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# Disability prevalence and disability-related employment gaps in the UK 1998–2012: Different trends in different surveys?



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## ABSTRACT

The persistently low employment rate among disabled individuals has been an enduring concern of governments across developed countries and has been the subject of a succession of policy initiatives, including labour market activation programmes, equality laws and welfare reform. A key indicator of progress is the trend in the disability-related employment gap, the percentage point difference between the employment rate for disabled and non-disabled individuals. Confusingly for the UK, studies undertaken between 1998 and 2012 have simultaneously reported both a widening and a narrowing of the gap. The source of the discrepancy can be found in the choice of survey, the General Household Survey (GHS) or the Labour Force Survey (LFS), although both use a common conception of disability and collect self-reported information from a random sample of households. The literature has analysed these surveys separately from each other and ignored inter-survey differences in findings. The Health Survey for England (HSE), a third national household survey, replicates the GHS questions on disability but has had limited use in this context. This empirical study compares the trends in disability prevalence and the disability-related employment gap across the three surveys using a three-stage harmonisation process. The negative relationship between the prevalence of disability and the employment gap found in cross-section inter-survey comparisons prompts an initial focus on differences in the definition of disability as an explanation of the discrepancy. This is broadened to include differences in survey methods and sample composition. Differences in the trend in disability prevalence and the employment gap remain following harmonisation for definition, survey method and sample composition. It is the LFS, the main policy-influencing and policy-assessment survey, which generates outlying results. As such, we cannot be confident that the disability-related employment gap has narrowed in the UK since 1998.

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## 1. Introduction

The employment of disabled individuals of working age is of long-standing interest in medicine (Bartley and Owen, 1996; Minton et al., 2012; Marmot, 2010; and Black, 2008) and across multiple social science disciplines (Colella and Bruyere, 2011: 473; and Schur et al., 2013: 4). Trends in the disability-related employment gap – the percentage point difference between the employment rate for disabled and non-disabled individuals – provides a key indicator of progress towards the inclusion of disabled people and provides the means to evaluate the successive efforts of

governments to increase the employment of disabled people (see Department for Work and Pensions (DWP), 2013: 15; and Schur et al., 2013: 222). Policy in the UK has focussed on labour market activation, welfare reform and legal intervention through equalities legislation. Examples of evaluation have included the impact of changes in eligibility and employment support within the main out-of-work disability benefit, Employment and Support Allowance (Grover and Piggott, 2013) as well as the UK Disability Discrimination Act (DDA) (Bell and Heitmueller, 2009; and Jones, 2006).

In contrast to consistent trends in employment gaps reported in US studies (Weathers and Wittenburg, 2009: 117), UK studies have reported conflicting trends. As Governments have celebrated success in raising employment rates for disabled groups (Black, 2008; DWP, 2013), especially when compared to other OECD countries (Schur et al., 2013: 38), influential authors (Berthoud, 2011; Minton

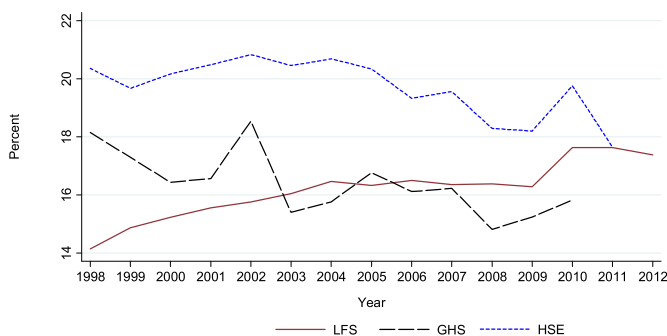
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et al., 2012; and Pope and Bambra, 2005) have provided contrasting evidence. The contradiction is related to choice of survey: studies based on the General Household Survey (GHS) report widening gaps whereas those based on the Labour Force Survey (LFS) consistently report narrowing ones. Both are official data collected and published by the Central Statistical Office for the UK, the Office for National Statistics. Despite this inconsistency in the literature, and the frequent use of both GHS and LFS data in research, no previous study has noted the divergence in trends or investigated its origins. As Hancock et al. (2013: 1) observe in relation to disability research, 'it is rare for [researchers] to investigate the robustness of their findings with respect to their choice of survey data'.

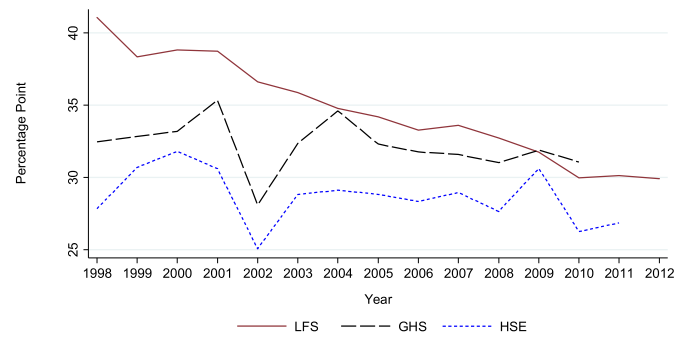
The few cross-survey comparisons that exist in the UK are limited to studies of cross-sections at a point in time. Blackaby et al. (1999) provided a first indication of differences between the GHS and LFS, with the employment gap greater in the LFS and attributed to differences in the definitions of disability between the surveys. Bajekal et al. (2004) extended the comparison to include five cross-sectional surveys in 2001, again concluding that differences in the measurement of disability were central to differences in disability prevalence and employment rates. It has been argued that the constraints imposed by inter-survey comparability should be less binding when looking at trends rather than levels. Weathers and Wittenburg (2009: 117) report consistent trends in prevalence rates and employment gaps across surveys for US data, even in the face of wide discrepancies in individual years, and conclude that 'findings for trends are not sensitive to disability conceptualisation'. The discrepancy in the trend in the disability-related employment gap reported for the UK therefore presents quite a puzzle, one which is explored here in the context of the impediments to inter-survey comparability in the field of disability research.

