52)	3 (4.4)	3 (3.5)	125 (103; 132)		
Short part-time (37.5–49%)	1 (0.4)	2 (0.6)	11 (11; 11)	-	-	-	-	-	-		
Marginal part-time (≤37.5%)	-	-	-	1 (0.7)	1 (0.5)	46 (46; 46)	1 (1.5)	1 (1.2)	194 (194; 194)		
Occupational category											
Non-manual skilled	27 (9.8)	29 (8.9)	11 (5; 17)	15 (9.7)	23 (10.8)	54 (32; 68)	8 (11.6)	9 (10.3)	131.5 (97; 149)	0.859	0.189
Non-manual non-skilled	86 (31.2)	96 (29.4)	6.5 (4; 11)	46 (29.7)	58 (27.1)	47 (37; 62)	18 (26.1)	24 (27.6)	130.5 (108; 194)		
Manual skilled	123 (44.6)	156 (47.7)	10 (3; 16)	64 (41.3)	84 (39.3)	53 (37.5; 68)	30 (43.5)	37 (42.5)	124.5 (94; 170)		
Manual non-skilled	40 (14.5)	46 (14.1)	6.5 (3; 17)	30 (19.4)	49 (22.9)	49.5 (34; 61)	13 (18.8)	17 (19.5)	120 (103; 155)		
Income in tertiles											
High	113 (40.9)	139 (42.5)	9 (5; 16)	54 (34.8)	74 (34.6)	54.5 (38; 67)	24 (34.8)	31 (35.6)	130 (105.5; 158.5)	0.001 ^T	<0.0001 ^T
Medium	107 (38.8)	127 (38.8)	8 (3; 13)	56 (36.1)	69 (32.2)	46.5 (34.5; 66.5)	14 (20.3)	19 (21.8)	124.5 (98; 132)		
Low	56 (20.3)	61 (18.7)	11 (4; 16.5)	45 (29.0)	71 (33.2)	50 (38; 64)	31 (44.9)	37 (42.5)	124 (102; 188)		
Type of contract											
Permanent contract	236 (85.5)	283 (86.5)	9 (3; 16)	124 (80.0)	165 (77.1)	51 (37; 66)	58 (84.1)	75 (86.2)	130 (103; 164)	0.332	0.012 ^T
Temporary contract	40 (14.5)	44 (13.5)	6.5 (4; 13.5)	31 (20.0)	49 (22.9)	47 (34; 66)	11 (15.9)	12 (13.8)	124 (102; 183)		
Total	276	327 (52.1)		155	214 (34.1)		69	87 (13.9)			

1
2 * *Sickness absence episodes due to mental disorders, regardless of duration, between 2012–2014.*

3 *SD, standard deviation; MD, median duration; P25, 25th percentile; P75, 75th percentile.*

4 † Statistically significant ($p < 0.05$).

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46

For peer review only

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Association between early LMP patterns and SA trajectories

Each person in the sample suffered from a mental disease at some point, and thus the probabilities must be interpreted accordingly. Increasing or decreasing risk was determined based on a more favourable, though never a desirable, SA trajectory. Multinomial logistic regression analysis showed that compared to women with a Stable Permanent LMP pattern, women with an Increasing Permanent Employment LMP pattern were more likely to exhibit a decreased risk of accumulating days on a future SA due to mental disorders (aOR 2.08; 95% CI: 1.18–3.66) (table 4). Among women, being predominantly employed by a big company, compared to a small-medium company, was associated with an increased probability of developing a future Low Stable SA trajectory rather than a Low Decreasing trajectory (aOR 0.64; 95% CI: 0.45–0.93) or a Decreasing trajectory (aOR 0.46; 95% CI: 0.28–0.74). Additionally, among women, an early working life that was mainly developed within publicly owned companies, compared to in privately owned companies, was related to a future Low Decreasing SA trajectory (aOR 1.81; 95% CI: 1.01–3.25). Finally, analysis of the predominant type of contract during the SA follow-up period revealed that women who mainly held temporary jobs, compared to those predominantly in permanent jobs, exhibited a higher probability of increasing accumulated days on SA (aOR 1.98; 95% CI: 1.10–3.55) (table 4).

Among men, we found that showing a Delayed Employment LMP, compared to a Stable Employment LMP, was associated with a higher probability of having a Low Stable accumulation of SA days rather than a High Stable SA trajectory (aOR 0.13; 95% CI: 0.02–0.84). In men, low salary levels were strongly related to a higher probability of a future High Stable SA trajectory (aOR 3.86; 95% CI: 1.73–8.58), and showed a trend of association with a Middle Stable SA trajectory although it was not statistically significant (aOR 1.66; 95% CI: 0.90–3.07).

Table 4 Association between labour market participation patterns and sickness absence trajectories among salaried workers

