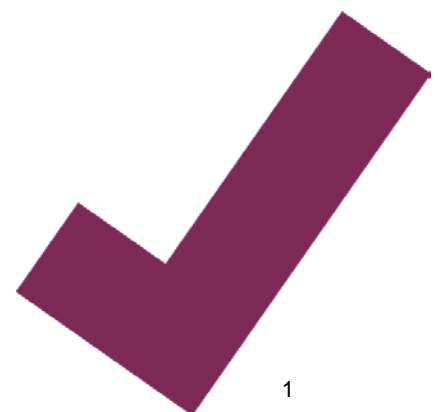# Employee engagement, sickness absence and agency spend in NHS trusts

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Publications Gateway Reference:	07679
Document Purpose	Report
Document Name	Employee engagement, sickness absence and agency spend in NHS trusts
Author	Jeremy Dawson and Michael West, The King's Fund
Publication Date	07 March 2018
Target Audience	CCG Clinical Leaders, CCG Accountable Officers, CSU Managing Directors, Care Trust CEs, Foundation Trust CEs , Medical Directors, Directors of PH, Directors of Nursing, Local Authority CEs, Directors of Adult SSs, NHS Trust Board Chairs, NHS England Regional Directors, NHS England Directors of Commissioning Operations, All NHS England Employees, Directors of HR, Directors of Finance, Allied Health Professionals, GPs, Communications Leads, Emergency Care Leads, Directors of Children's Services, NHS Trust CEs
Additional Circulation List	
Description	This report examines the relationship between staff engagement, sickness absence and reliance upon temporary staffing in NHS trusts. It is intended to support NHS organisations to build cultures of continuous improvement.
Cross Reference	NHS Staff Survey
Superseded Docs (if applicable)	N/A
Action Required	N/A
Timing / Deadlines (if applicable)	**N/A**
Contact Details for further information	Habib Naqvi WRES Implementation Team, Nursing Directorate Quarry House Leeds LS2 7UE 0113 8253636 www.england.nhs.uk/about/equality/equality-hub/equality-standard/resources/

Document Status

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Document Title: Employee engagement, sickness absence and agency spend in NHS trusts

Version number: 1

First published: March 2017

Prepared by: Jeremy Dawson **University of Sheffield** and Michael West of **The King's Fund**

Classification: official

This independent report was commissioned by the Workforce Race Equality Standard (WRES) team at NHS England. The views in the report are those of the authors and all conclusions are the authors' own.

The King's Fund is an independent charity working to improve health and care in England. We help to shape policy and practice through research and analysis; develop individuals, teams and organisations; promote understanding of the health and social care system; and bring people together to learn, share knowledge and debate. Our vision is that the best possible health and care is available to all.

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1 Foreword

I commissioned this study from The King's Fund to look at the 'real world' relationship between staff engagement, sickness absence and reliance on temporary staffing.

It confirms, empirically, what common sense suggests should be true: that staff engagement is not only good for employees' health but reduces trusts' cost and reliance on agency staffing. So doing the 'right thing' also helps trusts with their budget pressures. As such, this report offers important practical lessons for the whole NHS.

Simon Stevens
Chief Executive
NHS England

2 Executive summary

2.1 Introduction

This report describes an analysis of the links between employee engagement, sickness absence and spend on agency staff in NHS trusts in England in 2016/17. The analysis tests the proposition that where employee engagement is lower, there will be a higher level of sickness absence among staff, and this will necessitate a higher level of spend on agency (and bank) staff.

2.2 Methods

The analysis linked trust data from 2016/17 (and, for some measures, for the previous year) from the NHS Staff Survey (employee engagement), NHS Digital (sickness absence), and NHS Improvement (agency and bank staff spend). All analysis was therefore at the trust level (as opposed to site, directorate, or occupational group level analysis). We sought to establish whether there were the expected relationships between the variables in 2016/17 across the NHS as a whole; to determine whether there was evidence of any overall indirect effect between engagement and agency staff spend via sickness absence; to examine any differences by trust type; and to examine the effects across two years of data where possible.

2.3 Key findings

There were clear associations between employee engagement and sickness absence; and between employee engagement and agency staff spend (whether or not spend on bank staff was included within this). The effect size was substantial – a one standard deviation increase in overall engagement is associated with a drop of 0.9 per cent in spend on agency staff (a one standard deviation change in overall engagement represents a shift of 0.12 units on the scale from 1 to 5). For an average trust this works out at approximately £1.7 million (with a 95 per cent confidence interval of £600, 000–2.7 million).
There was a curvilinear relationship between sickness absence and spend on agency staff, such that at lower levels of absence there is a stronger relationship, but when absence reaches a high level, there is no substantial further increase in agency (and bank) staff spend as absence continues to rise yet further. There is evidence of an indirect (mediated) relationship between engagement and agency staff spend, via sickness absence levels. In other words, the effect of engagement on agency spend seems to be due to effects of sickness absence.
When these relationships were analysed to determine whether they occurred over time (from one year to the next), the results showed that they were similar to those examined within a single year. In particular, there was good evidence that higher engagement in one year was associated with lower subsequent spend on agency (and bank) staff the following year. This relationship over time was as strong as the relationships observed when we analysed the data within a single year. However, there were no clear, significant links between absence levels one year and agency staff spend the following year. This makes sense in that the relationship between absence and agency spend is likely to be more immediate whereas engagement is likely to have less variability from year to year.

The links between employee engagement one year and sickness absence the following year were only slightly stronger than (and not significantly different from) the links from sickness absence one year to employee engagement the next. Therefore, no firm conclusions can be drawn about the direction of causality in the relationships found. When more data is available over the coming years, it may be possible to more clearly establish the direction of causality in these relationships.

2.4 Conclusion

There is clear evidence that trusts with higher engagement levels have lower levels of sickness absence among staff, and also have lower spend on agency and bank staff. Given the data available, it was not possible to establish clearly the causal direction of these relationships. Nevertheless, the strength of the associations between engagement, staff absence and agency spend, and the financial implications suggests that NHS leaders should investigate the importance of nurturing positive, trusting cultures within which staff have high levels of wellbeing; where they feel valued, respected and supported; where they have high levels of influence in their workplaces; and where they are consequently more highly engaged.