We select three cross-sectional data sources which have been fielded in a largely consistent manner over an extended period, namely the LFS (1998–2012), GHS (1998–2010) and the Health Survey for England (HSE) (1998–2011). The first two are included given their extensive use in the literature and the emergence of apparently contradictory trends. The latter is under-utilised in research on disability-related employment gaps but provides a useful benchmark in this comparative study. Each survey uses a well-known and widely-used definition of disability, long-standing illness or impairment which limits activity. Figs. 1 and 2, which we discuss in detail in Section 5, present trends in the prevalence of disability and the disability-related employment gap (1998–2012) and clearly illustrate the discrepancy between the surveys noted above, namely that the increasing prevalence of disability and declining employment gap evident in the LFS are not replicated in either of the other two surveys.



Notes: *Sample 1* contains all respondents of working age and are weighted. A discontinuity occurs in the LFS between 2009 and 2010. 2002 is observed as an outlier in the GHS although there is no reference to a discontinuity.

Fig. 1. LLSI Prevalence by Survey (*Sample 1*) (1998–2012).



Notes: See notes to Figure 1.

Fig. 2. LLSI Employment Gap by Survey (*Sample 1*) (1998–2012).

The cross-sectional literature outlined below identifies three potential explanations for inter-survey differences in disability prevalence and employment gaps, including definitions of disability (and employment), survey methods and sample composition. These explanations are used to construct our three-stage harmonisation process in the context of inter-survey differences in trends. This is followed by a concise review of previous single-survey trend-based studies on disability prevalence rates and employment gaps in the UK covering the period 1984–2012. Our analyses focus on the period from 1998 for which we have consistent and comparable disability definitions and where the trend in the disability-related employment gap shows the greatest divergence between surveys. We find that differences in trends in disability prevalence and the disability-related employment gap between the LFS and the GHS/HSE remain after harmonisation.

## 2. Inter-survey differences in measuring disability and employment

### 2.1. Defining disability and employment

The definition of disability is key to understanding differences in prevalence rates (Houtenville et al., 2009) and employment gaps (Weathers and Wittenburg, 2009). However, the appropriate definition will depend on the particular policy context or research question. Altman (2014: 148) uses a flow chart to demonstrate how additional questions put to those who have a long-standing illness/condition successively tighten the definition and reduce the prevalence rate. In a similar exercise, Burkhauser et al. (2014: 196) use the analogy of an archery target in which progressively smaller concentric rings represent tighter definitions and smaller population sub-sets. So, for example, the outer-ring may comprise those who identify a health condition or pathology (for example, glaucoma), of which those who report impairment (low vision) are a subset. Those identified as having functional difficulties (for example, unable to read regular-sized print) which arise from impairment are a smaller subset still. Those who have activity limitation (unable to read books, instructions etc. in regular-sized print) or participation limitations (unable to work in jobs which require reading regular-sized print) are a subset of those with functional impairment. For Altman (2014: 148), it is the limitation of activity or participation which defines disability and this arises from interactions between personal characteristics (including functional limitation) and environmental barriers and supports (for example, accommodation through job description and/or adjustment to equipment (in this case, vision aids)). Disability, with its

dependence on skills, barriers and supports, is a more complex and heterogeneous concept than impairment but it is a better predictor of employment outcomes (Ettner, 2000) and is typically the focus of labour market policy.

Recent studies have specifically examined differences in definitions within and between surveys for disability-related disadvantage. For example, Altman (2014); Altman and Gulley (2009); and Burkhauser et al. (2014); and a collection of studies in Houtenville et al. (2009) compare disability prevalence rates and employment gaps across a number of definitions and surveys for the USA. A much smaller literature exists for the UK: Bajekal et al. (2004); Hancock et al. (2013); and Jagger et al. (2009) explore differences in disability prevalence rates across surveys including in relation to policy variables such as benefit receipt. Comparisons are made at a single point in time and key findings are (i) that much of the variation in prevalence rates and disability relationships is accounted for by differences in definitions; and (ii) that the broader the definition of disability, the smaller is the employment gap. Importantly for this study, and notwithstanding differences at the operational level, the GHS, LFS and HSE use a common conceptual definition of disability based on long-standing illness ('LSI') (the outer ring in the target analogy) and a more restrictive definition in which the condition gives rise to activity limitation (limiting LSI or 'LLSI') (an inner ring).

Although conceptually more straightforward, and more easily handled empirically than disability, definitions of employment also present comparability problems across the literature. Some studies report employment rates (Minton et al., 2012) and others report employment gaps (Jones and Wass, 2013). Certain groups – students, unpaid family workers and those on Government training schemes – are not consistently classified in relation to employment or consistently included/excluded from the underlying population. Some studies include a restriction on hours (for example, Berthoud, 2011: 9, specifies at least 16 h a week), focus solely on full-time employment, and/or look at employment at any point within a given time period.

## 2.2. Data collection and sample composition

Within the small comparative inter-survey literature, three further impediments to the comparability of disability-related employment gaps in any one year are identified: differences in the underlying population (Altman and Gulley, 2009; and Bajekal et al., 2004); differences in sample composition (Bajekal et al., 2004) and variation in survey methodology – question wording and ordering, probes, screening and mode of collection (Bajekal et al., 2004) – and survey context (Ballou and Markesich, 2009).

Differences in the target survey population are important because variation in participation rates, especially by age and by sex, can have an effect on employment gaps. Some studies are confined to men only (Kidd et al., 2000), to men and women together (Bajekal et al., 2004; Berthoud, 2007; Black, 2008; and Pope and Bamba, 2005), or men and women separately (Berthoud, 2011; Jones and Wass, 2013; and Minton et al., 2012). Since the focus is on employment, the underlying population is normally confined to those of working-age but the precise definition may vary. Geographical coverage is also relevant since participation and disability prevalence rates vary by region and coverage: the LFS (UK) differs from the GHS (GB) and from the HSE (England).