	Women			Men	
	Low Decreasing vs Low Stable aOR (95% CI)	Decreasing vs Low Stable aOR (95% CI)	Increasing vs Low Stable aOR (95% CI)	Middle Stable vs Low Stable aOR (95% CI)	High Stable vs Low Stable aOR (95% CI)
2002–2011					
Labour market participation patterns					
Stable Permanent	1	1	1	1	1
Increasing Permanent	1.03 (0.64–1.64)	2.08 (1.18–3.66) [†]	1.05 (0.61–1.81)	1.21 (0.67–2.17)	0.80 (0.36–1.76)
Delayed Employment	1.47 (0.66–3.27)	2.61 (0.95–7.12)	1.03 (0.39–2.73)	1.79 (0.59–5.41)	0.13 (0.02–0.82) [†]
Fluctuating Employment	1.06 (0.52–2.16)	2.41 (1.01–5.75) [†]	0.79 (0.35–1.80)	1.25 (0.57–2.74)	0.62 (0.21–1.85)
Company size					
Small-medium (≤100 workers)	1	1	1	1	1
Big (>100 workers)	0.64 (0.45–0.93) [†]	0.46 (0.28–0.74) [†]	0.72 (0.47–1.10)	0.94 (0.57–1.55)	1.24 (0.62–2.49)
Company ownership					
Private	1	1	1	1	1
Public	1.81 (1.01–3.25) [†]	1.55 (0.73–3.27)	1.10 (0.53–2.23)	1.78 (0.73–4.35)	2.24 (0.72–6.94)
2012–2014					
Working time (% weekly hours)					
Full-time (>87.5%)	1	1	1	1	1
Part-time (50–87.5%)	1.14 (0.70–1.86)	0.39 (1.17–0.86)	1.10 (0.63–1.94)	0.91 (0.32–2.60)	0.81 (0.20–3.33)
Short part-time (37.5–49%)	1.41 (0.08–24.23)	2.67 (0.15–46.40)	5.06 (0.43–59.11)	-	-
Marginal part-time (≤37.5%)	1.19 (0.25–5.58)	0.58 (0.06–5.52)	1.45 (0.25–8.37)	-	-
Occupational category					
Non-manual skilled	1	1	1	1	1
Non-manual non-skilled	1.19 (0.72–1.98)	1.09 (0.57–2.07)	0.93 (0.52–1.68)	0.89 (0.42–1.91)	0.57 (0.21–1.53)
Manual skilled	0.95 (0.50–1.82)	0.78 (0.94–1.77)	1.03 (0.50–2.12)	0.9 (0.42–1.94)	0.68 (0.25–1.85)
Manual non-skilled	1.29 (0.61–2.74)	0.70 (0.26–1.90)	0.99 (0.41–2.38)	1.10 (0.45–2.66)	0.51 (0.16–1.66)
Income in tertiles					
High	1	1	1	1	1
Medium	1.16 (0.74–1.80)	1.86 (1.05–3.30)	1.04 (0.61–1.76)	1.17 (0.70–1.94)	0.80 (0.37–1.75)
Low	0.73 (0.44–1.19)	1.50 (0.79–2.83)	1.01 (0.58–1.79)	1.66 (0.90–3.07)	3.86 (1.73–8.58) [†]
Type of contract					
Permanent contract	1	1	1	1	1
Temporary contract	0.90 (0.53–1.52)	0.66 (0.34–1.29)	1.98 (1.10–3.55) [†]	1.12 (0.58–2.13)	0.83 (0.32–2.12)

aOR: adjusted odds ratio for the rest of the variables included in the model.

[†] Statistically significant (p<0.05).

DISCUSSION

In this study, we assessed the role of early labour market participation patterns in the later course of SA due to mental diagnosis within a sample of salaried workers in Spain. Women whose early working life followed an Increasing Permanent Employment pattern were more likely to exhibit a decrease of accumulated SA days over time. Among men, an early Increasing Permanent, Fluctuating Employment, or Delayed Employment pattern showed a trend of association with a future Middle-Stable accumulation of SA days rather than a Low Stable pattern. Women whose early working life was mainly developed in big companies were more likely to exhibit a more favourable course of future SA. In contrast, women who were more often employed at public companies showed an increased risk of an adverse course of mental health-related absence.

The identified patterns of labour market participation were in line with what would be expected for a working population at the beginning of their working life. Young adults tend to enter the labour market lacking both work experience and appropriate working opportunities (16), and their entrance might be delayed due to the extended training periods that correspond with younger ages. Notably, we observed a fluctuating pattern, indicating that young adults experienced constant transitions—switching between temporary contracts, unemployment, and periods without social security coverage. Stable and Increasing Permanent employment patterns were associated with the oldest workers in our cohort, who exhibited a high proportion of permanent contracts.

Our present analysis of labour market participation patterns revealed that part-time jobs were more prevalent among women compared to men (Supplementary file, table 1). This higher prevalence of part-time work among women has long been characteristic in older adults (35). Moreover, higher proportions of part-time employment were found in workers who had a delayed entrance to employment or who steadily got permanent employment, such that the extension of part-time work to the younger population could result from the combination of studying and working. However, in Spain, over half of part-time jobs are reported to be involuntary (3). Notably, in the previous literature, the voluntariness of part-time work and social class are reported to be determinants of the potential harmful effect on mental health (35,36), related to the implied reduction of income.

We hypothesised that more transitions during early working life would be associated with higher risk of an adverse course of SA due to mental disorders. The patterns that most depicted a precarious early working life were Fluctuating Employment and Delayed Employment, and thus we expected that persons with these patterns would more commonly show a worse course of future SA for mental disorders. Our results revealed differences between men and women, although these findings should be cautiously interpreted since some working life patterns were exhibited by a small number of workers, potentially leading to non-significant associations. Men with fluctuating or delayed early employment patterns tended to show a middle stable rather than a low stable future accumulation of SA days, whereas women exhibited a tendency towards decreasing days on SA. Nevertheless, among men, a delayed entry to the labour market showed a later protective effect against a course of accumulating a high number of SA days. This finding could potentially be related to avoidance of the risk of a precarious labour market through family support, as reported in the literature, which enables the young population to delay entry into the labour market, attain a higher education level, and potentially access more favourable employment (37). However, this hypothesis is not confirmed in women. Hence, there may also be a gender-based explanation related to access to better contracts. Notably, our results are inconclusive in terms of significance and thus the observed associations should be interpreted as trends.

1
2
3 In the current literature, there is a lack of prior evidence regarding how transitions during
4 early working life affect the course of future mental health. Some studies claim that being employed
5 with a temporary contract is more often a choice based on previous mental health status, while
6 others demonstrate a relationship between employment-unemployment transitions and poor mental
7 health (36,38,39). Moreover, return-to-work expectations are reportedly lower among workers with
8 mental conditions compared to those with physical limitations due to the symptoms of mental health
9 conditions, such as hopelessness, low self-efficacy, and insecurity (40), or due to stigmatization or
10 lack of support at work (18). These studies have mostly use self-reported health measures and a
11 cross-sectional approach to assess the effects of poor mental health on future employment.
12 Additionally, a few longitudinal studies have assessed the effect of ageing, family trajectories, or
13 occupational category on work attachment (41). A life-course perspective has been applied to
14 examine how mental health trajectories in young adults might impact work, but such studies have
15 measured work as a single event, assessing the effect of pre-existing mental disorders or considering
16 the longitudinal approach for return to work (42,43). The potential effects of transitions within the
17 labour market on future sickness absence remain unexplored.

