

Multi-sectorial exploration of the association between unemployment, fragile employment and health care utilisation: a cross-sectional study

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Abstract

Background

The 2010 and 2020 Marmot Reviews on healthcare policy in England highlighted that unemployment and fragile employment significantly contribute to ill health and health disparities. However, the impact of unemployment and fragile employment on health care utilisation is not well understood. This study aims to fill this gap by evaluating the association between unemployment, fragile employment and health care utilisation across five different care settings in England.

Methods

Using a dataset linking local authority, health, and social care records from 3,841 working-age individuals in East London (2016–2020), jobseekers receiving Jobseekers' Allowance (JSA) were matched to non-recipients based on socio-economic factors. A bias-corrected matching and two-part regression model evaluated differences in health costs across primary, hospital, mental health, social, and community care settings, with subgroup analysis by age, gender, ethnicity, and deprivation.

Results

Jobseekers were more likely to use health services across all care settings, compared to non-JSA recipients. Among health service users, jobseekers incurred, on average, £117 (95% CI £78, £164) higher total health costs than non-JSA recipients, driven mostly by primary, secondary, and mental health care settings. Female jobseekers had relatively larger health costs than male jobseekers compared to their non-JSA counterparts. The findings remained robust to various sensitivity analyses.

Conclusions

Jobseekers are more likely to use health services and incur higher health care costs across primary, secondary and mental health care settings. Promoting collaboration between primary care and employment advisors could be an effective way to create a supportive environment for jobseekers, addressing their employment and health needs holistically.

1 Background

Unemployment is one of the key social determinants of health and health inequalities (1, 2), and its detrimental effects on individuals' health and wellbeing have been extensively explored (3, 4). Numerous studies have focused on the mechanisms that explain the negative impact of unemployment and found various mediating factors that lead to poor physical and mental health after job loss. For instance, reduced income due to unemployment can lead to cuts in basic needs such as food and groceries,

resulting in poor diet and ill health (5–7). In addition, financial difficulties caused by unemployment are associated with higher level of psychological distress, such as the fear of being unable to meet debt and loan obligations (8, 9). Additional mediating factors include risky behaviours such as smoking and excessive drinking (7, 10), fewer social contacts (11), and lower self-recognition and self-esteem (8, 12), all of which contribute to exacerbating the impact of unemployment toward individuals' physical and mental health.

While the UK unemployment rate has reached historical lows during the last decade, there are still significant geographical disparities in the labour market across the country, with most deprived areas being associated with higher levels of unemployment (13). In addition, Brexit, the Covid-19 pandemic and the rapid development in e-commerce and AI industry have been reshaping the UK labour market, with a steady increase in different types of fragile employment such as temporary employment, part-time employment and zero-hour contract (14). This fragile employment is associated with low income and strong sense of insecurity, and it is as harmful as 'full' unemployment to individuals' health and wellbeing (2, 15). Green (16) argued that fragile employment, in comparison to unemployment, might have slightly different mechanisms that affect health; individuals in fragile unemployment are relatively less affected by financial reasons as their long-term income is expected to be more stable compared to unemployed individuals. However, they might experience higher levels of psychological stress due to the prolonged feeling of uncertainty. In the UK, individuals made redundant or in fragile employment might be eligible for The Jobseekers' Allowance (JSA). The JSA is an unemployment benefits providing income support to jobseekers (unemployed or working less than 16 hours per week). Despite this income support, previous studies suggested that jobseekers are associated with deteriorating health, especially mental wellbeing in the UK (17, 18).

While jobseekers tend to be associated with poorer health, their association with health services use is not yet well understood. Unemployment can be associated with decreased health care utilisation mainly via income effect, whereby lost or reduced income are linked to lower demand and consumption of health services (9, 12, 19). In contrary, unemployment and fragile employment can be positively associated with health service use, meaning that individuals under unemployment and fragile employment are more likely to use health services. This is mainly resulted from health effects where being unemployed or fragile employed can lead to deteriorating health and wellbeing, therefore, more health service use (7, 20). A recent review (21) has found both income effects and health effects of unemployment and fragile employment on health care utilisation in relevant literature. For example, jobseekers with less financial pressure reported higher use of health services especially in health systems with universal coverage and comprehensive social safety net (11, 22). Whereas unemployment and fragile employment are associated with higher risks of depression and anxiety, linking to higher level use of mental health service use (23, 24). Nevertheless, there was considerable uncertainty around health care utilisation in other care settings, such as primary and secondary care.

Most published papers investigating the association between unemployment, fragile employment and health care utilisation focus on primary and hospital care. Potential association between unemployment

and health care utilisation across other care settings, including community and social care settings have received little attention. Social workers and community counselling services are reported as one of the main resources that unemployed individuals may seek (25). In addition, many papers focus on exploring the association with a single care setting such as GP visits, A&E visits or mental health services (11, 26, 27). This limits the ability to examine potential differences across different care settings. For instance, unemployed individuals who visit their GP more frequently may be associated with fewer psychology/psychiatry appointments. Examining these association within a single care setting may overlook the full picture about both the direction and the magnitude of the relationship between unemployment and health care utilisation.

This paper draws on a large dataset from the London Borough of Barking and Dagenham (LBBD) in East London to explore the correlation of unemployment, fragile employment and health care utilisation. The LBBD links local authority, health and social care data, which enable us to provide a more integrated analysis of the relationship between unemployment/fragile employment and health care utilisation across different care settings to better inform jobseekers' health care needs. Our paper explores this relationship, firstly, by breaking down the analysis into two components: the likelihood of using any health and social care services, and the level of services used. Secondly, we explore the extent to which unemployment and fragile employment are associated with health care utilisation across five different health care settings: primary, secondary, mental health, community and social care. Thirdly, we investigate potential differences in the association of unemployment on health care utilisation according to different subgroups defined by age, gender, ethnicity, and deprivation.