3 Introduction

This report describes the analysis of the links between employee engagement, sickness absence and spend on agency staff in NHS trusts in England in 2016/17. The analysis, commissioned by NHS England, to determine whether low employee engagement is associated with a higher level of sickness absence among staff, and this in turn necessitates a higher level of spend on agency staff. Although the original intent was to examine spend on agency staff spend only, we also examined spend on agency and bank staff combined.

4 Methods

4.1 Overall approach and sample

The analysis linked trust-level data from 2016/17 (and, for some measures, for the previous year) from the NHS Staff Survey (employee engagement), NHS Digital (sickness absence), and NHS Improvement (agency and bank staff spend). All analysis was at trust level (not, for example, at directorate level). The detail of the analytic methods is described in section 2.6, but the general approach was to establish whether there were relationships between the expected variables in 2016/17 across the NHS as a whole; to determine whether there was evidence of any indirect effect between engagement and agency staff spend via sickness absence; to examine any differences by trust type; and to examine the effects across two years of data where possible.

Data from all NHS trusts in England was collated. However, there were three mergers of trusts that occurred during 2016/17;[1] this means that the data from

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[1] Calderstones Partnership NHS Foundation Trust merged with Mersey Care NHS Foundation Trust; North Essex Partnership University NHS Foundation Trust with South Essex Partnership NHS Foundation Trust; and Manchester Mental Health and Social Care Trust with Greater Manchester West Mental Health NHS Foundation Trust.

different sources could not be reliably matched, as the employee base was substantially different. Therefore, these three trusts (or six old trusts) were excluded from the analysis. This resulted in a total sample size of 232 trusts, with the following numbers:

- 137 non-specialist acute trusts

- 17 specialist acute trusts

- 50 mental health/learning disability trusts (abbreviated to MH/LD henceforth)

- 18 community trusts

- 10 ambulance trusts.

4.2 Employee engagement

The word 'engagement' has different meanings and interpretations for different people. In psychology and management research many definitions have been used over the past 30 years. However, a useful description is that provided in the NHS Employers Staff Engagement toolkit: 'Engaged staff think and act in a positive way about the work they do, the people they work with and the organisation that they work in.'

The sub-dimensions of engagement, captured in the NHS Staff Survey reflect the dimensions in the NHS Employers definition.

Motivation. This is similar to the 'work engagement' construct used within the psychology literature, which is defined as a positive, fulfilling, work-related state of mind characterised by vigour, dedication, and absorption.[2] Staff who are motivated in this way are more likely to deliver high-quality care for patients.

Involvement. This incorporates both the ability to participate in decision-making within one's local work area, and proactivity in making positive changes at work where possible. It is consistent with definitions of engagement that emphasise leaders listening to their employees and ensuring conditions that encourage staff involvement.

Advocacy. This relates to the extent to which an employee is willing to recommend the organisation as a place to receive treatment, and to recommend the organisation as a place to work (closely related to the Friends and Family Test measure). It is the extent to which staff offer a positive picture of the organisation to outsiders.

These three dimensions of engagement have been measured in the annual NHS Staff Survey since 2009, and are reported both separately and together in engagement scores. In this report we use the overall engagement score and the separate dimensions to establish whether there is any overall effect, but then also to disentangle whether the elements of engagement have differentially strong relationships with absence and agency spend.

The overall engagement trust scores varied from 3.17 to 4.04 (measured on a scale from 1–5), with a mean of 3.80 and a standard deviation (SD) of 0.12. This

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[2] Schaufeli WB, Salanova M, Gonzalez-Roma V, Bakker AB (2002). 'The measurement of engagement and burnout: A two sample confirmatory factor analytic approach'. *Journal of Happiness Studies*, no 3, pp 71–92.

information is useful for the interpretation of effect sizes in the main analysis below because it is possible to calculate what a shift of one standard deviation would imply in financial savings where there is a demonstrated direct effect between engagement and agency spend or absence. The equivalent summary statistics for all dimensions of engagement are shown in the following table:

	Mean	SD	Range
Overall engagement	3.80	0.12	3.17-4.04
Motivation	3.92	0.09	3.45-4.10
Involvement	3.72	0.13	3.02-3.92
Advocacy	3.75	0.20	3.03-4.27

4.3 Sickness absence

Sickness absence is measured routinely via the electronic staff record and published by NHS Digital. At the time of analysis, monthly data up until February 2017 had been published, meaning that the final month of 2016/17 was not yet available. Therefore, sickness absence data is based on the 11 months from April 2016 to February 2017 inclusive.

It is calculated as the percentage of total (substantive) staff working time (calculated via full-time equivalent days) that is lost to sickness absence. In 2016/17 this varied across trusts from 1.7 per cent to 7.0 per cent, with a mean of 4.3 per cent.

Two trusts do not use the electronic staff record, and therefore data were unavailable for these trusts.

4.4 Agency staff spend

Spend on agency staff was measured using data provided by NHS Improvement. Two measures were considered: the amount of spend on agency staff specifically, and the amount of spend on agency and bank staff combined. In both cases these were expressed as a percentage of the total substantive pay spend by the trust (as opposed to the percentage of total pay); effectively this is therefore a ratio of additional pay to substantive pay (ie, the total annual payroll for staff on substantive contracts), multiplied by 100.

Both forms of the variable displayed a slight but clear positive skew. A square root transformation converts these to variables that are very close to a normal distribution; however, as with all transformations this makes the analysis more difficult to interpret. Therefore, the primary analysis used the original (untransformed) variables, and robustness checks were conducted by repeating the analysis with the transformed variables. Unless otherwise stated, the conclusions from the analysis were largely the same.

Agency staff spend varied from 0.1 per cent to 25.4 per cent of trust's annual substantive pay, with a mean of 6.8 per cent. The combination of agency and bank staff spend varied from 2.4 per cent to 33.7 per cent, with a mean of 12.1 per cent.