18
19
20
21
22 Individuals whose working life mainly involved employment at publicly owned companies were
23 more likely to later accumulate a higher number of SA days. This association could be related to the
24 fact that workers at publicly owned companies feel more confident about using such benefits, more
25 supported when asking for SA, or less pressured to prematurely return to work. Some studies claim
26 that such an association could be driven by the selection of low-motivation workers or people with
27 health-related problems or other limitations into this sector, due to the belief that these working
28 conditions are more suitable for them (24–26).

29
30
31 The SA trajectories with accumulation of fewer SA days were more likely to include workers
32 from big companies than from small-medium companies. This could suggest that big companies may
33 be a more facilitating and less stigmatizing setting when claiming a sickness absence. Moreover, in
34 smaller companies, employees tend to have specific roles that can't be easily replaced due to reliance
35 and shortage of resources to replace staff, and this setting may foster a stronger sense of compromise
36 (44).

37
38
39 It is important to note that our study coincided with the economic crisis, which led to
40 structural changes in the labour market. This context could have favoured future presentism.
41 Additionally, there could be a selection bias in terms of healthy workers, further aggravated by the
42 economic recession (45). In this setting, the fear of not being renewed or not finding a new job in the
43 labour patterns showing the greatest transitions could be related to a later high accumulation of SA
44 days.

45
46
47 The main limitation of the study was the assignment of individuals to the explanatory
48 variables and to the categories of the adjustment variables. Many individuals shifted among
49 categories over the follow-up period, and in these cases, we assigned them to the category in which
50 they spent most of their time during the follow-up. This could have led to a misclassification bias that
51 might underestimate the accumulation of SA days in other categories. Furthermore, we could not
52 account for the effects of prior health status on the course of SA as this information was not
53 available. This may have led to overestimating results, since people with worse prior mental health
54 could be more prone to have developed worse labour market participation trajectories. It is also
55 important to note that our results do not represent the whole public sector since, in Spain, civil
56 servants with permanent contracts follow different healthcare schemes. Likewise, the methodology
57 applied to the LMP patterns and SA trajectories involved group-based analyses that classified
58 individuals according to similar behaviours. Thus, some of the resulting groups had a very small
59
60

1
2
3 number of observations, and these results should be interpreted with caution. However, some
4 authors argue that a minimum of 5% should be enough to consider a pattern, and our results are
5 above these recommendations (46).
6

7 Our study also had several strengths. It was conducted using a large administrative database
8 that guaranteed representativeness of the sample, allowing us to select diagnosis subgroups with a
9 considerable sample size, and with a lengthy time window of 10 years. Moreover, it was a novel
10 approach to determine employment status based on type of contract (temporary and permanent),
11 and periods of unemployment and lack of social security coverage, and to assess the transitions
12 between these states. The diagnoses causing sickness absence episodes were medically certified by
13 primary doctors rather than self-reported, enhancing the validity of our results. Finally, the changes
14 in the public sector cannot be overlooked, and our study provides insight into the differences from
15 the private sector.
16
17
18
19
20

21 CONCLUSION

22 Overall, our present results provide insights regarding how labour market transitions—characterized
23 by employment flexibility and high unemployment rates—have impacted the course of future mental
24 health among the youngest working population.
25

26 Our analyses revealed that early working lives characterized by transitions between types of
27 contracts, and periods of unemployment and lack of social security coverage, were apparently
28 related to a worse mental health course. Future public health policies should consider how a
29 precarious labour market can shape the course of mental health in young working populations, with
30 the aim of addressing and preventing sickness absence in the long term.
31
32
33
34

35 **Acknowledgements** This work wouldn't have been possible without the Spanish National Social
36 Security Institute and the Catalanian Institute for Medical Evaluations.
37
38
39

40 **Ethical aspects** This study was performed in accordance with the standards of Good Clinical Practice
41 and the principles of the Declaration of Helsinki. The study protocol guaranteed the fulfilment of
42 Regulation (EU) 2016/679 of the European Parliament and the Council of 27 April 2016 on the
43 protection of natural persons regarding the processing of personal data and the free movement of
44 such data. It also fulfilled the Spanish Organic Law 3/2018 of December 5th on the Protection of
45 Personal Data and the Guarantee of Digital Rights.
46
47

48 This study was approved by the Parc de Salut Mar Ethics Committee in Barcelona (Research Protocol
49 nº 2019/8506/I).
50

51 The research team committed itself to the strict use of data for the present study. Additionally, a
52 linkage protocol agreement between the Center for Research in Occupational Health at the Pompeu
53 Fabra University, the National Social Security Institute, and the Catalanian Institute for Medical
54 Evaluations guaranteed the maintenance of confidentiality in providing the identified datasets to the
55 authors.
56
57
58
59
60

Contributors All listed authors fulfil authorship criteria. MU-L and LS participated in the study conception and design. LS and AA-G performed the data management and analysis. AA-G, MU-L, and LS interpreted the data. AA-G drafted the first version of the manuscript with close help from MU-L. MU-L and LS made subsequent revisions to the manuscript, and all of the authors revised the final version, agreed with the text and findings, and approved this final version. The corresponding author certifies that all listed authors meet authorship criteria. AA-G is the guarantor.

Funding The study was financed by the State Plan for Investigation, Development, and Innovation, 2013–2016, by the Health Institute Carlos III-FIS_FEDER – Subdirección General of Evaluation and Promotion of Investigation (Grants FIS PI17/00220).

Data sharing statement Data may be obtained from a third party and are not publicly available.

Competing interests None declared.