Sample composition is important (Bajekal et al., 2004; and Houtenville et al., 2009) and different studies apply different methods of sample standardisation which limits comparability between findings. Employment rates or employment gaps may be standardised by age (Pope and Bamba, 2005) or by occupation (Minton et al., 2012), both (Jones and Wass, 2013) or neither (Black,

2008; and DWP, 2013). Where authors report employment gaps with and without controls (for example Berthoud, 2011; and Jones and Wass, 2013), a small but noticeable difference in estimates is reported (3.5 percentage points for disabled men in 1998, Jones and Wass, 2013: 991).

Variation in data collection method or survey context can influence responses to questions on health, disability and employment (Ballou and Markesich, 2009). The inclusion of proxy interviews is found to reduce the prevalence rate because these responses are concentrated among the young (Bajekal et al., 2004: 136) and because disability is under-reported by proxy respondents (Schur et al., 2013: 18). Bajekal et al. (2004: 56) also report greater propensity to disclose disability in a telephone relative to a face-to-face interview.

## 3. UK studies of disability and employment trends

The main national household surveys used to investigate disability-related employment gaps have been the GHS and the LFS. The HSE has also run consistently for twenty years but has hitherto not been used. The main studies which examine trends in disability-related employment disadvantage are reported in Table 1 by dataset and time period. The time series divides at 1996–8 reflecting a series discontinuity in the LFS data and a trend reversal in the GHS. Note that the time periods in the studies cited do not precisely overlap with those used in Table 1, so we separate each study's finding into our own time periods rather than relying on their overall headline findings. For example, Berthoud (2011) covers the period 1974–2004, during which both prevalence rates and the employment gap increase. For the period 1998–2004, the prevalence rate falls and the employment gap shows a modest increase to 2000 which is eroded by a similarly modest fall to 2004. Later studies based on the GHS (Minton et al., 2012; and Baumberg, 2011) record an increase in the employment gap beyond 2003.

Overall, Table 1 shows there was a consensus that disability prevalence and the employment gap were increasing in both surveys in the earlier period. Trends diverge across surveys in the second period (1998–2012). Studies using the GHS report a falling prevalence rate and no trend in the employment gap. Studies based on the LFS report an increase in the prevalence rate and a large reduction in the employment gap. As an example, since 1998, the increasing employment gaps reported by Minton et al. (2012) using the GHS are in sharp contrast to the narrowing gaps reported by Black (2008); DWP (2013) and Jones and Wass (2013) using the LFS. This divergence in trends allows Black (2008: 31) to report that "the employment rate for disabled people has gradually increased since 1998 from 38% to 48%" while at the same time Minton et al. (2012: Figs. 3 and 4), whose focus is occupational differences in employment trends, report increasing employment disadvantage 1998–2009 for disabled men and women in each of four occupational groups. The absence of any impact of the DDA on employment gaps reported in Pope and Bamba (2005) using the GHS is also in contrast to the first signs of convergence noted by Jones (2006) using the LFS.

What is striking about these single survey studies (our own included) is the absence of reference to conflicting results reported elsewhere. Amidst this confusion of evidence, should policy-makers, disability campaigners, HR managers and equal opportunities officers celebrate an improvement in employment outcomes amongst disabled people? Currently, the answer to this question depends on which survey is used. Unsurprisingly, stakeholders and users of disability estimates report confusion and frustration at the unexplained variability in findings (Bajekal et al., 2004: 85).

**Table 1**  
Studies of disability prevalence and disability related employment trends.

	GHS	LFS
<i>Panel A: Prevalence</i>		
1984–1996	<b>Increase</b> Baumberg (2011) (1984–1996) Berthoud (2011) (1984–1996) Berthoud (2007) (1984–1996)	<b>Increase</b> Cousins et al. (1998) (1984–1996)
1998–2012	<b>Decrease</b> Baumberg (2011) (1998–2006) Berthoud (2011) (1998–2004) Berthoud (2007) (1998–2003)	<b>Increase</b> Black (2008) (1998–2007) Jones and Wass (2013) (1998–2011)
<i>Panel B: Employment gap</i>		
1984–1996	<b>Increase</b> Bartley and Owen (1996) (1984–1993) Baumberg (2011) (1984–1996) Berthoud (2007) (1984–1996) Berthoud (2011) (1984–1996) Berthoud and Blekesaune (2006) (1984–1996) Minton et al. (2012) (1984–1996) Pope and Bambra (2005) (1990–1996)	<b>Small increase</b> Burchardt (2000) (1984–1996) Cousins et al. (1998) (1984–1996)
1998–2012	<b>Stable (increase followed by decrease)</b> Berthoud (2007) (1998–2003) Berthoud (2011) (1998–2004) Berthoud and Blekesaune (2006) (1998–2003) Baumberg (2011) (1998–2006) Minton et al. (2012) (1998–2009) (increase) Pope and Bambra (2005) (1998–2002)	<b>Decrease</b> Black (2008) (1998–2007) Jones (2006) (1997 and 2003) Jones and Wass (2013) (1998–2011)

Notes: The exact definitions of employment and disability, target populations and sample composition vary between studies. Dates in parentheses refer to overlap between the literature and the two time periods specified 1984–1996 and 1998–2012.

**4. Data and methodology**

This study compares disability prevalence rates and employment gaps across a working-age sample from three nationally representative household surveys in the UK, the GHS, LFS and HSE, between 1998 and 2012, using progressively tighter methods for harmonising the survey data. Since the investigation is based entirely on the analysis of anonymised responses from existing secondary sources of survey data collected by or on behalf of the UK Government, no ethical approval was required.