4.5 Control variables

Because there are some systematic differences in both sickness absence rates and spend on agency (or agency and bank) staff between different categories of organisation, a number of variables were included in all analyses as control variables. Specifically, the control variables used were:

- trust type – using the categorisation used by NHS Improvement (as listed in section 2.1 above)

- region – major region of the country: London, South, Midlands or North (more precise versions of region were examined, but did not add significant explanatory power above major region, so in the interest of parsimony the major region variable was used)

- foundation trust status – whether the trust was a foundation trust or not

- teaching trust status – whether the trust was classified as a teaching trust or not

- trust size – number of full-time equivalent staff employed by the trust.

4.6 Analysis methods

The primary method used for the analysis was regression analysis (otherwise known as the general linear model). The analyses examined the overall questions posed in the introduction (section 1, above), in the following way.

1. *Is there a link between employee engagement and sickness absence?* This was examined with a series of regression analyses, in which first overall engagement, then each dimension of engagement separately, and finally all dimensions of engagement together, were added to the control variables as predictors, with absence as the dependent variable. In the first instance this was done within a single year's data for all variables.

2. *Is there a link between sickness absence and agency staff spend?* This was examined with two regression analyses, with agency staff spend (and agency plus bank staff spend) as dependent variables, with sickness absence from 2016/17 added to the control variables as a predictor.

3. *Is there a link between engagement and agency staff spend?* This was first examined via a series of regression analyses in which the engagement variables (using the same pattern as above) were used to predict agency (and agency plus bank) staff spend; then, mediation analysis was employed[3] to establish whether there is an indirect link between these variables via sickness absence. (The presence of such an indirect effect would support the hypothesis that engagement is linked to agency staff spend because of the effect on sickness absence).

4. *Are these effects dependent on trust type?* Although most trust types have insufficient numbers to be able to answer this question properly, for acute and MH/LD trusts the effects were tested separately, to see whether there are different findings between these two trust types.

5. *Is there evidence that the effects in 1-4 above carry over from year to year?* Unfortunately, as there was only a single year's data available for agency staff spend, longitudinal analysis is not possible; however, by using regression analysis with the predictors from 2015/16 rather than 2016/17, it is possible to estimate the effects of engagement and/or sickness absence on the following year's spend. We also use cross-lag analysis to establish whether there is a stronger link from engagement one year to the next year's sickness absence than vice versa (which would support the suggestion that there is a causal link).

In all cases, in addition to linear effects, we also tested for curvilinear effects by using quadratic terms of the predictors in the analysis. Unless explicitly stated in the results below, there was no evidence of such curvilinear effects.

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[3] This used the SPSS macros PROCESS and MEDCURVE.

5 Cross-sectional analysis 2016/17

5.1 Links between employee engagement and sickness absence

A full table of results for the models linking employee engagement and sickness absence is given in Appendix 1. The effects of the control variables indicate that sickness absence was generally higher in non-acute trusts, in Northern trusts, and (to a lesser extent) in non-foundation trusts.[4]

There were clear effects of each of the engagement variables with sickness absence. The effect was strongest for the overall engagement variable: the coefficient of -1.59 (p < .001) indicates that as engagement increases by one unit (ie, a difference of 1 on the 1–5 scale that engagement is measured on), sickness absence decreases by 1.59 per cent. A one-unit change at the trust level is extreme, however, as indicated by the standard deviation of overall engagement of 0.12. A one-standard deviation change (representing a relatively normal amount of variation between trusts) in overall engagement would be associated with a 0.19 per cent change in sickness absence. This would translate as a decrease from the average sickness absence of 4.3 per cent to around 4.1 per cent. Although this may seem small, for an average-sized trust this would represent a saving of approximately 2,000 sick days per year, or around £365,000 less in salary costs lost to sickness absence. However, it is important to recognise the lack of certainty in this figure: as the 95 per cent confidence interval around the regression coefficient is (-2.36, -0.83). This change in the number of sick days for an average-sized trust could therefore be anywhere between approximately 1,000 and 2,800, and the difference in salary costs between around £182,000 and £511,000 (with 95 per cent confidence).

The three dimensions separately have slightly smaller effect sizes, but each was statistically significant in its own right: that is, increases in motivation, involvement or advocacy were associated with lower levels of sickness absence, to almost the same level. When all three were considered simultaneously, it was advocacy that had a significant independent effect above the other two. This is perhaps unsurprising: employees' views about how willing they are to recommend the trust (as a place to work, or to receive treatment) may be affected by their observations of levels of absence. However, the fact that overall engagement had a strong significant effect, and that motivation and involvement separately had significant effects, indicates that advocacy is far from being the sole reason for the link.

5.2 Links between sickness absence and agency staff spend

A full table of results for the models linking sickness absence and agency (and bank) staff spend is given in Appendix 2. The effects of the control variables indicate that agency staff spend was generally highest in acute trusts and in London.

Somewhat surprisingly, there was not a direct effect between sickness absence levels and either version of the extra spend variable. However, there was some

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[4] Regression diagnostics for all tests were checked using usual procedures. All residuals followed a normal distribution. There was no evidence of heteroscedasticity in any analysis. Evidence of non-linear effects is reported where it was found. There was one positive outlier in some analyses (where agency staff spend or agency plus bank staff spend were the outcomes); however, this had little influence on the results. When this case was removed, in general the results strengthened, and no substantive conclusions were altered.