2 Methods

2.1 Care City cohort

This study uses health and social care data linked to local authority data of Barking and Dagenham residents (East London), thereafter denoted as the 'Care City' cohort (28). The data linking process was conducted by the NHS Barking and Dagenham, Havering, and Redbridge Foundation Trust, who de-identified the full datasets and made the datasets available via their Data Safe Heaven platform. Most of the datasets were linked through the unique NHS number for individuals; for where the NHS number is missing, fuzzy logic was applied to match individuals to their corresponding NHS numbers using their first name, last name, address, and date of birth. Whereas the Unique Property Reference Number (UPRN) was used for the matching between individual-level and household-level data. After the matching process complete, the Care City cohort includes data on demographic and socio-economic variables, household characteristics, health conditions and health and social service use.

2.2 Target population

The population of interest for this study was defined as the working-age (16- to 64-year-olds) population without any long-term conditions or disabilities. The paper focuses on a 'healthy' cohort to minimise the potential for reverse causality and the potential impacts of individual long-term conditions on both individual's employability and use of health care services. Individuals collecting disability-related benefits were also excluded mainly due to their inability to work.

2.3 Exposure

The exposure was defined as the receipt of income-based JSA. To be eligible, individuals must meet the following criteria: 1) be unemployed or working less than 16 hours per week; 2) be under the State pension age; 3) not be in full-time education; 4) be able to work (i.e. not disable) and actively looking for work 5) have savings below £16,000.

2.4 Health care costs

The outcome was health and social care costs across five different care settings including primary, hospital, mental health, social and community care. Each care setting includes:

- 1) Primary care: GP visits, non-GP visits and prescriptions
- 2) Hospital care: A&E, elective care, non-elective care and outpatient
- 3) Mental health care: inpatient and outpatient activities
- 4) Social care: home care, supported living placements, crisis intervention, nursing facilities
- 5) Community care: administering tests, assessment, clinical intervention, counselling, health promotion, health review and other activities

The health care costs for each care setting were calculated yearly based on the number and/or duration of attendances to each care setting multiplied by the unit cost for the corresponding activity. The sources of the unit cost differed according to specific care settings. For primary care, the unit costs for GP visit and non-GP visit were extracted from "Unit Costs of Health and Social Care" published by Personal Social Services Research Unit (PSSRU) annually. For the rest of the care settings, the unit cost for each activity came from the national tariffs based on Healthcare Resource Groups (HRGs), defined as categories of treatments that are clinically alike. With all costs by care settings calculated, the total health care cost was derived by summing up the costs across the five care settings, which were reported annually. Full details of the costing are reported elsewhere (28).

2.5 Regression-adjusted matching

To quantify the correlation of unemployment and fragile employment on health care utilisation, we estimated differences in health care costs between JSA and non-JSA recipients who are not receiving JSA and disability-related benefits. JSA recipients were identified through the benefit variable registered as “job seekers allowance”, while non-JSA recipients were identified by the empty values in the benefit variable. The assumption was made that individuals without any types of registered benefit did not receive any benefits. Since jobseekers and control (non-JSA recipients) groups are likely to differ according to important demographic, socio-economic and health factors, matching was considered (29). Briefly, this approach involves pairing individuals based on their characteristics to improve the comparability between control and treated groups. In this study, we paired JSA recipients with non-JSA recipients who share similar characteristics, establishing comparability in the health care costs between the two groups. To help minimise any remaining imbalances in the observed characteristics, undertaking regression adjustment after the matching is often recommended (30). This approach is known as bias-corrected matching (BCM) and has been previously considered in the analysis of (skewed) health care costs (31). We adopted the BCM approach to estimate mean differences in health care costs across different care settings between the JSA and non-JSA groups.

Same methods were applied to both same year correlation and 1-year correlation. The same year correlation used health care utilisation occurred within the same year of JSA collection as the outcome measurement to test the contemporaneous correlation whereas the 1-year correlation used health care utilisation happened one year after JSA collection to examine the 1-year correlation. By examining both the immediate and 1-year correlation, we could to some extent rule out the reverse causality and explore the dynamics of the temporality in the relationship. We defined eligible individuals in one year as a cohort. Since we did not have the health care costs data in 2021 financial year, we excluded 2020 cohort, which the 1-year health care costs were absent. Therefore, the sample of this study included three cohorts from 2016-2019, and their health service costs in 2016-2019 and 2017-2020 for same year correlation and 1- year correlation analysis respectively.

The first part of the BCM approach involves performing matching to pair and achieve balance between the jobseekers and the non-JSA recipients based on their observed characteristics. We considered a matching approach, known as ‘genetic matching’, which generalises the propensity score and Mahalanobis distance in order to optimise the distance metrics, and achieve a better balance between groups (32). We used 1:3 matching ratio as this is likely to improve precision in settings where there is a large pool of the control group. This approach involves matching each jobseeker with the 3 most similar (‘nearest neighbours’) non-JSA individuals. The matching is done without replacement, i.e. control individuals cannot be used more than once. Covariates used in the matching included age, gender, ethnicity, deprivation quintile, BMI category and smoking category. Also, exact matching on year was applied to make sure jobseekers were matched to the non-JSA recipients within the same year. This analysis was conducted using the R package “Matchit”. Before matching, missing data in ethnicity, BMI and smoking status. was addressed using multiple imputation. We followed recent methodological guidance to combine multiple imputation and matching (Leyrat et al 2017).

The second part of the BCM approach involves applying a regression model to the matched datasets and estimate mean differences in health care costs between the JSA and non-JSA groups, while adjusting for residual imbalances in the matching covariates. Since the cost data was highly skewed and exhibited a high proportion of zero values, we considered two-part models to account for the distinct nature of individuals with zero versus positive health costs (33). The first part of the model consisted of a logistic regression which evaluates the probability of individuals having any health and social care utilisation (positive health care costs). The second part of the model involved fitting a generalised linear regression, with a gamma distribution and a log link, for those individuals with positive health care costs, to obtain differences in costs between JSA and non-JSA groups. The two-part model was conducted using r package “twopartm”. We derived 95% confidence intervals for the parameters of interest using non-parametric bootstrap, using the percentile approach and 1000 bootstrap replications.