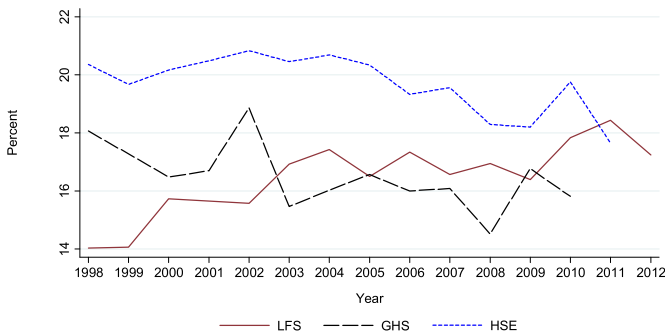
**4.1. Data**

The surveys are compared in Table 2 in terms of some of the key areas of structural difference which might be expected to give rise to differences in estimates and trends in disability prevalence and employment gaps: namely the purpose of the survey (specific or general), geographic coverage and data collection methods (such as interview mode and the inclusion of proxy interviews).

The GHS is a general survey operating annually since 1971 (with the exception of 1999) where information on long-term illness, disability and employment is available on a consistent basis each year. A longitudinal element was introduced in 2006 and the survey was renamed the General Lifestyle Survey in 2008.

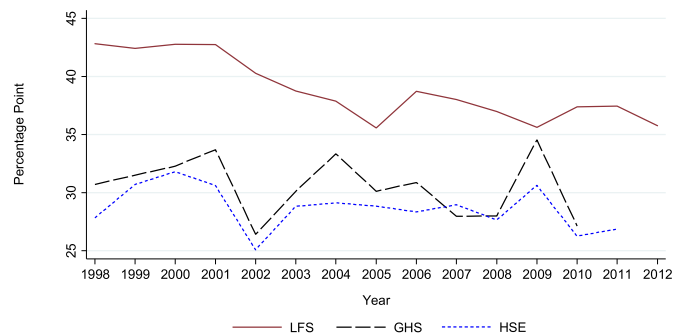
The HSE is a specialist survey collecting health information through face-to-face interviews. For consistency our analyses are restricted to the general population sample. Definitions of long-term illness, disability and employment status are internally consistent (1998–2011) and comparable with the GHS (see Table 3). Question order is reversed relative to the GHS and LFS, with health information (including disability) collected in advance of employment information.

The LFS, the largest household survey in the UK, focuses on information relating to economic activity. We use the April to June quarters to remove seasonal variation and examine the period 1998–2012 during which definitions of long-term illness, disability and employment status are internally consistent – although the



Notes: See notes to Figure 1. *Sample 2* restricts coverage to England and excludes proxy responses and also requires that individuals are in their first interview and are interviewed face-to-face.

**Fig. 3.** LLSI Prevalence in Harmonised Samples (*Sample 2*) across Surveys (1998–2012).



Notes: See notes to Figure 3.

**Fig. 4.** LLSI Employment Gap in Harmonised Samples (*Sample 2*) across Surveys (1998–2012).

**Table 2**  
An overview and comparison of the GHS, LFS and HSE.

	HSE	LFS	GHS/GLS
Main Focus	Health	Economic Activity	General Purpose
Period	1991–2012	1973–2013	1979–2011
Sub-period for analysis	1998–2011	1998–2012	1998–2010
Geographic Area	England	UK (includes NI)	Great Britain
Interview Mode	Face-to-face	Face-to-face and telephone	Face-to-face (except proxy interviews)
Data Collection	Repeated cross section	Repeated cross section but with 1 year (5 quarter) panel element	Repeated cross section (1998–2005) Repeated cross section but with 4 year panel element (2006–2011)
Analysis Sample	General Population sample. Working age	Working age	Working age
Question Ordering	Disability then employment	Employment then disability	Employment then disability
Proxy Interviews	Excluded from General Population Sample	About 31% of the sample.	About 9% of the sample.
Average Annual Working Age Sample	Varies considerably by year (3,000–12,000)	60,000–90,000	10,000–17,000

Notes: In the LFS 'year' refers to the April–June Quarter of the relevant year. From 2013 the questions on long-term health problems and how this limits activity have changed and, for consistency across time, the analysis is restricted to 2012. Between 2009 and 2010 a discontinuity was created by a change in the administration of the questionnaire. The following information was included in the introduction of the disability module: "I should now like to ask you a few questions about your health. These questions will help us estimate the number of people in the country who have health problems". In the HSE, there is a change to the wording of the question relating to long-standing illness in 2012 and our analysis is therefore restricted to 2011.

**Table 3**  
A comparison of disability definitions in the GHS, LFS and HSE.

Variable	Definition	Time period	Survey	Routing
LSI	Do you have any long-standing illness, disability or infirmity? By long-standing I mean anything that has troubled you over a period of time, or that is likely to affect you over a period of time?	1991–2011	HSE	None
LLSI	Does this illness or disability/do any of these illnesses or disabilities limit your activities in any way?	1996–2011	HSE	LSI
LSI	Do you have any health problems or disabilities that you expect will last for more than a year?	1997–2012	LFS	None for working age sample.
LLSI	Do these health problems or disabilities, when taken singly or together, substantially limit your ability to carry out normal day to day activities? If you are receiving medication or treatment, please consider what the situation would be without the medication or treatment.	1997–2012	LFS	LSI
LSI	Do you have any long-standing illness, disability or infirmity? By long-standing, I mean anything that has troubled you over a period of time or that is likely to affect you over a period of time?	1998–2010	GHS	None.
LLSI	Does this illness or disability (Do any of these illnesses or disabilities) limit your activities in any way?	1998–2010	GHS	LSI

questions are different from those asked in the GHS (see Table 3). Each quarter includes respondents over five waves with a majority of 'repeat' respondents (waves two to five) being surveyed by telephone.

#### 4.2. Methodology

Our empirical approach focuses on harmonising the estimates between surveys in three key stages: (1) definitions of disability and employment; (2) survey methods; and (3) sample composition. Harmonisation is progressive beginning with stage 1 and *Sample 1*, where disability and employment are defined as closely as possible. Information on disability, while defined on the basis of different question wording (see Table 3), is based on the same conceptual definition of LLSI. This is derived from questions on the presence of LSI and whether this limits activity. The HSE and GHS use harmonised definitions of LSI and LLSI based on identical questions.