evidence of curvilinear relationships, and for that reason a version of the models with sickness absence squared as a predictor is included in Appendix 2.
This indicates that, in particular, there was a significant quadratic relationship between level of sickness absence and level of agency pay. The nature of this relationship is demonstrated in the plot below.
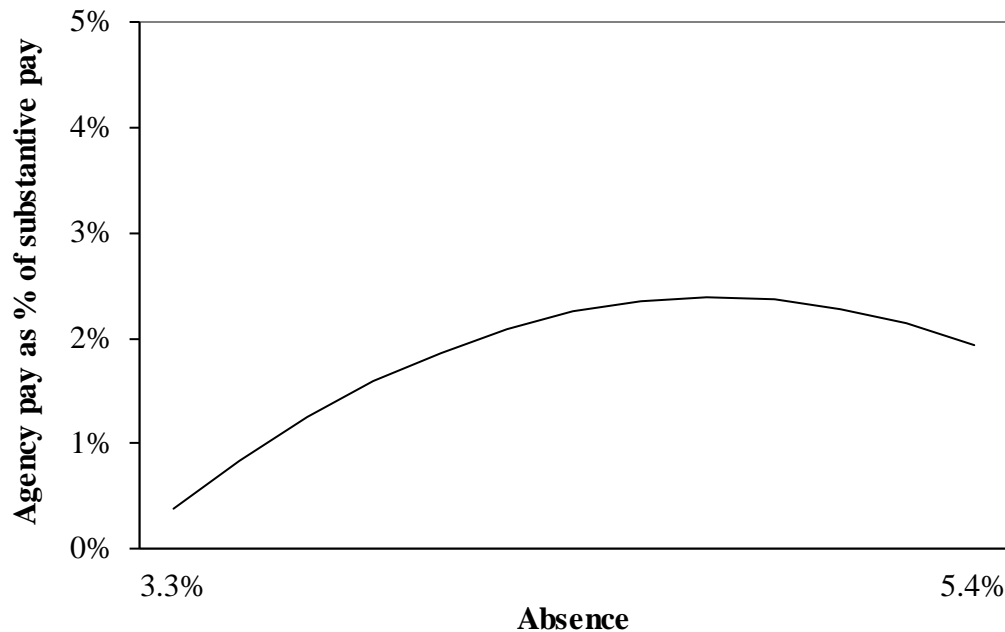
Although the precise shape of the plot does not necessarily tell the full story, the pattern indicated is clear. It suggests that at lower levels of absence, there is a relatively steep relationship with agency staff pay: in particular up to around 4.5 per cent absence, higher levels of absence are associated with substantially more agency staff pay. However, once the level of absence gets towards 5 per cent, this appears to tail off; at very high levels of absence it may even become negative again, perhaps due to other mechanisms being put in place to deal with the absence or trust simply running out of money to pay for agency staff.
The relationship with agency and bank staff pay is not quite significant. Even though there appears to be a significant effect of absence in the final model, as the squared term is not statistically significant this should not be interpreted as revealing a robust effect. However, the pattern of the relationship is very similar to that described above for agency staff.

5.3 Links between employee engagement and agency staff spend

A full table of results for the models linking employee engagement and agency staff spend is given in Appendix 3, and a full table of results for the models linking employee engagement and agency plus bank staff spend is given in Appendix 4.

As demonstrated in Appendix 3, there was a clear and significant relationship between overall engagement and agency staff spend: the coefficient of -7.57 (p = .002) means that for a one-unit increase in overall engagement, agency staff spend would fall on average by about 7.6 per cent of the total level of substantive

pay. Again, however, a one-unit change in engagement is extreme. A more realistic picture is given by the demonstration that a one-standard deviation change is associated with a 0.9 per cent drop. That is, if an average trust with moderate engagement has an agency staff spend level of 6.8 per cent, then one with relatively high engagement would (on average) have an agency staff spend level of 5.9 per cent. For a typical trust, this represents about £1.7 million: demonstrating that the real financial effect of low engagement is far more than the lost pay due to sickness absence alone. As before, the uncertainty in this figure is considerable: the difference in level of agency staff spend could be, with 95 per cent confidence, anywhere between £600,000 and £2.7 million (to the nearest £100,000).

Looking at the effects of the separate engagement dimensions, there appeared to be substantial relationships of both involvement and advocacy, although not of motivation, with agency spend. When all three dimensions were included in the same analysis, advocacy retained a significant effect in the same direction; somewhat confusingly, there appeared then to be a positive relationship between motivation and agency staff spend, but this is due to the well-known phenomenon of including multiple correlated variables within a single regression analysis (the correlations between the dimensions range from 0.58 to 0.81). Therefore, the most appropriate interpretation of these results is that advocacy had the most important relationship with agency staff spend, followed by involvement, and there was no evidence of a relationship between motivation and agency staff spend. The findings in Appendix 4 reveal that there was a similar pattern when the outcome was agency and bank staff spend combined. The only major difference here was that there is not a significant effect of involvement by itself. The general conclusions would be very similar though: an increase of one standard deviation in overall engagement is associated with a decrease in spend on agency and bank staff of about 1.2 per cent when expressed in terms of total substantive spend. For an average-sized trust, this represents approximately £2.2 million (with a 95 per cent confidence interval of between £700,000 and £3.6 million).

In the light of the findings in section 3.2 above, curvilinear relationships between engagement and agency (and bank) staff spend were tested; however, there was no evidence that these were statistically significant.

There was, however, evidence of an indirect effect between engagement and agency staff spend via sickness absence. Because of the curvilinear nature of the absence-spend relationship, this is not straightforward to quantify, but the instantaneous indirect effect[5] is far larger at low values of engagement (5.25 at one standard deviation below the mean of engagement) than at high values (1.93 at one standard deviation above the mean of engagement). Only at very high levels of engagement is this effect not statistically significant (ie, different from zero). Therefore, this supports the notion that at least one of the reasons why there is a link between engagement and agency staff spend is the effect on sickness absence.

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[5] The instantaneous indirect effect shows the expected mediated relationship; when there is a curvilinear relationship involved, the size of this effect will be different at different levels of the independent variable (which in this case is engagement). The effect is interpreted in a similar way to a regression coefficient: that is, an effect of size 5.25 means that, on average, a one-unit difference in engagement is associated with a difference of 5.25 per cent in agency staff spend that can be attributed to the difference in sickness absence rates.

5.4 Variations by trust type

The analyses in sections 3.1 to 3.3 were repeated on each trust type separately. The findings, especially those around confidence in the results and statistical significance, were heavily affected by sample size, as there is a good size sample (137) of non-specialist acute trusts; a modest sample (50) of MH/LD trusts; and very small samples of the other three trust types (17 acute specialist, 18 community and 10 ambulance).
Full results for each trust type are not given here, but are available on request to the authors. However, the key findings are summarised as follows.[6]

- In acute trusts, the relationships between employee engagement and sickness absence mirrored those of the full sample very closely indeed. Most relationships that were statistically significant using the full sample were also significant with acute trusts only, and with similar magnitudes. The relationship between sickness absence and agency staff spend did not reach statistical significance. The links between engagement and agency staff spend, however, were mostly statistically significant, with a similar pattern to that across the whole sample.