REFERENCES

1. eurostat. Temporary and part-time jobs on the rise - Product - Eurostat [Internet]. Products Eurostat News. 2018 [cited 2018 Nov 22]. Available from: <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/WDN-20180813-1>
2. Pitxer Campos J V, Sánchez Velasco A, Lorente Campos Adoración Guamán Hernández R. La dinámica de la temporalidad en el mercado laboral español en las dos últimas crisis: cambios normativos, modelo productivo y prácticas empresariales [Internet]. Valladolid; 2014 [cited 2018 Oct 22]. Available from: http://webs.ucm.es/info/ec/jec14/comunica/A_EL/A_EL_2.pdf
3. OIT. Non-standard employment around the world: Understanding challenges, shaping prospects [Internet]. 2016. 374 p. Available from: http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_534326.pdf
4. Fernández Gutiérrez M. Empleo público y temporalidad: ¿es el sector público parte del problema? *Temas Laborales, Cons Andaluz Relac Laborales* [Internet]. 2009;102:51–87. Available from: http://www.academia.edu/5505972/Empleo_p%C3%BAblico_y_temporalidad._Es_el_sector_p%C3%BAblico_parte_del_problema
5. Virtanen P, Siukola A, Lipiäinen L, Liukkonen V, Pentti J, Vahtera J. Trajectory analyses of sickness absence among industrial and municipal employees. *Occup Med (Chic Ill)*. 2017;67(2):109–13.
6. Instituto Nacional de Estadística. (National Statistics Institute) [Internet]. [cited 2019 Apr 30]. Available from: <http://www.ine.es/dynt3/inebase/index.htm?padre=982&capsel=985>
7. Dirección de Estadística y Análisis Sociolaboral. Informe Jóvenes y Mercado de Trabajo [Internet]. 2018 [cited 2018 Oct 22]. Available from: http://www.empleo.gob.es/es/sec_trabajo/analisis-mercado-
8. Delclós J, García S, López JC, Sampere M, Serra C, Plana M, et al. Duración de la incapacidad

temporal por contingencia común por grupos diagnósticos DURATION OF NON WORK-RELATED SICKNESS ABSENCE BY CLINICAL DIAGNOSIS. Arch Prev Riesgos Labor. 2010;13(134):180–7.

9. OCDE. Factsheet on Promoting Mental Health [Internet]. 2018 [cited 2019 Apr 22]. Available from: <http://www.oecd.org/health/health-systems/OECD-Factsheet-Mental-Health-Health-at-a-Glance-Europe-2018.pdf>
10. Gabbay M, Taylor L, Sheppard L, Hillage J, Bambra C, Ford F, et al. NICE guidance on long-term sickness and incapacity. Br J Gen Pract [Internet]. 2011 Mar [cited 2019 Apr 22];61(584):e118–24. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21375894>
11. WHO. European Health Information Gateway. Absenteeism from work due to illness, days per employee per year - European Health Information Gateway [Internet]. Updated 2018. [cited 2019 Apr 22]. Available from: https://gateway.euro.who.int/en/indicators/hfa_411-2700-absenteeism-from-work-due-to-illness-days-per-employee-per-year/
12. Ministerio de Trabajo MYSS. Sistema de la seguridad social. Resumen de Ejecución del Presupuesto. 2018.
13. Finnes A, Enebrink P, Ghaderi A, Dahl J, Nager A, Öst L-G. Psychological treatments for return to work in individuals on sickness absence due to common mental disorders or musculoskeletal disorders: a systematic review and meta-analysis of randomized-controlled trials. Int Arch Occup Environ Health [Internet]. 2019 Apr 24 [cited 2019 Apr 22];92(3):273–93. Available from: <http://link.springer.com/10.1007/s00420-018-1380-x>
14. Lallukka T, Kronholm E, Pekkala J, Jäppinen S, Blomgren J, Pietiläinen O, et al. Work participation trajectories among 1,098,748 Finns: reasons for premature labour market exit and the incidence of sickness absence due to mental disorders and musculoskeletal diseases. BMC Public Health. 2019;19(1):1418.
15. Canivet C, Bodin T, Emmelin M, Toivanen S, Moghaddassi M, Östergren PO. Precarious employment is a risk factor for poor mental health in young individuals in Sweden: A cohort study with multiple follow-ups. BMC Public Health [Internet]. 2016;16(1). Available from: <http://dx.doi.org/10.1186/s12889-016-3358-5>
16. Vancea M, Utzet M. How unemployment and precarious employment affect the health of young people: A scoping study on social determinants. Scand J Public Health. 2017;45(1):73–84.
17. Patel V, Flisher AJ, Hetrick S, McGorry P, Cross R, Memorial W. Mental health of young people : a global public-health challenge. 2007;369.
18. de Vries H, Fishta A, Weikert B, Rodriguez Sanchez A, Wegewitz U. Determinants of Sickness Absence and Return to Work Among Employees with Common Mental Disorders: A Scoping Review. J Occup Rehabil [Internet]. 2018;28(3):393–417. Available from: <http://dx.doi.org/10.1007/s10926-017-9730-1>
19. Norder G, Roelen CAM, Bültmann U, van der Klink JLL. Shift work and mental health sickness absence: a 10-year observational cohort study among male production workers. Scand J Work Environ Health. 2015;41(4):413–6.
20. Norder G, Roelen CAM, van der Klink JLL, Bültmann U, Sluiter JK, Nieuwenhuijsen K. External Validation and Update of a Prediction Rule for the Duration of Sickness Absence Due to Common Mental Disorders. J Occup Rehabil. 2017;27(2):202–9.
21. Wilthagen T, Tros F. The concept of ‘flexicurity’: a new approach to regulating employment