2.6 Subgroup and sensitivity analysis

We examined whether unemployment and fragile employment correlation varied according to different sub-groups of individuals, defined according to age, gender, ethnicity, deprivation quintiles.

Three sensitivity analyses were conducted:

1) Individuals collecting JSA in the year preceding JSA collection were excluded from the sample, to test whether the results remained robust after only including the starters of JSA collection. Individuals collecting JSA in the previous year were excluded from the population and rematching the starters of JSA collection to the non-JSA recipients. It tests whether the health costs differences in JSA and non-JSA initiators differ from that in prevalent users of JSA and non-JSA.

2) A different two-part model specification was applied. It assesses the robustness of the results to distributional assumptions in the two-part model, i.e., assuming that health care costs follow a Normal (instead of Gamma) distribution.

3) A 1:1 genetic matching was conducted instead of 1:3 genetic matching. While 1:3 matching might improve the precision of the results, compared to 1:1 matching, it might introduce some bias to the analysis (34) because the quality of the second and third matches may be lower than the first (best) match. Therefore, we assessed whether the covariate balance and the parameters of interest were sensitive to the number of matches.

3 Results

3.1 Matching balance and baseline characteristics

The balance of the baseline characteristics between exposure and control groups before and after matching is shown in Table 1. There was some degree of imbalance in baseline characteristics before

matching. Individuals receiving JSA were, on average, almost two years younger, with a slightly higher proportion of women compared to the non-JSA recipients. The JSA group was more ethnically diverse than the non-JSA group. For example, we found that only around 22% JSA collectors are white; the majority of the remaining JSA collectors had mixed (36%) or black (26%) ethnic background. Whereas in the non-JSA recipients group, the white is the dominant ethnic group (31%), with Asian (25%), mixed (21%) and black (19%) ethnic background more evenly distributed. The JSA group was generally more deprived than the non-JSA group, with 68% individuals living in most deprived quantile, compared to 52% in non-JSA group. Also, JSA recipients were more likely to be smokers and overweight compared to the non-JSA counterparts. At baseline, individuals in the JSA group had an (unadjusted) average total cost of £294 (SD £1,657), compared to £132 (SD £945) for those in the non-JSA group. After performing 1:3 matching without replacement, JSA and non-JSA groups were balanced according to all key characteristics, with absolute standardized mean differences being less than 0.1, which is a widely-accepted threshold of covariate balance (29) .

Figure 1 displays the distribution of propensity scores for the treated (1) and control (0) groups before and after matching. The left panel (Unadjusted Sample) shows that before matching, there is a significant imbalance, with the treated and control groups having different propensity score distributions and limited overlap. The right panel (Adjusted Sample) demonstrates that after matching, the distributions for the treated and control groups are much more similar, indicating improved balance and sufficient common support for valid comparisons between the groups.

Table 1
Balance in baseline characteristics before and after matching.

	Before matching			After matching (1:3)		
	JSA (n = 3,841)	Non-JSA (n = 225,649)	Standardised means difference	JSA (n = 3,841)	Non-JSA (n = 11,523)	Standardised means difference
Propensity score, Mean	0.03	0.02	0.52	0.03	0.03	-0.0010
Age, Mean	34.27 (12.65)	35.99 (11.95)	-0.14	34.27 (12.65)	34.25 (12.68)	0.0009
Gender						
Female, %	52.28%	49.28%	0.06	52.28%	52.24%	0.0007
Ethnicity						
Asian / Asian British	14.06%	25.10%	-0.32	14.06%	14.08%	0.0000
Black / Black British	26.35%	19.38%	0.16	26.35%	26.33%	-0.0005
Mixed / Multiple	36.03%	21.09%	0.31	36.03%	36.05%	0.0004
Other	1.80%	3.02%	-0.09	1.80%	1.78%	-0.0004
White	21.77%	31.40%	-0.23	21.77%	21.77%	0.0013
Deprivation Quintile						
1(most deprived)	68.45%	52.05%	0.35	68.45%	68.44%	0.0000
2	26.63%	38.15%	-0.26	26.63%	26.64%	0.0002
3+	4.92%	9.80%	-0.23	4.92%	4.92%	-0.0002
Smoking status						
Ex-smoker	9.35%	10.97%	-0.06	9.35%	9.35%	0.0000
Non-smoker	59.93%	69.37%	-0.19	59.93%	59.93%	0.0000
Smoker	30.72%	19.65%	0.24	30.72%	30.72%	0.0000
BMI category						
Healthy	34.76%	35.50%	-0.02	34.76%	34.76%	0.0000
Morbidly obese	3.12%	2.32%	0.05	3.12%	3.12%	0.0000

	Before matching			After matching (1:3)		
	JSA (n = 3,841)	Non-JSA (n = 225,649)	Standardised means difference	JSA (n = 3,841)	Non-JSA (n = 11,523)	Standardised means difference
Obese	17.10%	18.11%	-0.03	17.10%	17.10%	0.0000
Overweight	26.03%	31.40%	-0.12	26.03%	26.03%	0.0000
Too young	12.78%	8.81%	0.12	12.78%	12.78%	0.0000
Underweight	6.20%	3.87%	0.10	6.20%	6.20%	0.0000

3.2 Costs difference by care settings

The coefficients of the two-part models for both same year and 1-year correlation were reported in Fig. 2. Figure 2a reports the odds of jobseekers having positive health care costs compared to non-JSA individuals. Overall, jobseekers were more likely to have positive health care costs across all care settings. For example, jobseekers are 98% and 61% more likely to have positive mental health and primary care costs, respectively, compared to non-JSA individuals. These results are very similar between same year and 1-year analyses. The 1-year odds ratio in social care setting seemed to be anomalous, possibly due to the small subset of individuals with positive social care costs, which disproportionately contribute to the results.