- In MH/LD trusts, there was not a significant link between overall engagement and sickness absence, but there was specifically for the advocacy dimension of engagement. There was evidence of a curvilinear relationship between sickness absence and agency staff spend, similar to that for the overall sample. There were no significant relationships between employee engagement and agency staff spend.

- In acute specialist trusts, somewhat surprisingly given the sample size, there were also statistically significant relationships between engagement (overall, and also motivation and advocacy separately) and sickness absence. There was no significant relationship between sickness absence and agency staff spend, or between employee engagement and agency staff spend – not surprising, given the small sample size (17 trusts).

- In community trusts there were no significant relationships. This is not surprising given the sample size (18 trusts).

- In ambulance trusts there were no significant relationships. Again, this is also not surprising given the sample size (10 trusts).

Broadly, then, this demonstrates that there were no real differences by trust type: the pattern found across the whole sample was also true for acute trusts only, and among the other trust types – where the samples were mostly too small to detect anything conclusive – there was no evidence of any different patterns.

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[6] In all cases the relationships with agency staff spend also apply when considering agency plus bank staff spend.

6 Longitudinal analysis

6.1 Links between employee engagement and sickness absence

When employee engagement measured in autumn 2015 was used to predict sickness absence in 2016/17, the pattern of results was very similar to that observed in the cross-sectional analysis (reported in section 3.1 and Appendix 1). The same predictors were statistically significant, and with similar effect sizes. Tables of full results are not reported here, therefore, but are available on request. This suggests that the extent to which employees feel engaged in one year is likely to be linked with absence levels a full year later.

In an attempt to glean further insight into direction of causality of these relationships, a cross-lag analysis was conducted, in which the associations between employee engagement in 2015 and sickness absence in 2016/17 were compared with the associations between employee engagement in 2016 and sickness absence in 2015/16. Although the effect sizes were slightly larger for the former associations (which would suggest that lower engagement is more likely to lead to higher sickness absence than vice versa), these differences were not statistically significant, meaning that firm conclusions about the causal direction cannot be drawn.

6.2 Links between sickness absence and agency staff spend

When sickness absence in 2015/16 was used to predict agency staff (or bank plus agency staff) spend in 2016/17, the links were somewhat less clear. Specifically, there were no statistically significant effects, even though the trends are in the expected direction.

This is likely to be because the effects of absence do not link directly to spend on agency staff the following year – the relationship between absence and agency spend is likely to be more bound in time in the sense that when there is absence, it has to be covered now rather than in a year's time. However, some of the underlying causes of the absence are likely to persist, and therefore it is not surprising that there might be a small association.

6.3 Links between employee engagement and agency staff spend

There were, however, significant relationships between employee engagement measured in autumn 2015, and spend on agency (and bank) staff in 2016/17. Specifically, the patterns of results, including the effect sizes and statistical significance, was very similar to those of the cross-sectional analysis (in Appendices 3 and 4); in fact, the effect sizes were on average slightly larger. This means that there is clear evidence that employee engagement – and in particular the advocacy and involvement elements – links with subsequent spend on agency (and bank) staff.

Although this is not in itself strong evidence for a causal effect, it is certainly in line with what would be expected if engagement does in fact lead to lower spend on agency staff. Unfortunately, as previously noted, a cross-lag analysis similar to that in section 4.1 cannot be conducted as agency staff spend is only available for one year.

6.4 Variations by trust type

When broken down by trust type, the results very closely mirrored those of the cross-sectional analysis: that is, results for acute trusts were similar to those for the overall sample, but for the other trust types most results failed to reach statistical significance because of the small sample size. For all practical purposes, it is reasonable to infer that the associations are likely to be similar across different types of trusts.

7 Summary of findings

Overall, therefore, there is a relatively clear pattern of results, albeit with some specific nuances.

It is clear that there was an association between employee engagement within NHS trusts, and the extent to which the trusts spend on agency (and bank) staff. This was true when engagement is considered as an overall factor. When it was broken down into its three constituent dimensions, advocacy emerges as the most important sub-dimension, with involvement also having substantial effects (but motivation less so). To quantify the effect, a one-standard deviation change (representing a typical variation between trusts) in overall engagement in an average trust was associated with a saving of approximately £1.7 million (95 per cent confidence interval £600,000–2.7 million). Thus, there is some considerable uncertainty in the size of this effect, and indeed the nature of its causal links, but even at the lower limit it appears reasonably substantial. It does suggest that increasing engagement might result in substantial financial savings for trusts. There was also a clear association between employee engagement and the level of sickness absence in trusts. Again, this was true whether engagement was considered as an overall score, or separately by sub-dimension. Indeed, each dimension individually was a statistically significant predictor of absence, although when considered jointly, it was advocacy that was the most important. A one-standard deviation increase in overall engagement in an average-sized trust was associated with a saving of approximately 2,000 sick days per year, which works out at around £365,000 less in salary costs lost to sickness absence (95 per cent confidence interval from £182,000–511,000). When compared with the figure relating to agency spend, this is considerably smaller. There are various possible reasons for this, but one of them is that the true cost of absence is far greater than the loss of salaried time alone. It may reflect that agency staff are more expensive than substantive staff for the same work. It may also relate to more persistent staff vacancies, which could be more difficult to fill (or occur more regularly) when engagement is lower.

Slightly more complicated is the relationship between sickness absence and spend on agency (and bank) staff. There was a relationship evident in the data, although it was not a straightforward linear relationship; when absence reaches a higher level, there was less (or no) further increase in agency and bank staff spend. This is possibly due to either the need to use other options when absence is that high (eg, recruiting more staff), or the inability to recruit appropriate agency or bank staff beyond a certain level or trusts simply running out of money to hire agency staff. Despite this, there is evidence of an indirect (mediated) relationship between engagement and agency staff spend, via sickness absence levels; this indirect relationship is itself variable, however, and is stronger when absence is at lower levels, particularly below 4 per cent.