- 1
2
3 and labour markets. *Transf Eur Rev Labour Res* [Internet]. 2004;10(2):166–86. Available from:
4 <http://journals.sagepub.com/doi/10.1177/102425890401000204>
5
- 6 22. Kerkhofs M, Lindeboom M. Age related health dynamics and changes in labour market status.
7 *Health Econ*. 1997;6(October 1996):407–23.
8
- 9 23. Stuth S, Jahn K. Young, successful, precarious? Precariousness at the entry stage of
10 employment careers in Germany. *J Youth Stud*. 2020;23(6):702–25.
11
- 12 24. Mastekaasa A. Absenteeism in the Public and the Private Sector: Does the Public Sector
13 Attract High Absence Employees. *J Public Adm Res Theory*. 2019;1–17.
14
- 15 25. Böhm T, Riedel N. On selection into public civil service. *CESifo Econ Stud*. 2013;59(1):34–71.
16
- 17 26. Dur R, Zoutenbier R. Intrinsic Motivations of Public Sector Employees: Evidence for Germany.
18 *Ger Econ Rev*. 2015;16(3):343–66.
19
- 20 27. Virtanen M, Ervasti J, Head J, Oksanen T, Salo P, Pentti J, et al. Lifestyle factors and risk of
21 sickness absence from work: a multicohort study. *Lancet Public Heal* [Internet].
22 2018;3(11):e545–54. Available from: [http://dx.doi.org/10.1016/S2468-2667\(18\)30201-9](http://dx.doi.org/10.1016/S2468-2667(18)30201-9)
23
- 24 28. Amick BC, McLeod CB, Bültmann U. Labor markets and health: An integrated life course
25 perspective. *Scand J Work Environ Heal*. 2016;42(4):346–53.
26
- 27 29. Ervasti J, Kausto J, Koskinen A, Pentti J, Vahtera J, Joensuu M, et al. Labor Market Participation
28 before and after Long-Term Part-Time Sickness Absence in Finland: A Population-Based
29 Cohort Study. *J Occup Environ Med*. 2020;62(4):E142–8.
30
- 31 30. Gómez MAL, Durán X, Zaballa E, Sanchez-Niubo A, Delclos GL, Benavides FG. Cohort profile:
32 The Spanish WORKing life social Security (WORKss) cohort study. *BMJ Open*. 2016;6(3).
33
- 34 31. Durán A. La Muestra Continua de Vidas Laborales de la Seguridad Social. *Rev del Minist Trab y*
35 *Asuntos Soc* [Internet]. 2007 [cited 2018 Oct 24];10. Available from:
36 http://www.mitramiss.gob.es/es/publica/pub_electronicas/destacadas/revista/numeros/ExtraSS07/Est09.pdf
37
- 38 32. Abbott A, Tsay A. Sequence analysis and optimal matching methods in sociology: Review and
39 prospect. Vol. 29, *Sociological Methods and Research*. 2000. 3-33 p.
40
- 41 33. Skrondal A, Rabe-Hesketh Sophia. *Generalized Latent Variable Modeling Statistical Analysis of*
42 *Shapes Clinical Trials in Oncology Second Edition Design and Analysis of Quality of Life Studies*
43 *in Clinical Trials Dynamical Search Introduction To Measurement Error and Bayesian*
44 *Adjustments St. New York*. 2004.
45
- 46 34. van de Schoot R, Sijbrandij M, Winter SD, Depaoli S, Vermunt JK. The GRoLTS-Checklist:
47 Guidelines for Reporting on Latent Trajectory Studies. *Struct Equ Model* [Internet].
48 2017;24(3):451–67. Available from: <http://dx.doi.org/10.1080/10705511.2016.1247646>
49
- 50 35. Barnay T. Health, work and working conditions: a review of the European economic literature.
51 *Eur J Heal Econ*. 2016;17(6):693–709.
52
- 53 36. Waenerlund AK, Hammarström A, Virtanen P. Is temporary employment related to health
54 status? Analysis of the Northern Swedish Cohort. *Scand J Public Health*. 2011;39(5):533–9.
55
- 56 37. Serracant P. The Impact of the Economic Crisis on Youth Trajectories : A Case Study from
57 Southern Europe. 2015;
58
- 59 38. Dawson C, Veliziotis M, Pacheco G, Webber DJ. Is temporary employment a cause or
60 consequence of poor mental health? A panel data analysis. *Soc Sci Med* [Internet].

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

2015;134:50–8. Available from: <http://dx.doi.org/10.1016/j.socscimed.2015.04.001>

39. Virtanen M, Kivimäki M, Joensuu M, Virtanen P, Elovainio M, Vahtera J. Temporary employment and health: A review. *Int J Epidemiol*. 2005;34(3):610–22.
40. Pedersen P, Lund T, Lindholdt L, Nohr EA, Jensen C, Sjøgaard HJ, et al. Labour market trajectories following sickness absence due to self-reported all cause morbidity - A longitudinal study. *BMC Public Health* [Internet]. 2016;16(1):1–10. Available from: <http://dx.doi.org/10.1186/s12889-016-3017-x>
41. Lu W, Benson R, Glaser K, Platts LG, Corna LM, Worts D, et al. Relationship between employment histories and frailty trajectories in later life: Evidence from the English Longitudinal study of ageing. *J Epidemiol Community Health*. 2017;71(5):439–45.
42. Norder G, van der Ben CA, Roelen CAM, Heymans MW, van der Klink JLL, Bültmann U. Beyond return to work from sickness absence due to mental disorders: 5-year longitudinal study of employment status among production workers. *Eur J Public Health*. 2017;27(1):79–83.
43. Arends I, Almansa J, Stansfeld SA, Amick BC, Klink JLL Van Der, Bültmann U. One-year trajectories of mental health and work outcomes post return to work in patients with common mental disorders. *J Affect Disord* [Internet]. 2019;257(July):263–70. Available from: <https://doi.org/10.1016/j.jad.2019.07.018>
44. Alba Ramirez A. La incapacidad temporal para el trabajo: análisis económico de su incidencia y su duración [Internet]. 2009 [cited 2019 May 5]. Available from: http://www.seg-social.es/wps/wcm/connect/wss/f4e8cb57-4ff0-4c03-abbf-3003665f18a3/F9_07.pdf?MOD=AJPERES&CVID=
45. Leinonen T, Viikari-Juntura E, Husgafvel-Pursiainen K, Solovieva S. Cause-specific sickness absence trends by occupational class and industrial sector in the context of recent labour market changes: A Finnish panel data study. *BMJ Open*. 2018;8(4):1–11.
46. Farrants K, Friberg E, Sjölund S, Alexanderson K. Trajectories of future sickness absence and disability pension days among individuals with a new sickness absence spell due to osteoarthritis diagnosis ≥ 21 days: A prospective cohort study with 13-month follow-up. *BMJ Open*. 2019;9(8):1–11.