While the definition of LLSI in the LFS also aims to identify the population with activity limitations, the wording is determined by the need to operationalise the legal definition of disability contained within the DDA, and therefore makes reference to a period of 'one year', to 'substantially' limiting and to 'normal day-to-day'

activities. Interviewers are provided with a set of guidelines on the limitations and activities which meet the definition and respondents are asked to consider their situation without medication or treatment. While the reference to 'substantially limiting' raises the threshold for identification as disabled, the discounting of assistive medication and treatment works in the opposite direction. It is notable that Bajekal et al. (2004: 57–8), using a separate survey, find a high level of convergent validity between the full DDA definition used in the LFS and LLSI definitions used in the GHS and HSE. Nevertheless, since small differences in definitions can have a large impact on prevalence (Ballou and Markesich, 2009; and Cousins et al. 1998), we perform a sensitivity analysis using the LSI definition (results are reported in Online Appendix 4) which is more similarly worded across the surveys (see Table 3) and therefore reduces any discrepancy introduced by the question wording in the LFS definition of LLSI.

Our analysis of employment is based on the International Labour Organisation (ILO) definition as far as possible, relating to activity in the last week (no minimum hours restriction is imposed) and includes those in paid employment or self-employment or temporarily away, unpaid family workers and those on government employment training programmes. The LFS and GHS both collect

information based on ILO definitions, and past-week activity in the HSE is used to generate a comparable binary variable (where employment includes paid employment, unpaid work for a self-/family-owned business, or a Government scheme for employment training (see [Online Appendix 1](#))).

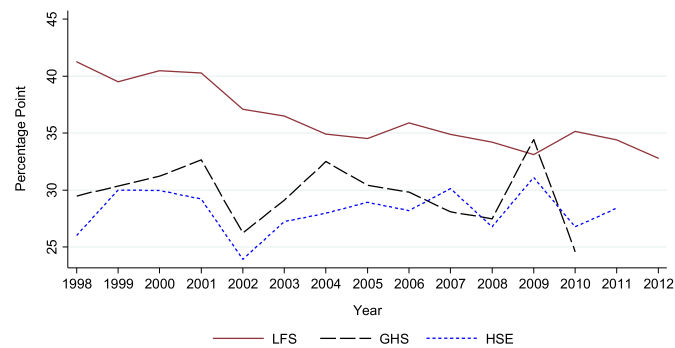
Stage two of the harmonisation accounts for the main structural differences between the surveys by restricting the sample to a consistent geographic coverage (England) and to responses where common survey methods have been applied. In terms of the latter, interviews by proxy, repeat (panel follow-up) interviews and telephone interviews are excluded from the harmonised sample (*Sample 2*). By construction, this results in a substantial reduction in the sample size in both the LFS (about 11% of the original sample is retained) and the GHS (59% of the original sample is retained (26% in years with a longitudinal element (2006–2010))).

While harmonisation for survey methods brings the GHS and LFS into line with the HSE, some differences in the composition of the sample remain (see [Online Appendix 2](#)). In the absence of a consistent set of population weights for all surveys and years, we harmonise for sample composition at stage 3 using regression analysis. The regression-adjusted employment gap is measured as the marginal effect of LLSI from an employment probit model estimated separately by survey and year on *Sample 2*. The specification includes controls for personal characteristics including gender, age group, highest qualification (which is broadly although not entirely comparable across surveys (see [Online Appendix 3](#))) and region.

Following [Hancock et al. \(2013\)](#), the effects of sample composition are further explored using propensity score matching where the survey is modelled separately for each year on the set of personal characteristics listed above. For the HSE and GHS the nearest neighbour is selected (without replacement) from the LFS to generate matched-LFS samples (*Sample 3*). We impose a caliper of 0.01 to improve the quality of the match. This results in a reduction in inter-survey differences in the observed variables, such that in 2010, 16 of 18 variables are not significantly different between matched LFS and HSE, and 18 of 18 variables are not significantly different between matched LFS and GHS. About 80% of individuals are matched in both the GHS and HSE.

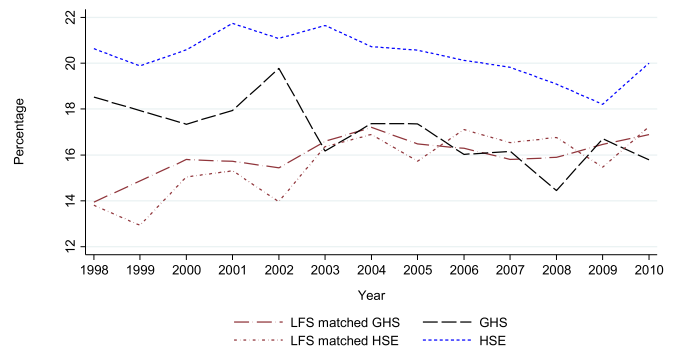
### 5. Results and discussion

Trends in disability (as measured by LLSI) and disability-related employment gaps from the three data sources after successive



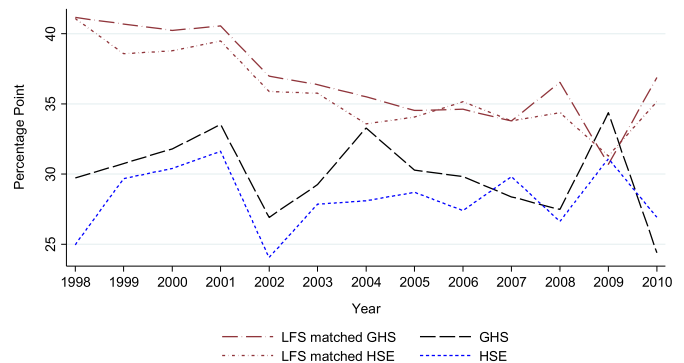
Notes: See notes to Figure 3.