When considered over time the findings were similar to those examined within a single year. In particular, there was good evidence that engagement in one year was associated with subsequent spend on agency (and bank) staff, to a similar degree to the association within a single year. This is possibly due to relatively stable levels of engagement from one year to the next, but is also consistent with the idea that changing engagement levels one year may affect subsequent staffing costs. However, there were no clear, significant links between absence levels one year and agency staff spend the following year. In addition, the links between employee engagement one year and sickness absence the following year were only slightly stronger than (and not significantly different from) the links from sickness absence one year to employee engagement the next. Taken with the previous results, therefore, this means that no firm conclusions can be drawn about the direction of causality in the relationships found, although the results are certainly in the expected direction.

All these effects appeared to be fairly consistent by trust type. It is impossible to infer much from this, because the only trust type with a large sample size was non-specialist acute trusts. It is fair to say that for these trusts, the patterns were very similar to those for the whole sample. For the other trust types, the samples were too small to allow firm conclusions, though those few effects that were statistically significant were consistent with those found in acute trusts and the sample overall. Therefore, the overall conclusion is that all trust types displayed a similar pattern to that found overall.

An interesting angle that is not possible to examine with the current data is whether the findings here are consistent across different demographic groups of staff. The recently-published report "Links between NHS staff experience and patient satisfaction: Analysis of surveys from 2014 and 2015" suggests that certain negative staff experiences have particularly damaging effects on outcomes, especially for staff from a Black and Minority Ethnic (BME) background. In particular, perceptions of unequal treatment and discrimination were especially damaging. Therefore future research may explore whether low engagement levels amongst BME staff are particularly associated with sickness absence amongst this group, as it may be that their experiences disproportionately contribute to the spend on agency and bank staff.

8 Limitations

As with all research, there are a number of limitations with the design that need to be taken into account when interpreting the findings.

First, it was not possible to do any truly longitudinal analysis, as figures for spend on agency and bank staff were only available for one year. This means that there may well be interesting patterns in the relationships between the variables over time that we have been unable to detect.

It also means that we cannot say much about the casual direction of the effects. Although there was nothing to suggest that the expected causal effects (higher employee engagement leading to lower sickness absence, in turn leading to lower spend on agency and bank staff) do not hold, we cannot say with certainty that the causal mechanism is as suggested here. Indeed, it is likely that at least some of the effect will be explained by other factors; for example, high-quality leadership within trusts may be the cause of good engagement and also lead directly to lower sickness levels, or staffing strategies that are more able to cope without the need for many agency staff. This is speculation, however, and just one example of other possible explanatory mechanisms for the relationships found. In addition, local labour markets may have some effect on all the variables in the analyses. We have attempted to control for this by the inclusion of region and other contextual variables as covariates in the analyses, but this cannot be removed completely. In general, there are various external variables that may have an influence on the process but were measured and therefore not included.

There were also other limitations with the data. In particular, sickness absence data did not cover the whole 12-month period (only 11 months). Some trusts' data could not be included in the analysis either due to the lack of published sickness absence data, or the fact that organisations merged during the year. As with any recording of absence data, we cannot be certain how accurate this is. Finally, all the data had to be matched at the trust level; this will undoubtedly obscure some associations that would only become apparent when examining the data at a lower level, eg, site, department or occupational group, if such data was available.

Appendix 1: Employee engagement predicting sickness absence

Engagement variable:	Overall		Motivation		Involvement		Advocacy		All	
	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p
Intercept	10.75 (7.87, 13.63)	0.000	9.31 (5.13, 13.50)	0.000	9.36 (5.93, 12.79)	0.000	8.54 (7.00, 10.09)	0.000	6.15 (1.66, 10.64)	0.007
Trust type[1]: specialist	-0.15 (-0.46, 0.16)	0.354	-0.33 (-0.64, -0.03)	0.034	-0.27 (-0.58, 0.03)	0.079	0.00 (-0.33, 0.32)	0.979	0.06 (-0.28, 0.41)	0.715
Trust type[1]: MH/LD	0.72 (0.54, 0.90)	0.000	0.73 (0.55, 0.92)	0.000	0.81 (0.63, 1.00)	0.000	0.66 (0.48, 0.84)	0.000	0.61 (0.40, 0.82)	0.000
Trust type[1]: community	0.67 (0.41, 0.93)	0.000	0.68 (0.41, 0.95)	0.000	0.66 (0.39, 0.93)	0.000	0.67 (0.42, 0.93)	0.000	0.68 (0.42, 0.94)	0.000
Trust type[1]: ambulance	0.83 (0.40, 1.26)	0.000	1.07 (0.61, 1.53)	0.000	0.80 (0.23, 1.36)	0.006	1.10 (0.75, 1.44)	0.000	1.43 (0.80, 2.05)	0.000
Region[2]: London	-1.41 (-1.63, -1.20)	0.000	-1.45 (-1.67, -1.22)	0.000	-1.45 (-1.67, -1.23)	0.000	-1.44 (-1.64, -1.23)	0.000	-1.46 (-1.68, -1.25)	0.000
Region[2]: South	-0.83 (-1.01, -0.65)	0.000	-0.86 (-1.04, -0.67)	0.000	-0.85 (-1.04, -0.67)	0.000	-0.84 (-1.01, -0.66)	0.000	-0.85 (-1.02, -0.67)	0.000
Region[2]: Midlands	-0.56 (-0.73, -0.39)	0.000	-0.56 (-0.74, -0.37)	0.000	-0.58 (-0.76, -0.41)	0.000	-0.57 (-0.74, -0.40)	0.000	-0.58 (-0.75, -0.40)	0.000
Teaching trust status[3]	-0.03 (-0.22, 0.15)	0.742	-0.03 (-0.22, 0.16)	0.771	-0.02 (-0.20, 0.17)	0.865	-0.03 (-0.21, 0.16)	0.774	-0.02 (-0.21, 0.16)	0.804
Foundation trust status[4]	-0.11 (-0.27, 0.04)	0.150	-0.18 (-0.33, -0.02)	0.025	-0.16 (-0.31, 0.00)	0.048	-0.08 (-0.24, 0.07)	0.284	-0.08 (-0.23, 0.08)	0.318
Trust size[5]	0.00 (0.00, 0.00)	0.916	0.00 (0.00, 0.00)	0.931	0.00 (0.00, 0.00)	0.863	0.00 (0.00, 0.00)	0.687	0.00 (0.00, 0.00)	0.547
Engagement: overall	**-1.59 (-2.36, -0.83)**	**0.000**								
Engagement: motivation			**-1.16 (-2.23, -0.09)**	**0.034**					0.20 (-1.21, 1.62)	0.777
Engagement: involvement					**-1.24 (-2.16, -0.31)**	**0.009**			0.73 (-0.74, 2.19)	0.329
Engagement: advocacy							**-1.04 (-1.46, -0.61)**	**0.000**	**-1.34 (-1.97, -0.70)**	**0.000**
R[2]	**.656**		**.637**		**.641**		**.666**		**.669**	