Figure 1 Early labour market participation-LMP patterns in salaried workers living in Catalonia (2002-2011).

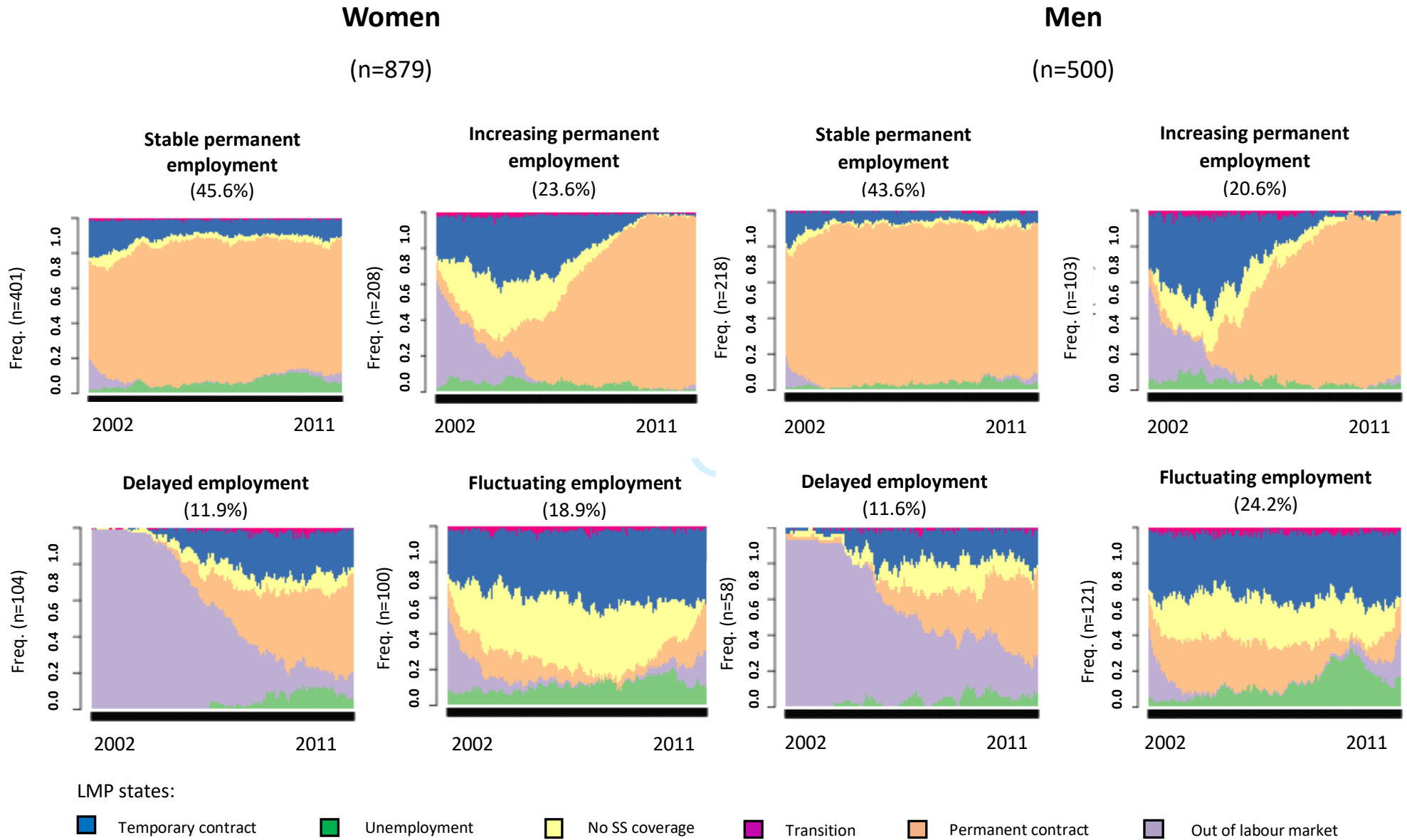


Table 1 Sample distribution of salaried workers living in Catalonia (2002-2014) and their SA episodes due to mental disorders (2012-2014), according to employment related characteristics.

Age in 2002 (mean (SD))	Women (N=879)			Men (N=500)		
	23.2 (3.0)			23.1 (3.0)		
2002-2011	N (%)	Episodes* (%)	MD (P25; P75)	N (%)	Episodes* (%)	MD (P25; P75)
Company size						
Small-medium (≤ 100 workers)	576 (65.5)	694 (65.2)	26 (9;72.5)	367 (73.4)	442 (70.4)	22 (9;55)
Big (>100 workers)	303 (34.5)	370 (34.8)	18 (8;58)	133 (26.6)	186 (29.6)	21 (6;58)
Company ownership						
Private	738 (84.0)	892 (83.8)	22 (8; 64)	449 (89.8)	449 (71.5)	22 (8;54)
Public	100 (11.4)	125 (11.7)	29 (10.5; 76)	32 (6.4)	39 (6.2)	35.5 (6;75.5)
2012-2014						
Working time (%weekly hours)						
Full-time (>87.5%)	748 (85.1)	902 (84.8)	24 (9; 66.5)	476 (95.2)	595 (94.7)	22 (8;57.5)
Part-time (50%-87.5%)	116 (13.2)	145 (13.6)	18 (8;45)	21 (4.2)	29 (4.6)	16 (6;50)
Short part-time (37.5%-49%)	5 (0.6)	7 (0.7)	75 (24;103)	1 (0.2)	2 (0.3)	11 (11;11)
Marginal part-time ($\leq 37.5\%$)	10 (1.1)	10 (0.9)	17.5 (10;43)	2 (0.4)	2 (0.3)	120 (46;194)
Occupational category						
Non-manual skilled	160 (18.2)	189 (17.8)	23 (10; 66.5)	50 (10)	61 (9.7)	23 (11;67)
Non-manual non-skilled	503 (57.2)	616 (57.9)	24 (9; 67)	150 (30)	178 (28.3)	16 (6;50)
Manual skilled	137 (15.6)	161 (15.1)	22 (7; 58)	217 (43.4)	277 (44.1)	21 (9;61)
Manual non-skilled	79 (9.0)	98 (9.2)	24 (8; 56)	83 (16.6)	112 (17.8)	28 (7;61)
Income in tertiles						
High	268 (30.5)	327 (30.7)	23 (8; 63)	191 (38.2)	244 (38.9)	19 (8;60)
Medium	282 (32.1)	328 (30.8)	27 (10; 78)	177 (35.4)	215 (34.2)	15 (6;46)
Low	328 (37.4)	407 (38.3)	21.5 (8;59)	132 (26.4)	169 (26.9)	37 (13.5;82)
Type of contract						
Permanent contract	701 (79.8)	837 (78.7)	23 (9; 67)	418 (83.6)	523 (83.3)	21 (8;58)
Temporary contract	178 (20.3)	227 (21.3)	26 (8.5; 61)	82 (16.4)	105 (16.7)	28 (7;55)
Total	879	1.064		500	628	