**Fig. 5.** Regression-adjusted LLSI Employment Gap in Harmonised Samples (*Sample 2*) across Surveys (1998–2012).



Notes: See notes to Figure 3. *Sample 3* is a matched subsample of *Sample 2*.

**Fig. 6.** LLSI Prevalence in Harmonised Matched Samples (*Sample 3*) across Surveys (1998–2010).



Notes: See notes to Figure 6.

**Fig. 7.** Regression-adjusted LLSI Employment Gap in Harmonised Matched Samples (*Sample 3*) across Surveys (1998–2010).

harmonisation for (1) disability and employment definitions, (2) survey methods and (3) sample composition are reported in [Figs. 1–7](#).

#### 5.1. Harmonised definitions (*Sample 1*)

[Fig. 1](#) presents the proportion of the working-age population who report LLSI in each of the three surveys over the period from 1998. Despite asking identical questions, the prevalence of LLSI in the HSE is consistently greater than in the GHS (about 3 percentage points), possibly reflecting the emphasis on health in the survey ([Schur et al., 2013: 18](#)). Both the GHS and HSE show a significant downward trend which extends beyond those reported in the literature (3 and 2 percentage points respectively 1998–2009). In contrast, LLSI prevalence is increasing in the LFS (2 percentage points 1998–2009). A seemingly minor discontinuity (see notes to [Table 2](#) and [Online Appendix 6](#)) appears to create a marked increase in reporting in the LFS between 2009 and 2010 and, as a consequence, our formal analysis of trends is restricted to between 1998 and 2009.

[Fig. 2](#) presents the LLSI employment gap (that is, the percentage point difference in the employment rate between those who do and do not report LLSI). That the employment gap is greater in the GHS than in the HSE is consistent with the lower prevalence in the former than in the latter. As found in our review above, there are major differences in trends across the surveys: there is no discernible trend in either the GHS or HSE but a large and

continuous downward trend in the LFS (9 percentage points 1998–2009). The absence of a trend in the GHS is consistent with the literature. Although Minton et al. (2012) report increasing gaps for broad occupations, Berthoud (2007, 2011) and Berthoud and Blekesaune (2006) report an absence of trend at the aggregate level. The clear downward trend in the LFS is consistent with trends reported by Black (2008); DWP (2013); and Jones and Wass (2013).

The statistical significance of differences in linear trends in the prevalence of LLSI and the LLSI-related employment gap between surveys for *Sample 1* are reported in Appendix Table A.1. The positive trend in the rate of LLSI in the LFS is confirmed and is in contrast to a negative trend (of similar magnitude) in the other two surveys (Panel A). The narrowing trend in the LLSI employment gap in the LFS (0.6 percentage points per year) is confirmed (at the 1% level) as being at odds with the absence of trend in the other two surveys (Panel B).

As a further check on the impact of definition on trends across surveys, Figs. 1, 2, 6 and 7 are replicated for the long-standing illness definition (LSI) in Figures OL1 to OL4 in Online Appendix 4. As expected, given the broader definition, prevalence rates are higher and employment gaps are lower in all three surveys but the same inter-survey differences in trends are evident.

### 5.2. Harmonised survey methods (*Sample 2*)

Figs. 3 and 4 replicate Figs. 1 and 2 but for *Sample 2*, which is restricted to England and excludes proxy responses, repeat interviews and telephone interviews. There is no change to the HSE sample by construction. Appendix Table A.2 reports LLSI prevalence rates and employment gaps for each element of harmonisation separately and indicates an increase in the prevalence of LLSI in the harmonised LFS. Comparing Figs. 3 and 1, there is greater variability in the harmonised LFS series, as may be expected due to the smaller sample. Otherwise, though, the trends for the LFS and the GHS remain similar to the original samples, i.e. the LLSI prevalence rate displays a modest downward trend in the GHS and HSE but, even before the discontinuity in 2009, the trend in the LFS is upward.

The exclusion of repeat (panel) interviews, telephone interviews and proxy interviews increases the employment gap in the LFS (see Table A.2). In terms of trends, comparing Figs. 2 and 4, harmonisation narrows the difference in employment gaps between the GHS and the HSE, which both now fluctuate around 30 percentage points. The downward trend in the LFS remains evident, although it is shallower than for *Sample 1* (falling from 43 to 36 percentage points 1998–2009, rather than from 41 to 32 points). The effects of (i) restriction to England and exclusion of proxy interviews are separated from (ii) wave one and face-to-face interviews in the Online Appendix 5 (Figures OL5 to OL8 respectively), and indicate a greater impact of the latter. Overall, the divergent trends in both LLSI prevalence and the LLSI-related employment gap observed in the literature and in *Sample 1* remain after harmonisation for collection and coverage, albeit that the reduction in the employment gap in the LFS over time is less distinctive.

### 5.3. Harmonised sample composition (*Sample 2* and *Sample 3*)

Extending the harmonisation to sample composition in Stage 3, Fig. 5 reports regression-adjusted LLSI employment gaps for *Sample 2*. As expected, these are lower than unadjusted gaps across the surveys and the impact of harmonising for sample composition is greater in the LFS. Again, though, key differences between the data sources remain: the employment gap is greater

in the LFS than in the GHS and HSE and a downward trend is pronounced only in the LFS (8 percentage points). The statistical significance of the difference in the linear trend between surveys in the LLSI employment gap is tested in Table A.3 (Panel B). While the trend is not significantly different between the HSE and GHS, being absent in both cases, the LFS remains significantly different to both of these surveys at the 1% level with a narrowing trend of 0.6 percentage points per year. The differences in the linear trend in the prevalence rate across surveys are also robust to harmonisation for survey methods and regression adjustment for sample composition (Panel A).