Notes:
[1]*Trust type reference category is acute (non-specialist)*
[2]*Region reference category is North*
[3]*Reference category is non-teaching trusts*
[4]*Reference category is non-Foundation trusts*
[5]*Trust size measured by full-time equivalent employees*
Statistically significant (p < .05) effects of engagement variables shown in bold

Appendix 2 – Sickness absence predicting agency (and bank) staff spend

Dependent variable:	Agency staff spend				Agency plus bank staff spend			
	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p
Intercept	6.86 (2.66, 11.06)	0.001	-2.64 (-11.51, 6.23)	0.558	9.53 (3.80, 15.26)	0.001	-0.84 (-12.99, 11.31)	0.892
Trust type[1]: specialist	-3.86 (-5.77, -1.94)	0.000	-3.68 (-5.57, -1.78)	0.000	-6.06 (-8.67, -3.45)	0.000	-5.87 (-8.47, -3.26)	0.000
Trust type[1]: MH/LD	-1.93 (-3.20, -0.65)	0.003	-1.79 (-3.06, -0.52)	0.006	-2.36 (-4.10, -0.62)	0.008	-2.21 (-3.95, -0.47)	0.013
Trust type[1]: community	-2.96 (-4.70, -1.22)	0.001	-2.72 (-4.45, -0.99)	0.002	-5.85 (-8.22, -3.48)	0.000	-5.59 (-7.96, -3.22)	0.000
Trust type[1]: ambulance	-6.00 (-8.36, -3.65)	0.000	-5.09 (-7.54, -2.64)	0.000	-7.64 (-10.85, -4.42)	0.000	-6.63 (-9.99, -3.28)	0.000
Region[2]: London	4.36 (2.54, 6.18)	0.000	4.66 (2.84, 6.47)	0.000	9.56 (7.08, 12.04)	0.000	9.88 (7.39, 12.37)	0.000
Region[2]: South	1.52 (0.19, 2.85)	0.026	1.38 (0.05, 2.70)	0.042	3.30 (1.48, 5.12)	0.000	3.15 (1.33, 4.97)	0.001
Region[2]: Midlands	2.41 (1.22, 3.61)	0.000	2.21 (1.01, 3.40)	0.000	4.60 (2.97, 6.23)	0.000	4.38 (2.75, 6.02)	0.000
Teaching trust status[3]	-0.58 (-1.75, 0.59)	0.328	-0.55 (-1.71, 0.61)	0.349	-0.57 (-2.17, 1.03)	0.482	-0.54 (-2.12, 1.05)	0.505
Foundation trust status[4]	-0.95 (-1.90, 0.01)	0.052	-0.90 (-1.84, 0.05)	0.062	-0.49 (-1.79, 0.81)	0.458	-0.44 (-1.73, 0.86)	0.505
Trust size[5]	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.001	0.00 (0.00, 0.00)	0.000
Sickness absence	0.44 (-0.38, 1.25)	0.295	**4.99 (1.15, 8.84)**	**0.011**	0.78 (-0.34, 1.89)	0.171	**5.75 (0.48, 11.03)**	**0.033**
Sickness absence squared			**-0.53 (-0.96, -0.09)**	**0.018**			-0.58 (-1.17, 0.02)	0.058
R^2	.357		.375		.444		.453	

Notes:
[1]*Trust type reference category is acute (non-specialist)*
[2]*Region reference category is North*
[3]*Reference category is non-teaching trusts*
[4]*Reference category is non-Foundation trusts*
[5]*Trust size measured by full-time equivalent employees*
Statistically significant (p < .05) effects of absence variables shown in bold