* Sickness absence closed episodes due to mental disorders regardless of its duration between 2012-2014; SD, standard deviation; MD, median duration; P25, percentile 25; P75, percentile 75

Figure 1 Sickness absence trajectories in salaried women living in Catalonia (2012-2014).

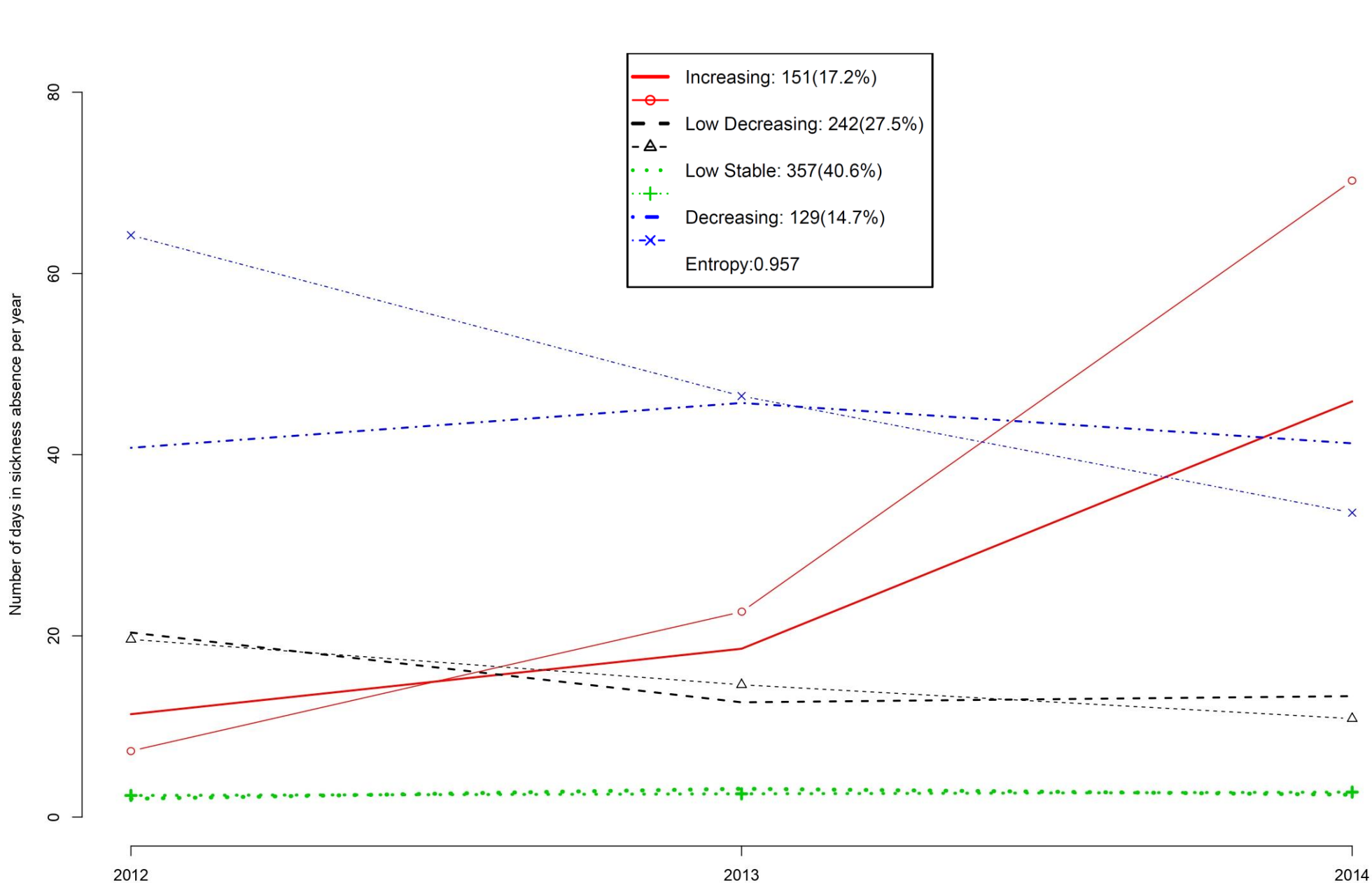
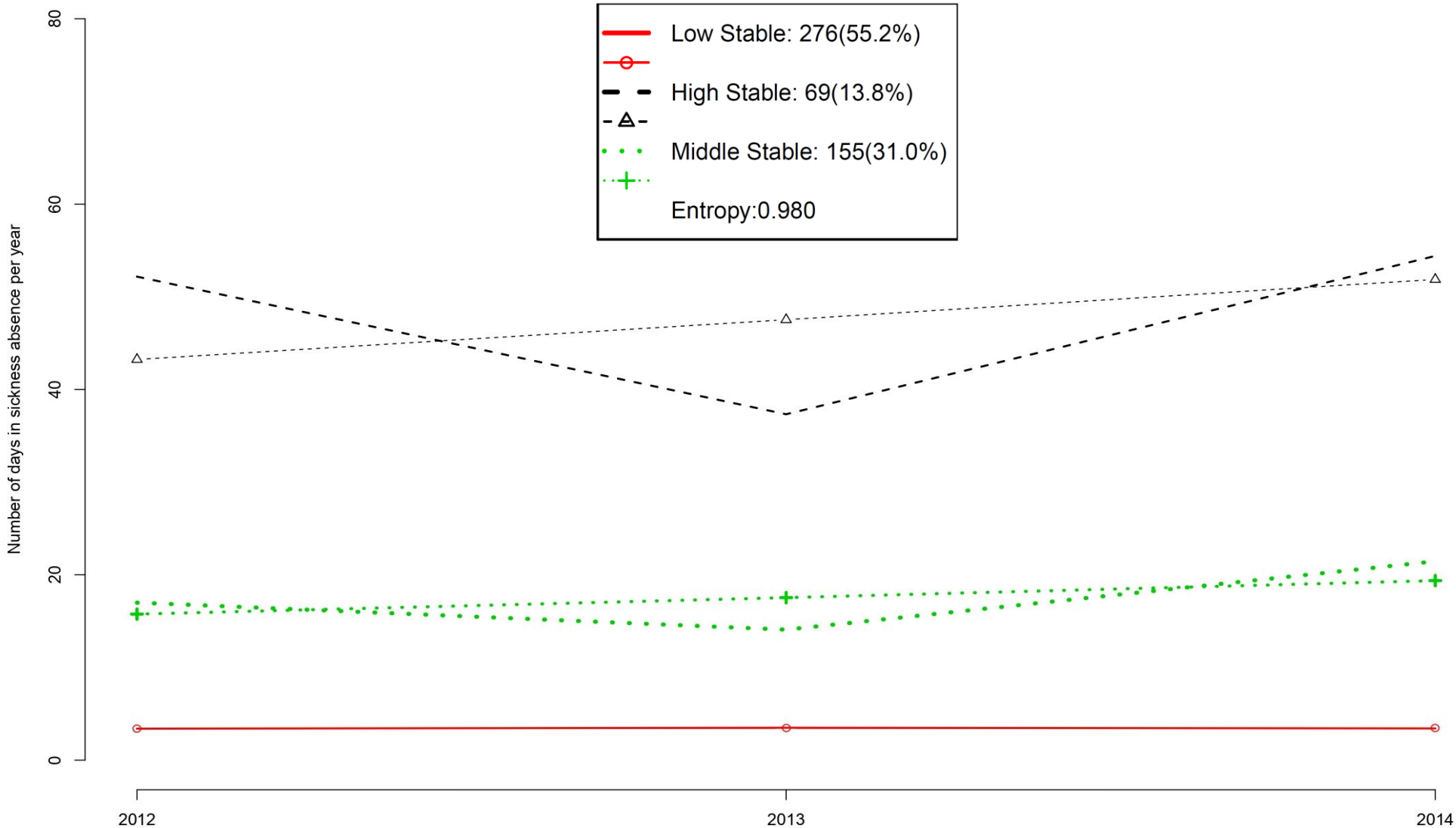