Figure 2b presents the results from part 2 of the two-part models, i.e. mean differences in health care costs between JSA and non-JSA recipients who have positive health care costs. Overall, jobseekers are associated with £117.32 (95%CI £78.27, £164.22) higher total health care costs compared to the non-JSA recipients. This mean cost difference was evenly driven by differences in primary care (£21.99, 95%CI £14.66, £28.72), hospital care (£30.47, 95%CI £7.38, £54.77), mental health care (£26.39, 95% £4.96, £52.02) and community care (£20.68, 95% £9.33, £34.04) settings. Little or no differences were driven by the social care (£4, 95%CI £-39, £10) setting. Same year and 1-year correlation analyses provided similar results, although the later suggested weaker correlation across all the settings.

3.3 Subgroup analysis

Figure 3 shows differences in total health care costs between JSA and non-JSA recipients according to different subgroups. Similar correlation sizes in same year and 1-year analyses were found across most of the subgroups. Firstly, jobseekers between 30–39 years old tend to have £32.04 (95% CI £1.35, £63.41) higher cost differences compared to the jobseekers below 30 years old; the results for other age groups were mostly small and uncertain. Secondly, differences in total health care costs between JSA group and non-JSA group were, on average, significantly higher (£40.13, 95% CI £13.78, £65.33) for women compared to men. There were no significant differences in total health care costs by different ethnic groups and deprivation levels as all the 95% CI crossed zero.

3.4 Sensitivity analysis

The detailed results for the three sensitivity analyses were included in appendix 1–3. In general, the results were robust to the three alternative assumptions considered in the sensitivity analysis. The first appendix showed the outcomes of excluding individuals having JSA collection in the previous year. Although with about £20 increase in total health care costs mainly driven by the increase in hospital care, the overall results were close to the results from the original population in both same and 1-year correlation. The results in Appendix 2 indicated that the outcome was not sensitive to the choice of gaussian distribution or normal distribution as model specifications. Shown in Appendix 3, despite an approximately £20 increase in mental health care costs, which led to a small rise in total health care costs, there were no significant differences in mean costs across other settings when the matching ratio was switched to 1:

4 Discussion

4.1 Summary of the findings

This paper exploited employment-related data and health care costs across different care settings in East London. We found that the jobseekers were more likely to use health services across different care settings. Amongst health service users, jobseekers tend to incur in higher health care costs in primary, secondary and mental health care settings, although the magnitude remained relatively modest, particularly the year after being exposed to unemployment and/or fragile employment. These small 'correlation sizes' were somewhat expected as the paper considered a 'healthy' cohort. Unemployment or fragile employment seems to have a stronger impact on women as the differences in health care costs between female JSA and non-JSA recipients is significantly higher than that between male JSA and non-JSA recipients. These results were robust to different methodological assumptions, including model specification and matching approaches.

4.2 Compare with existing literature

Our finding that jobseekers are associated with a higher mental health care costs is in line with those of previous studies in the area. For example, several papers (24, 27, 35, 36) found a positive association of unemployment on the likelihood of using mental health services among the unemployed individuals. However, the findings of this study suggest that jobseekers not only were more likely to use mental health services but were also more likely to use health services in other care settings.

Unlike our study, previous studies found more mixed results about unemployment association on primary and hospital care utilisation (37–39). Differences between our findings and those of previous studies might be related to the definition of primary and hospital care utilisation. For instance, most studies investigating the association of unemployment on primary care primarily focus on GP visits within primary care settings (11, 40). This narrow focus could potentially lead to an underestimation of the true association of unemployment on primary care settings when compared to our comprehensive inclusion in primary care settings, which comprises GP visits, non-GP visits and prescriptions. Similar in hospital care settings, many papers examined the association of unemployment on hospitalisation (22,

41) without including outpatient services and emergency care; this, again, could potentially underestimate the association of unemployment on hospital care utilisation.

Our finding that female jobseekers have higher health costs than male counterparts is supported by other studies. For example, Hollander, Bruce (41) and Geyer and Peter (22) have found that women are more likely to use hospital care after job loss in Sweden and Germany respectively. However, Heggebo (42) had a contradicting results where he found male unemployed individuals in Norway have a higher chance of being hospitalised than their female counterparts. One of the possible explanations for the result is that men are more likely to suffer in silence after job loss, which could link to delayed health seeking behaviour. This delay, in turn, may contribute to more serious health issues and incur more health care utilisation.

4.3 Strengths

Being able to compare the association of unemployment and fragile employment across a wide range of health care settings is one of the main strengths of this study. The multi-sectorial exploration helps drawing a broader picture of health service use and cost differences between jobseekers and employed individuals. A better understanding of jobseekers' distribution of health care utilisation can potentially improve policy-makers' understanding about their health care service needs (43, 44). For example, our study suggests that the added health care utilisation across different care settings amongst jobseekers is likely to be complementary rather than substitute. In addition, this study adds to existing literature by considering of the association between unemployment and social and community care settings. The study found that JSA recipients do not appear to be associated with higher social and community care compared to non-JSA individuals. Another strength of this study lies in the focus on the healthier cohort of patients, which reduces the risk of reverse causality. The LBBB linked datasets recorded a wide range of chronic conditions which enable us to subset a sample of healthy individuals until the collection of JSA for analysis. In addition, the study followed recent methodological guidance on the use of matching, providing added rigour to the analysis. This combined with a range of sensitivity analyses have improved our confidence that the findings were not sensitive to crucial methodological and analytical assumptions (31, 33).