Appendix 3 – Employee engagement predicting agency staff spend

Engagement variable:	Overall		Motivation		Involvement		Advocacy		All	
	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p
Intercept	37.45 (19.98, 54.92)	0.000	8.80 (-16.41, 34.01)	0.492	32.39 (11.83, 52.94)	0.002	30.51 (21.14, 39.89)	0.000	-10.18 (-36.44, 16.09)	0.446
Trust type[1]: specialist	-3.53 (-5.36, -1.71)	0.000	-4.27 (-6.08, -2.46)	0.000	-4.11 (-5.90, -2.31)	0.000	-2.60 (-4.47, -0.72)	0.007	-1.42 (-3.39, 0.54)	0.155
Trust type[1]: MH/LD	-1.83 (-2.93, -0.74)	0.001	-1.64 (-2.77, -0.52)	0.004	-1.38 (-2.50, -0.25)	0.017	-2.21 (-3.30, -1.12)	0.000	-2.22 (-3.48, -0.96)	0.001
Trust type[1]: community	-2.70 (-4.31, -1.09)	0.001	-2.74 (-4.39, -1.09)	0.001	-2.77 (-4.39, -1.14)	0.001	-2.68 (-4.25, -1.11)	0.001	-2.80 (-4.34, -1.26)	0.000
Trust type[1]: ambulance	-8.21 (-10.83, -5.58)	0.000	-5.42 (-8.22, -2.62)	0.000	-8.55 (-11.96, -5.15)	0.000	-7.23 (-9.34, -5.12)	0.000	-4.19 (-7.85, -0.52)	0.025
Region[2]: London	4.17 (2.85, 5.49)	0.000	3.68 (2.31, 5.05)	0.000	4.03 (2.70, 5.37)	0.000	4.14 (2.87, 5.41)	0.000	3.58 (2.30, 4.87)	0.000
Region[2]: South	1.40 (0.29, 2.51)	0.014	1.15 (0.02, 2.29)	0.047	1.32 (0.20, 2.45)	0.022	1.43 (0.35, 2.52)	0.010	1.27 (0.20, 2.33)	0.020
Region[2]: Midlands	2.26 (1.21, 3.32)	0.000	2.12 (1.03, 3.22)	0.000	2.15 (1.09, 3.22)	0.000	2.23 (1.21, 3.26)	0.000	1.87 (0.84, 2.90)	0.000
Teaching trust status[3]	-0.62 (-1.76, 0.51)	0.279	-0.55 (-1.71, 0.61)	0.350	-0.57 (-1.71, 0.58)	0.329	-0.62 (-1.73, 0.49)	0.270	-0.48 (-1.57, 0.61)	0.386
Foundation trust status[4]	-0.70 (-1.64, 0.24)	0.146	-1.07 (-2.01, -0.13)	0.026	-0.88 (-1.82, 0.06)	0.065	-0.45 (-1.38, 0.48)	0.339	-0.31 (-1.22, 0.60)	0.504
Trust size[5]	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.001
Engagement: overall	**-7.57 (-12.21, -2.93)**	**0.002**								
Engagement: motivation			0.07 (-6.36, 6.50)	0.983					**13.34 (4.95, 21.72)**	**0.002**
Engagement: involvement					**-6.30 (-11.83, -0.76)**	**0.026**			0.23 (-8.46, 8.93)	0.958
Engagement: advocacy							**-5.90 (-8.44, -3.35)**	**0.000**	**-9.29 (-13.07, -5.52)**	**0.000**
R²	**.389**		**.364**		**.373**		**.418**		**.454**	

Notes:

[1]*Trust type reference category is acute (non-specialist)*

[2]*Region reference category is North*

[3]*Reference category is non-teaching trusts*

[4]*Reference category is non-Foundation trusts*

[5]*Trust size measured by full-time equivalent employees*

Statistically significant (p < .05) effects of engagement variables shown in bold

Appendix 4 – Employee engagement predicting agency plus bank staff spend

Engagement variable:	Overall		Motivation		Involvement		Advocacy		All	
	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p	B (95% CI)	p
Intercept	49.49 (25.51, 73.47)	0.000	10.67 (-23.82, 45.16)	0.543	37.56 (9.30, 65.82)	0.009	42.46 (29.62, 55.29)	0.000	-21.18 (-57.00, 14.64)	0.245
Trust type[1]: specialist	-5.58 (-8.09, -3.08)	0.000	-6.51 (-8.99, -4.03)	0.000	-6.35 (-8.82, -3.88)	0.000	-4.25 (-6.81, -1.68)	0.001	-2.39 (-5.08, 0.29)	0.080
Trust type[1]: MH/LD	-2.01 (-3.51, -0.51)	0.009	-1.75 (-3.29, -0.22)	0.025	-1.49 (-3.04, 0.05)	0.058	-2.54 (-4.03, -1.05)	0.001	-2.94 (-4.65, -1.22)	0.001
Trust type[1]: community	-5.30 (-7.51, -3.09)	0.000	-5.36 (-7.61, -3.11)	0.000	-5.38 (-7.62, -3.14)	0.000	-5.27 (-7.43, -3.12)	0.000	-5.38 (-7.48, -3.28)	0.000
Trust type[1]: ambulance	-10.06 (-13.66, -6.46)	0.000	-6.34 (-10.17, -2.50)	0.001	-9.77 (-14.45, -5.09)	0.000	-8.97 (-11.85, -6.08)	0.000	-3.17 (-8.17, 1.82)	0.212
Region[2]: London	9.05 (7.23, 10.86)	0.000	8.39 (6.51, 10.27)	0.000	8.79 (6.95, 10.63)	0.000	9.05 (7.31, 10.79)	0.000	8.21 (6.45, 9.96)	0.000
Region[2]: South	3.00 (1.47, 4.52)	0.000	2.67 (1.12, 4.23)	0.001	2.86 (1.31, 4.41)	0.000	3.06 (1.58, 4.55)	0.000	2.81 (1.35, 4.26)	0.000
Region[2]: Midlands	4.16 (2.72, 5.61)	0.000	3.97 (2.47, 5.46)	0.000	4.02 (2.56, 5.48)	0.000	4.13 (2.73, 5.54)	0.000	3.69 (2.28, 5.10)	0.000
Teaching trust status[3]	-0.52 (-2.08, 1.03)	0.510	-0.42 (-2.01, 1.17)	0.602	-0.45 (-2.02, 1.13)	0.576	-0.52 (-2.04, 0.99)	0.497	-0.35 (-1.83, 1.13)	0.641
Foundation trust status[4]	-0.25 (-1.54, 1.04)	0.698	-0.74 (-2.02, 0.55)	0.260	-0.53 (-1.82, 0.76)	0.416	0.11 (-1.17, 1.38)	0.870	0.32 (-0.92, 1.57)	0.610
Trust size[5]	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.000	0.00 (0.00, 0.00)	0.001	0.00 (0.00, 0.00)	0.004
Engagement: overall	**-9.63 (-16.00, -3.26)**	**0.003**								
Engagement: motivation			0.69 (-8.11, 9.49)	0.877					**16.86 (5.43, 28.29)**	**0.004**
Engagement: involvement					-6.53 (-14.14, 1.08)	0.092			5.33 (-6.53, 17.19)	0.377
Engagement: advocacy							**-7.99 (-11.48, -4.51)**	**0.000**	**-14.07 (-19.21, -8.92)**	**0.000**
R[2]	.462		.444		.448		.489		.525	

Notes:
[1]*Trust type reference category is acute (non-specialist)*
[2]*Region reference category is North*
[3]*Reference category is non-teaching trusts*
[4]*Reference category is non-Foundation trusts*
[5]*Trust size measured by full-time equivalent employees*
Statistically significant (p < .05) effects of engagement variables shown in bold

8.1 About the authors

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