Figure 2 Sickness absence trajectories in salaried men living in Catalonia (2012-2014).



STROBE Statement—Checklist of items for the report of *cohort study* “The relationship between early working life patterns, in publicly and privately owned companies, and the course of future sickness absence due to mental disorders”

	Item No	Recommendation	Compliance (PAGE)
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	YES (2)
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	YES (2)
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	YES (4)
Objectives	3	State specific objectives, including any prespecified hypotheses	YES (4)
Methods			
Study design	4	Present key elements of study design early in the paper	YES (4-5)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	YES (4-5)
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	YES (4-5)
		(b) For matched studies, give matching criteria and number of exposed and unexposed	NA
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	YES (5)
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	NA
Bias	9	Describe any efforts to address potential sources of bias	YES (9)
Study size	10	Explain how the study size was arrived at	YES (4)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	YES (5)
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	YES (5)
		(b) Describe any methods used to examine subgroups and interactions	NA
		(c) Explain how missing data were addressed	NA
		(d) If applicable, explain how loss to follow-up was addressed	NA
		(e) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	YES (5)
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	YES (14)
		(b) Indicate number of participants with missing data for each variable of interest	NA
		(c) Summarise follow-up time (eg, average and total amount)	YES (4-5)
Outcome data	15*	Report numbers of outcome events or summary measures over time	YES (5)

1	Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted	YES (5)
2			estimates and their precision (eg, 95% confidence interval). Make clear	
3			which confounders were adjusted for and why they were included	
4			(b) Report category boundaries when continuous variables were	YES (5)
5			categorized	
6			(c) If relevant, consider translating estimates of relative risk into	NA
7			absolute risk for a meaningful time period	
8	Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions,	NA
9			and sensitivity analyses	
10	Discussion			
11	Key results	18	Summarise key results with reference to study objectives	YES (6-7)
12	Limitations	19	Discuss limitations of the study, taking into account sources of potential	YES (9)
13			bias or imprecision. Discuss both direction and magnitude of any	
14			potential bias	
15	Interpretation	20	Give a cautious overall interpretation of results considering objectives,	YES (7-9)
16			limitations, multiplicity of analyses, results from similar studies, and	
17			other relevant evidence	
18	Generalisability	21	Discuss the generalisability (external validity) of the study results	YES (9)
19	Other information			
20	Funding	22	Give the source of funding and the role of the funders for the present	YES (10)
21			study and, if applicable, for the original study on which the present	
22			article is based	

23
24
25
26
27
28
29
30
31 *Give information separately for exposed and unexposed groups.