The LLSI prevalence rate and regression-adjusted LLSI employment gap based on the matched sub-sample (*Sample 3*) are shown in Figs. 6 and 7 respectively. In Fig. 6, both matched LFS samples exhibit a similar pattern of growth in LLSI prevalence found in *Sample 1* and *Sample 2* (and not evident in the GHS and HSE). The significance of the difference in the regression-adjusted linear trends between the matched samples across surveys is confirmed in Appendix Table A.4 (Panel A). The regression-adjusted employment gap derived from the matched samples (Fig. 7) tracks downwards in the LFS, and the reduction is greater than in Fig. 5 (at about 10 percentage points 1998–2009), albeit 2009 appears to mark a dip in the employment gap. Appendix Table A.4 (Panel B) confirms that the downward linear trend in the LLSI employment gap remains significant in the LFS, while there is no significant trend within the HSE or GHS. Indeed, differences in the trends between surveys remain significant at the 1% level. Overall, therefore our results suggest that the combined influence of definition, survey methodology and sample composition does not eliminate the discrepancy between the LFS and the other two surveys.

## 6. Conclusion

While the OECD (2010: 50–51) laments the general absence of progress in narrowing disability-related employment gaps around the world, and indeed a widening in several countries, Schur et al. (2013: 38) identifies the UK as a successful outlier. This is based on data from the LFS, the preferred source of data to monitor disability employment trends (see Black (2008); DWP (2013)) and for policy-making in the area of disability and employment (Cousins et al., 1998: 326; and Bajekal et al., 2004: 4–5). By replicating trends in prevalence and employment gaps reported in previous studies while using a common definition of disability (based on LLSI) and harmonising for survey methods and sample composition, the present study has confirmed that different surveys report different trends and that the narrowing disability-related employment gap in the LFS since 1998 is not replicated in the two other national surveys, the GHS or HSE. Until we can account for the discrepancy in trends, we cannot be confident that the disability-related employment gap has fallen, and therefore that the UK has been relatively more successful than its neighbours in integrating disabled people into work.

Discrepancies between surveys raise important questions for research as well as policy in relation to the future collection and use of information on disability and employment. In investigating divergent trends, and seeking to account for them in terms of differences in definitions, survey methodologies and sample compositions, our aim has been to identify the sensitivity of findings to the survey used rather than to identify the best survey or the optimal definition of disability. Choices here may be based on value as well as methodological judgements. The narrowing impact of *Sample 2* on the employment gap suggests that issues relating to survey methodology, for example the influence of proxy responses and interview mode, while unable to fully explain the discrepancy, are

important. Of course, there remain differences between the three surveys that we have been unable to control for and which may contribute to the remaining differences in the trends, including the focus of the survey, structuring of the questionnaire and precise wording of the definition of disability, both in relation to LLSI and LSI.

The negative relationship between prevalence rates and the employment gap observed between surveys is explored further in [Online Appendix 7](#) and suggests that the widening coverage of disability in the LFS, albeit using a consistent definition, is a driver of the narrowing LFS employment gap. The relationship is not observed in the GHS or HSE and, while inter-survey differences in prevalence are a possible explanation for differences in the employment gap between the LFS and HSE, this is not true for differences between the LFS and GHS. Further research could usefully identify differences between surveys in the composition of the disabled population over time, for example, in terms of the type of condition or impairment, and the link between this and employment disadvantage.

In highlighting and investigating divergent trends in disability prevalence and employment disadvantage between surveys, our aim has been to caution researchers and policy-makers in drawing conclusions from results of a single survey, to identify the sensitivity of findings to differences in survey methodology and to provide direction to further research in this area. We wish to encourage greater critical reflection from authors when drawing conclusions based on a single survey, particularly with respect to the robustness of their findings to their choice of survey, and also further investigation into survey methodology

as a source of inter-survey differences in studies of disability. It is this type of analysis that will inform recommendations for future data collection and ultimately enable us to answer that most basic of questions in the field of disability research: has there been a narrowing of the disability-related employment gap in the UK?

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### Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.socscimed.2015.07.012>.

### Appendices

**Table A.1**

LLSI Prevalence and Employment Gaps with Harmonised Definitions (*Sample 1*) across Surveys (pooled sample).

	LFS	GHS	HSE
<b>Panel A: Prevalence</b>			
Trend	0.002*** (17.12)	−0.002*** (7.14)	−0.002*** (4.39)
Personal characteristics	No	No	No
Region fixed effects	No	No	No
N	914,492	136,158	92,435
Wald chi2 (p-value) (all variables)	292.94 (0.00)	51.01 (0.00)	19.32 (0.00)
Trend		Wald chi2 trend (LFS = GHS) (p-value) 158.12 (0.00)	
		Wald chi2 trend (GHS = HSE) (p-value) 2.60 (0.11)	
		Wald chi2 trend (LFS = HSE) (p-value) 93.52 (0.00)	
		Wald chi2 trend (LFS = GHS = HSE) (p-value) 228.01 (0.00)	
<b>Panel B: Employment Gap</b>			
No LLSI	0.407*** (141.95)	0.331*** (40.11)	0.297*** (36.40)
No LLSI*trend	−0.006*** (18.55)	−0.001 (1.19)	−0.001 (1.04)
Personal characteristics	No	No	No
Region fixed effects	No	No	No
Trend	Yes	Yes	Yes
No LLSI*trend	Yes	Yes	Yes
N	914,492	136,058	91,841
Wald chi2 (p-value) (all variables)	72,872.65 (0.00)	9150.40 (0.00)	5773.68 (0.00)
No LLSI*trend		Wald chi2 no LLSI*trend (LFS = GHS) (p-value) 28.17 (0.00)	
		Wald chi2 no LLSI*trend (GHS = HSE) (p-value) 0.00 (0.96)	
		Wald chi2 no LLSI*trend (LFS = HSE) (p-value) 25.73 (0.00)	
		Wald chi2 no LLSI*trend (LFS = GHS = HSE) (p-value) 48.44 (0.00)	

Notes: Data are pooled between 1998 and 2009 (prior to the LFS discontinuity) and marginal effects are generated from a probit model where the dependent variables are LLSI (Panel A) and employment (Panel B) respectively. t-statistics in parenthesis where \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 per cent level respectively. The Wald chi2 tests for the difference in the trend (Panel A) and no LLSI\*trend coefficients (Panel B), across two or more models.