4.4 Limitations

The study has, however, some limitations. Firstly, our definition of unemployment only includes individuals collecting JSA; individuals who were unemployed or in fragile employment, but not collecting JSA, were not included in the study. In addition, we could not distinguish between those who are unemployed and those in fragile employment, therefore, unable to test whether the mean costs differ between the two groups (45). Secondly, it is likely that some relevant confounders might have not been included in our dataset. One such example is education, which is known for being associated both with unemployment and healthcare utilisation. However, we have matched JSA and non-JSA individuals according to deprivation status, and one might reasonably assume that the matched individuals would have had similar levels of education (within deprivation levels). Thirdly, we were unable to exploit

longitudinal richness of the dataset. The main reason was that individuals in the LBBD dataset move in and out of the GP practice, which had direct implications for the data linkage, and made it difficult to follow individuals longitudinally. A longitudinal dataset could have allowed us to exploit potential long-term effects of unemployment and fragile employment. Fourthly, by exploring data from one of the most deprived areas in the UK, our findings may have limited generalisability to other areas in the UK and beyond.

4.5 Future research

An interesting follow up to this research would be to link our dataset to the Department for Work and Pensions data, which would enable us to define the exposure (unemployment) more rigorously. It has been suggested that long-term unemployment may have a greater detrimental effect on health and health care utilisation, compared to short-term unemployment (Marmot, 2010, Marmot et al., 2020). It would be, therefore, valuable to exploit the potential association of long-term unemployment on health and health care utilisation. Future research should also prioritise exploring the reasons for complementary association between care settings. This could be achieved by incorporating qualitative analysis to investigate the health needs and health-seeking preferences among jobseekers. By interviewing jobseekers on their health needs, barriers and perceptions related to their health care utilisation pattern, the social welfare and health systems can better understand their health needs, promote their health and well-being, and ultimately enhance their employability prospects.

5 Conclusion

Based on the evidence from Barking and Dagenham residents, JSA recipients were more likely to use health services and incur in higher costs compared to non-JSA individuals. These differences permeate across primary, hospital and mental health care.

Current policy initiatives primarily emphasise the employability among individuals out of labour market, including those with disabilities (46, 47). However, our findings underline the importance of acknowledging the potential escalated health care needs due to job loss and fragile employment. To promote health and employability among the jobseekers, policies should strategically focus on raising awareness of the impact of unemployment on increasing health needs, particularly among professionals working in social welfare and health systems. These professionals often serve as the first point of contact for jobseekers who might be experiencing health issues after job loss or under fragile employment (47). Equipping them with the awareness and knowledge necessary to identify and address jobseekers' health needs could link to more effective support and referrals to appropriate health services.

Additionally integrating employment services with primary care settings, as demonstrated in a pilot study conducted by the University of York might mitigate the association between unemployment, fragile employment and health care utilisation (48). This pilot study placed employment advisers in GP practices and found improving employment rates and health outcome among the selected patients.

While this approach requires further investigations on a broader scale in the UK, it could potentially create a supportive environment for both unemployed and fragile employed population, addressing their employment and health care needs holistically.

Abbreviations

A&E - Accident and Emergency

BCM - Bias-Corrected Matching

BMI - Body Mass Index

GP – General Practitioner

HRGs - Healthcare Resource Groups

JSA – Jobseekers' Allowance

LBBD - London Borough of Barking and Dagenham

PSSRU - Personal Social Services Research Unit

UK - United Kingdom

UPRN - Unique Property Reference Number

Declarations

Ethics approval and consent to participate

This study meets national guidelines set out by the Research Ethics Service for the NHS in UK. No further ethics approval was required. (<http://www.hra-decisiontools.org.uk/ethics/resultN2.html>).

Consent for publication

Not applicable

Availability of data and materials

The data that support the findings of this study are available from the authors but restrictions apply to the availability of these data, which were used under license from the Barking, Havering and Redbridge NHS Foundation Trust, North East London NHS Foundation Trust and London Borough of Barking and

Dagenham for the current study, and so are not publicly available. Data are, however, available from the authors upon reasonable request and with permission from the aforementioned data holders.

Competing interests

The authors declare that they have no competing interests.

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Author's contributions

MG contributed to the design of the study and provided a substantial review of the work.

KL has contributed to the data analysis, drafting and editing the paper.

JS contributed to the data access, data linkage and the review of the paper.

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References

1. World Health Organization. Closing the gap in a generation: Health equity through action on the social determinants of health. 2008.
2. Marmot M. Fair society, healthy lives : the Marmot Review : strategic review of health inequalities in England post-2010. London; 2010.
3. Bartley M, Ferrie J. Do we need to worry about the health effects of unemployment? J Epidemiol Community Health. 2010;64(1):5-6.
4. Jin RL, Shah CP, Svoboda TJ. The impact of unemployment on health: A review of the evidence. Journal of Public Health Policy. 1997;18(3):275–301.
5. Nordenmark M, Strandh M, Layte R. The Impact of Unemployment Benefit System on the Mental Well-Being of the Unemployed in Sweden, Ireland and Great Britain. European Societies. 2006;8(1):83-110.
6. Lee C, Huang G-H, Ashford SJ. Job Insecurity and the Changing Workplace: Recent Developments and the Future Trends in Job Insecurity Research. Annual Review of Organizational Psychology and

- Organizational Behavior. 2018;5:335-59.
7. Plessz M, Ezdi S, Airagnes G, Parizot I, Ribet C, Goldberg M, et al. Association between unemployment and the co-occurrence and clustering of common risky health behaviors: Findings from the Constances cohort. *PLoS One*. 2020;15(5):e0232262.
 8. Thomas C, Benzeval M, Stansfeld S. Psychological distress after employment transitions: the role of subjective financial position as a mediator. *J Epidemiol Community Health*. 2007;61(1):48-52.
 9. Ryu S, Fan L. The Relationship Between Financial Worries and Psychological Distress Among U.S. Adults. *J Fam Econ Issues*. 2023;44(1):16-33.
 10. Davalos ME, Fang H, French MT. Easing the pain of an economic downturn: macroeconomic conditions and excessive alcohol consumption. *Health Econ*. 2012;21(11):1318-35.
 11. Ahs A, Burell G, Westerling R. Care or not care—that is the question: Predictors of healthcare utilisation in relation to employment status. *Int J Behav Med*. 2012;19.
 12. Schaller J, Stevens AH. Short-run effects of job loss on health conditions, health insurance, and health care utilization. *J Health Econ*. 2015;43.
 13. Overman H, Xu X. Spatial disparities across labour markets. IFS Deaton Review of Inequalities. 2022.
 14. Herz B, Van Rens T. The labor market in the UK, 2000–2019. IZA World of Labor. 2020.
 15. Marmot M, Allen J, Boyce T, Goldblatt P, Morrison J. Health Equity in England: The Marmot Review 10 Years On.: Institute of Health Equity; 2020.
 16. Green F. Health effects of job insecurity. IZA World of Labor. 2020.
 17. Roberts H, Pearson J, Madeley R, Hanford S, Magowan R. Unemployment and health: the quality of social support among residents in the Trent region of England. *Journal of Epidemiology and Community Health*. 1997;51:41-5.
 18. Ferrie JE, Shipley MJ, Newman K, Stansfeld SA, Marmot M. Self-reported job insecurity and health in the Whitehall II study: potential explanations of the relationship. *Soc Sci Med*. 2005;60(7):1593-602.
 19. Ahs A, Westerling R. Health care utilization among persons who are unemployed or outside the labour force. *Health Policy*. 2006;78.
 20. Pharr JR, Moonie S, Bungum TJ. The Impact of Unemployment on Mental and Physical Health, Access to Health Care and Health Risk Behaviors. *ISRN Public Health*. 2012;2012:1-7.
 21. Li K, Lorgelly P, Jasim S, Morris T, Gomes M. Does a working day keep the doctor away? A critical review of the impact of unemployment and job insecurity on health and social care utilisation. *Eur J Health Econ*. 2022.
 22. Geyer S, Peter R. Hospital admissions after transition into unemployment. *Soz Praventivmed*. 2003;48(2):105-14.
 23. Comino EJ, Harris E, Silove D, Manicavasagar V. Prevalence, detection and management of anxiety and depressive symptoms in unemployed patients attending general practitioners. *Aust N Z J Psychiatry*. 2000;34.

24. Elser H, Ben-Michael E, Rehkopf D, Modrek S. Layoffs and the mental health and safety of remaining workers: a difference-in-differences analysis of the US aluminium industry. *J Epidemiol Commun Health (JECH)*. 2019;73.
25. Norstrom F, Waenerlund AK, Lindholm L, Nygren R, Sahlen KG, Brydsten A. Does unemployment contribute to poorer health-related quality of life among Swedish adults? *BMC Public Health*. 2019;19(1):457.
26. Chan MF, Wong FK. The risk factors for hospital re-admission in medical patients in Singapore. *Health Soc Care Commun*. 2014;22.
27. Cherrie M, Curtis S, Baranyi G, McTaggart S. Use of sequence analysis for classifying individual antidepressant trajectories to monitor population mental health. *BMC Psychiatry*. 2020;20.
28. Shand J. Towards integrated care: Using linked data to explore health and social care utilisation for adult residents of Barking and Dagenham in 2016/17. London: University College London (UCL); 2020.
29. Stuart EA, Lee BK, Leacy FP. Prognostic score-based balance measures can be a useful diagnostic for propensity score methods in comparative effectiveness research. *J Clin Epidemiol*. 2013;66(8 Suppl):S84-S90 e1.
30. Abadie A, Imbens GW. Bias-Corrected Matching Estimators for Average Treatment Effects. *Journal of Business & Economic Statistics*. 2011;29(1):1-11.
31. Kreif N, Grieve R, Radice R, Sekhon JS. Regression-adjusted matching and double-robust methods for estimating average treatment effects in health economic evaluation. *Health Services and Outcomes Research Methodology*. 2013;13(2-4):174-202.
32. Diamond A, Sekhon JS. Genetic Matching for Estimating Causal Effects: A General Multivariate Matching Method for Achieving Balance in Observational Studies. *The Review of Economics and Statistics*. 2013;95(3):932-45.
33. Belotti F, Deb P, Manning WG, Norton EC. twopm: Two-part models. *The Stata Journal* 2015;15:3-20.
34. Rassen JA, Shelat AA, Myers J, Glynn RJ, Rothman KJ, Schneeweiss S. One-to-many propensity score matching in cohort studies. *Pharmacoepidemiol Drug Saf*. 2012;21 Suppl 2:69-80.
35. Cho SJ, Lee JY, Hong JP, Lee HB. Mental health service use in a nationwide sample of Korean adults. *Soc Psychiatry Psychiatr Epidemiol*. 2009;44.
36. Dezetter A, Briffault X, Alonso J, Angermeyer MC. Factors associated with use of psychiatrists and nonpsychiatrist providers by ESEMeD respondents in six European countries. *Psychiatr Serv*. 2011;62.
37. Giatti L, Barreto SM, César CC. Informal work, unemployment and health in Brazilian metropolitan areas, 1998 and 2003. *Cad Saude Publica*. 2008;24.
38. Song X, Zou G, Chen W, Han S. Health service utilisation of rural-to-urban migrants in Guangzhou, China: Does employment status matter? *Trop Med Int Health*. 2017;22.