**Table A.2**  
LLSI Prevalence and Employment Gaps by Survey (pooled sample).

	Survey		
	LFS	GHS	HSE
<b>Panel A: Prevalence</b>			
Harmonised Definitions ( <i>Sample 1</i> )	15.89	16.34	19.89
Harmonised Sample ( <i>Sample 2</i> )	16.14	16.66	19.89
England only	15.43	16.15	19.89
Wave One only	14.52	16.56	19.89
Exclude Proxy Interviews only	17.04	16.67	19.89
Face-to-face only	15.65	16.34	19.89
Matched Sample ( <i>Sample 3</i> ) (LFS–GHS)	15.94	17.39	–
Matched Sample ( <i>Sample 3</i> ) (LFS–HSE)	15.60	–	20.45
<b>Panel B: Employment Gap</b>			
Harmonised Definitions ( <i>Sample 1</i> )	35.50	32.15	28.72
Harmonised Sample ( <i>Sample 2</i> )	39.25	30.62	28.72
England only	33.65	30.78	28.72
Wave One only	38.69	32.10	28.72
Exclude Proxy Interviews only	37.10	32.16	28.72
Face-to-face only	40.31	32.15	28.72
Harmonised Sample ( <i>Sample 2</i> ) and Regression-adjusted	36.68	29.97	27.84
Matched Sample ( <i>Sample 3</i> ) (LFS–GHS)	39.33	31.39	–
Matched Sample ( <i>Sample 3</i> ) (LFS–HSE)	39.12	–	29.22
Matched Sample ( <i>Sample 3</i> ) Regression-adjusted (LFS–GHS)	36.97	30.27	–
Matched Sample ( <i>Sample 3</i> ) Regression-adjusted (LFS–HSE)	36.09	–	28.05

Notes: Analysis is based on a pooled sample 1998–2010 where each stage of the harmonisation process is completed separately.

**Table A.3**  
Regression-adjusted LLSI Prevalence and Employment Gaps in Harmonised Samples (*Sample 2*) across Surveys (pooled sample).

	LFS	GHS	HSE
<b>Panel A: Prevalence</b>			
Trend	0.003*** (9.65)	–0.001*** (3.05)	–0.001*** (3.48)
Personal characteristics	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
N	100,912	85,005	92,008
Wald chi2 (p-value) (all variables)	7214.13 (0.00)	4359.07 (0.00)	5001.15 (0.00)
Trend		Wald chi2 trend (LFS = GHS) (p-value) 69.34 (0.00)	Wald chi2 trend (GHS = HSE) (p-value) 0.12 (0.73)
		Wald chi2 trend (LFS = HSE) (p-value) 88.17 (0.00)	Wald chi2 trend (LFS = GHS = HSE) (p-value) 110.40 (0.00)
<b>Panel B: Employment Gap</b>			
No LLSI	0.415*** (45.57)	0.314*** (29.77)	0.287*** (34.00)
No LLSI*trend	–0.006*** (5.82)	–0.002 (1.38)	–0.001 (1.17)
Personal characteristics	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes
Trend	Yes	Yes	Yes
No LLSI*trend	Yes	Yes	Yes
N	100,912	84,986	91,595
Wald chi2 (p-value) (all variables)	18,296.78 (0.00)	13,499.38 (0.00)	15,134.92 (0.00)
No LLSI*trend		Wald chi2 no LLSI*trend (LFS = GHS) (p-value) 6.16 (0.01)	Wald chi2 no LLSI*trend (GHS = HSE) (p-value) 0.15 (0.70)
		Wald chi2 no LLSI*trend (LFS = HSE) (p-value) 11.41 (0.00)	Wald chi2 no LLSI*trend (LFS = GHS = HSE) (p-value) 12.62 (0.00)

Notes: See notes to Table A.1. Controls for region and personal characteristics (gender, age and highest qualification) are included but are not reported; a time trend is also included but not reported in the employment analysis (Panel B).

**Table A.4**Regression-adjusted LLSI Prevalence and Employment Gaps in Harmonised Matched Samples (*Sample 3*) (pooled sample).

	LFS matched to GHS	GHS	LFS matched to HSE	HSE
<b>Panel A: Prevalence</b>				
Trend	0.003*** (7.45)	−0.002*** (3.61)	0.004*** (9.51)	−0.001*** (2.85)
Personal Characteristics	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
N	69,306	69,758	74,204	74,712
Wald chi2 (p-value) (all variables)	5161.42 (0.00)	3515.92 (0.00)	5669.54 (0.00)	4032.35 (0.00)
Trend	Wald chi2 trend (LFS matched to GHS = GHS) (p-value) 62.41 (0.00)		Wald chi2 trend (LFS matched to HSE = HSE) (p-value) 80.69 (0.00)	
<b>Panel B: Employment Gap</b>				
No LLSI	0.421*** (36.39)	0.318*** (29.08)	0.408*** (37.86)	0.290*** (30.92)
No LLSI*trend	−0.007*** (4.86)	−0.002 (1.38)	−0.006*** (4.81)	−0.001 (1.08)
Personal Characteristics	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes
Trend	Yes	Yes	Yes	Yes
No LLSI*trend	Yes	Yes	Yes	Yes
N	69,306	69,739	74,204	74,374
Wald chi2 (p-value) (all variables)	12,764.60 (0.00)	10,991.85 (0.00)	13,655.55 (0.00)	12,140.23 (0.00)
No LLSI*trend	Wald chi2 no LLSI*trend (LFS matched to GHS = GHS) (p-value) 6.51 (0.01)		Wald chi2 no LLSI*trend (LFS matched to HSE = HSE) (p-value) 8.71 (0.00)	

Notes: See notes to Table A.3.

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