39. Hajek A, König HH. Which factors lead to frequent attendance in the outpatient sector among individuals in the second half of life? Evidence from a population-based longitudinal study in Germany. *BMC Health Serv Res*. 2018;18.
40. Nolan A. A dynamic analysis of GP visiting in Ireland: 1995-2001. *Health Econ*. 2007;16(2):129-43.
41. Hollander A-C, Bruce D, Ekberg J, Burström B, Ekblad S. Hospitalisation for depressive disorder following unemployment—differentials by gender and immigrant status: a population-based cohort study in Sweden. *Journal of Epidemiology and Community Health*. 2013;67(10):875-81.
42. Heggebo K. Gendered health consequences of unemployment in Norway 2000-2017: a register-based study of hospital admissions, health-related benefit utilisation, and mortality. *BMC Public Health*. 2022;22(1):2447.
43. Rueda S, Chambers L, Wilson M, Mustard C, Rourke SB, Bayoumi A, et al. Association of returning to work with better health in working-aged adults: a systematic review. *Am J Public Health*. 2012;102(3):541-56.
44. Wanberg CR, van Hooft EAJ, Dossinger K, van Vianen AEM, Klehe UC. How strong is my safety net? Perceived unemployment insurance generosity and implications for job search, mental health, and reemployment. *J Appl Psychol*. 2020;105(3):209-29.
45. Powell A. Understanding statistics on employment, unemployment and earnings. House of Commons Library; 2024.
46. Whitworth A. Mainstreaming Effective Employment Support for Individuals with Health Conditions: An Analytical Framework for the Effective Design of Modified Individual Placement and Support (IPS) Models. *Social Policy and Society*. 2018;18(4):517-33.
47. Work and Pensions Committee. Welfare to work: Second report of session 2015 - 16. London: House of Commons; 2015.
48. Sainsbury R, Nice K, Nevill C, Wood M, Dixon J, Mitchell M. The Pathways Advisory Service: Placing employment advisers in GP surgeries. Department for Work and Pensions 2008.

Figures

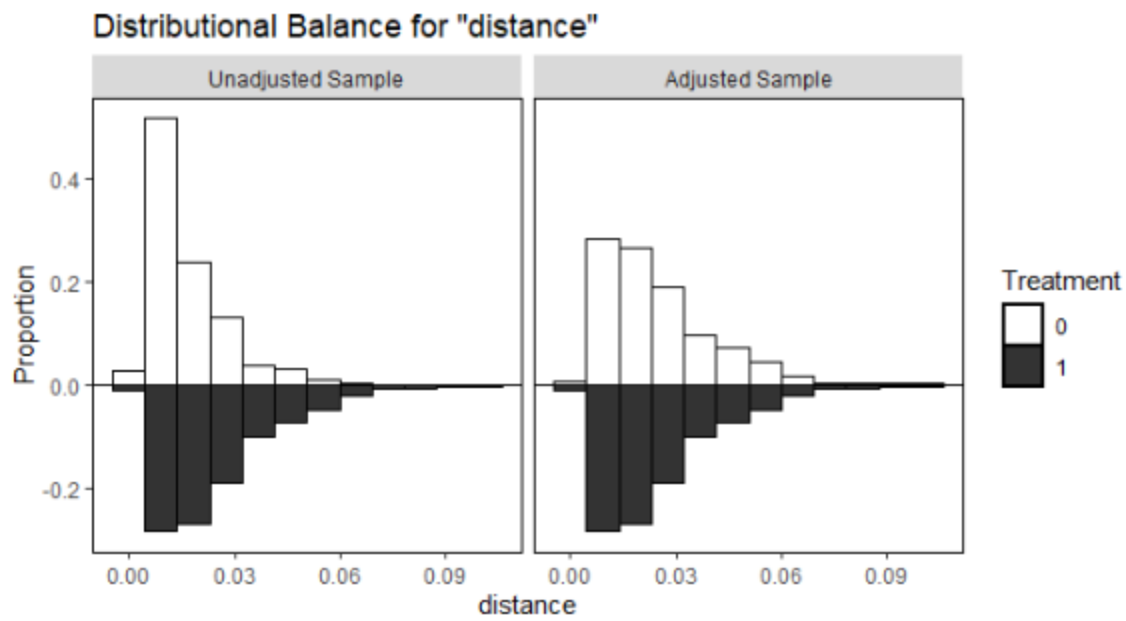


Figure 1

Distribution of propensity scores for the treatment (1) and control (0) groups before and after matching

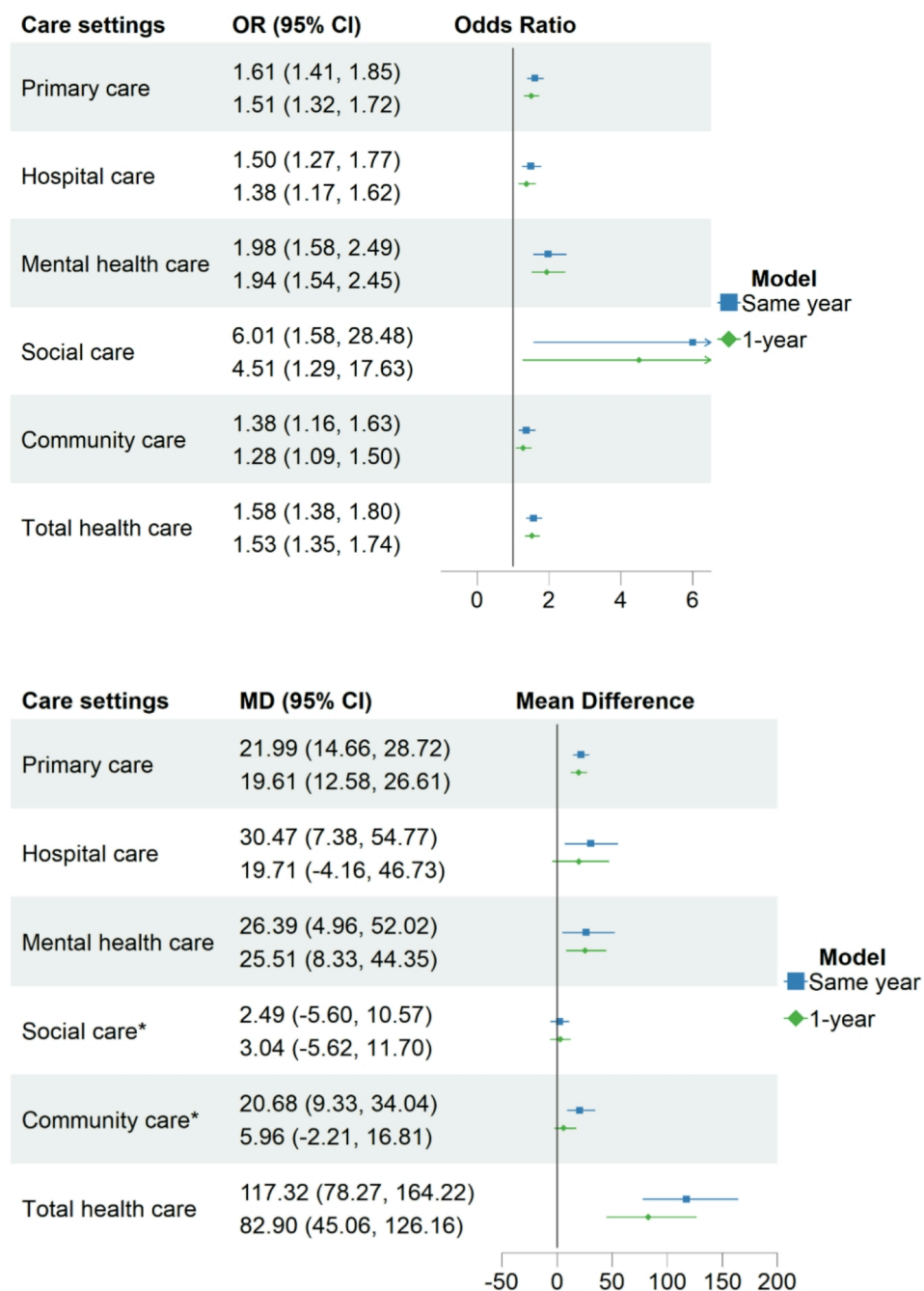


Figure 2

The odds of JSA recipients to have non-zero costs compared to non-JSA individuals (left panel), and mean differences in total costs between JSA and non-JSA groups.

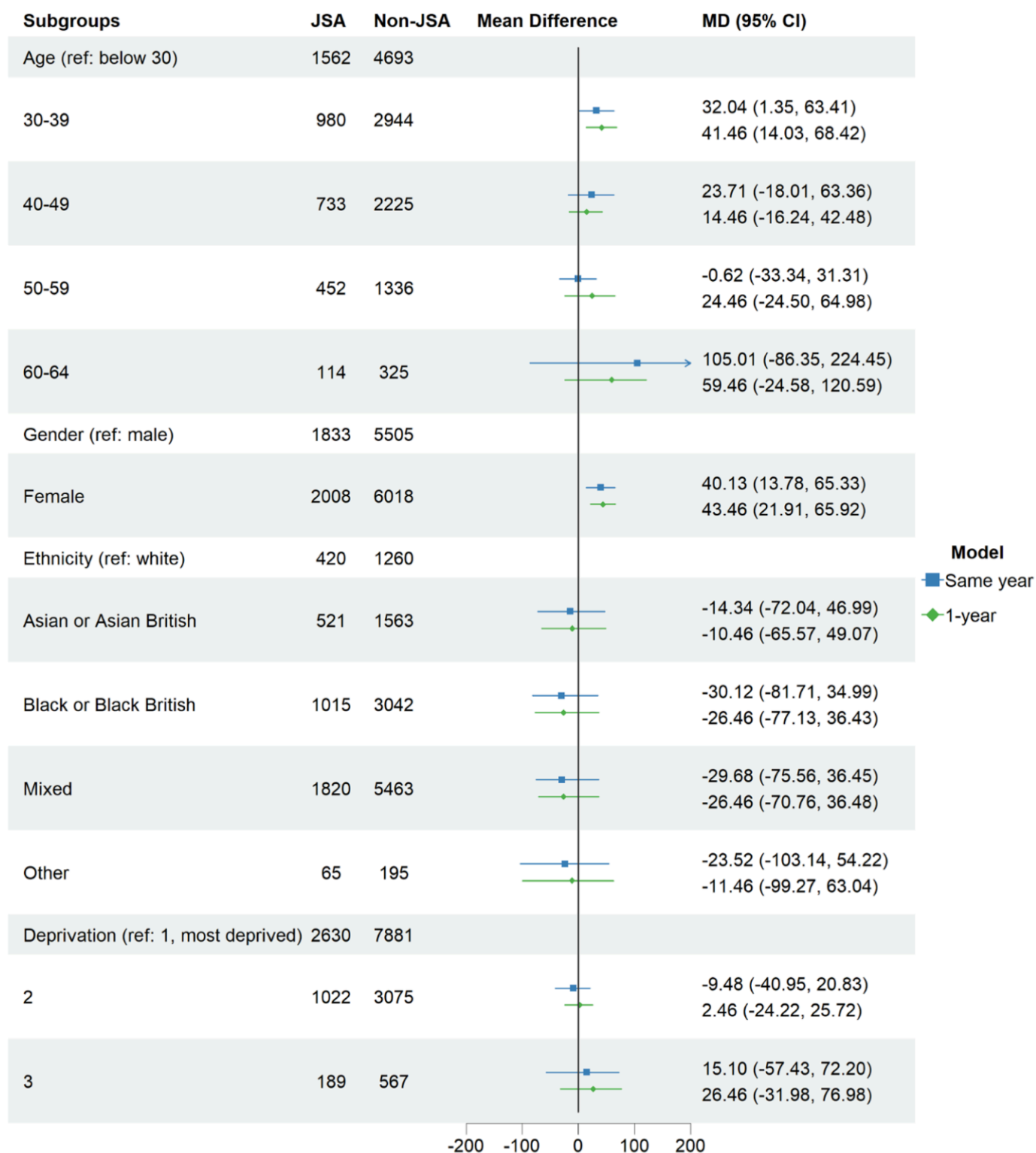


Figure 3

Mean differences in health care costs between JSA and non-JSA across different subgroups

Supplementary Files

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