



The Association between Appraisal and Leadership of NHS Staff and Five Key Outcome Variables

The Case of Absenteeism, Patient Satisfaction, Quality of Services, Use of Resources and Mortality

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Summary

Regression Analysis Results: Appraisal Key Score Variables as Predictors

- **The three appraisal key score variables incorporated into the regression analysis as control/independent/predictor¹ variables are:** ‘% having appraisal in the last 12 months’; ‘% having a well-structured appraisal in the last 12 months’ and ‘% agreeing personal development plan (PDP) in the last 12 month’. We have also controlled for size of trust, location (London vs. other regions of the UK) and hospital status (specialist status vs. non-specialist status)². In the next step of the analysis, we hope to control for another variable which identifies teaching and non-teaching hospitals. The identification of teaching and non-teaching hospitals is underway.
- **We run 5 different regression models for every one of the 5 outcome variables.** These outcome variables are Absenteeism, Patient Satisfaction, Quality of Services, Use of Resources and Mortality.
- **Absenteeism as an outcome/dependent³ variable:** Key score ‘% having appraisal in the last 12 months’ is significant in one regression model.
- **Patient Satisfaction as an outcome variable:** None of the key score variables is significant.
- **Quality of Services and Use of Resources as outcome variables:** We have similar results for these two outcome variables which are used in the Annual Health Check. ‘Use of resources’ as part of the annual health check, assesses all NHS trusts, including foundation trusts and provides a rounded evaluation of their financial performance. As part of the annual health check, NHS trusts are also asked to assess their performance against the Government's core standards for NHS healthcare (i.e. quality of services). They then have to declare this information publicly. We feel it is essential to investigate how these outcome variables associate with appraisal and leadership within the NHS.

¹ These terms are used interchangeably throughout this report.

² This variable is not included in regression analysis where mortality is the outcome variable.

³ These terms are used interchangeably throughout this report.

- **Almost all of the relationships between the three appraisal key scores are significant in the 5 regression models in which ‘use of resources’ and ‘quality of services’ are outcome variables.** The appraisal key score ‘% agreeing personal development plan (PDP) in the last 12 months’ has a negative relationship with both of the outcome variables in a model where we controlled for all of the appraisal key score variables, size of trust, location and hospital status.
- **Mortality as an outcome variable:** None of the key score variables is significant. In order to improve the results, we have looked at the scatter plots to see anomalous cases. Excluding three cases in which rates of mortality were significantly higher than others in the data (this was evident in the scatter plot), and also 25 specialist status trusts, appraisal key scores are still not significant. We will control for teaching and non-teaching hospitals at a later stage, which might lead to a different result.

Regression Analysis Results: Leadership Key Score Variables as Predictors

- **The seven leadership key score variables incorporated into the regression analysis as independent variables are ‘Satisfied with quality of work?’ ; ‘Role makes a difference?’; ‘Feel valued by colleagues?’; ‘Have an interesting job?’ ; ‘Quality of job design’; ‘Work pressure felt’ and ‘Support from supervisor’.** We have also controlled for size of trust, location (London vs. other regions of the UK) and status of hospital (specialist status vs. non-specialist status).
- **We ran a total of nine different regression models for each of the five outcome variables.** As indicated above, the outcome variables we used in the regression analysis are Absenteeism, Patient Satisfaction, Quality of Services, Use of Resources and Mortality. We present two of the models for each of the five outcome variables in section 3. In model 1, we control for all leadership key score variables, size of trust and location and hospital status. In model two we control only for the seven key score variables. We controlled for the leadership key score variables in model 2.
- **We have presented regression models 3 to 9 separately in section 4.** In each of these models we controlled for only one leadership key score variable, size of trust, location and hospital status.

- **Absenteeism as an outcome variable:** Key score variables ‘Quality of job design’; ‘Work pressure felt’ are significant in all models. These variables have a negative relationship with absenteeism (See sections 3 and 4).
- **Patient satisfaction as an outcome variable:** Key score variables ‘Quality of job design’ and ‘Work pressure felt’ are significant in most of the models. These variables have a negative relationship with absenteeism.
- **Quality of Services and Use of Resources as outcome variables:** In two of the regression analysis, within which Quality of Services and Use of Resources are outcome variables, we found that ‘Quality of job design’ has a positive and significant relationship with both outcome variables. In addition, the key score variable ‘Work pressure felt’ is significant and has a negative relationship with both of the outcome variables. The directions of these associations are what we normally expect.
- **Mortality as an outcome variable:** Key score variables ‘Quality of job design’; ‘Work pressure felt’ are significant. Both of these variables have a negative relationship with the outcome variable.
- In many cases, it is interesting to see that variables ‘Quality of job design’ and ‘Work pressure felt’ are have shown a significant relationship with the outcome variables. It appears that these issues should be of particular importance for managers in the NHS.

1. Introduction

- 1.1. We linked the 2008 NHS staff survey with five outcome variables. These variables are absenteeism, patient satisfaction, quality of services, use of resources and mortality in the NHS.
- 1.2. We discuss the association between the outcome variables and the predictor variables.
- 1.3. By running OLS regression, we captured these associations. We included three independent variables namely trust size, dummy variables for hospital status and location. The other independent variables included into the models are appraisal and leadership key scores.
- 1.4. We included a total of ten key score variables, in order to capture appraisal and leadership in the NHS. We used three appraisal key score variables as predictors when we looked at the association between appraisal and the five outcome variables. We used seven leadership key score variables as predictors when we looked at the association between leadership and the five outcome variables. Details about these key score variables is uncovered in sections 2 and 3.
- 1.5. The analysis does not in any way imply causality nor does it incorporate all relevant control variables. Indeed, this is one of the reasons why the value of R^2 is low in some models (See sections 2 and 3).
- 1.6. We reported both standardised and unstandardised beta coefficients. This is because unstandardised beta coefficient allows a greater degree of insight, given the interpretability of the variables (with the exception of scale variables like work pressure)

2. Results of Regression Analysis: Appraisal Key Scores as Predictors

- 2.1. The three appraisal key score variables incorporated into the regression analysis are ‘% having appraisal in the last 12 months (apprais)’; ‘% having a well-structured appraisal in the last 12 months (qualapp)’ and ‘% agreeing personal development plan (PDP) in the last 12 months (pdp)’.
- 2.2. We also considered controlling for two additional appraisal related variables called ‘Have you received the training etc identified in PDP?’ and ‘Has your manager supported you in accessing this training’. However, these variables had 48% missing values, so we therefore excluded these variables from the regression analyses.
- 2.3. We ran five models for each outcome variable. In these models, we altered the combination of control variables and predictors incorporated into the regression analysis in five different ways. This helps to see the associations of different control variables in question. The models included the following control variables⁴.

Model 1: Size, Specialist Status, London, apprais, qualapp, pdp.

Model 2: apprais, qualapp, pdp.

Model 3: Size, Specialist Status, London, apprais.

Model 4: Size, Specialist Status, London, qualapp.

Model 5: Size, Specialist Status, London, pdp.

Absenteeism and Appraisal

- 2.4. Table 1 presents the relationship between absenteeism and appraisal. In model 1, the control variables, entered as block account for 16.8% of the variance in staff absenteeism.
- 2.5. Specialist Status is significant ($p < 0.01$), indicating that for Specialist Status Hospitals, staff absenteeism is lower by an average value of 0.554%. Also, Trusts

⁴ Specialist Status does not apply to the model in which standardised mortality rate is the outcome variable.

being located in London is significant ($p < 0.001$), indicating that trusts location in London, have lower staff absenteeism by an average value of 0.799%. In this model none of the appraisal key scores are significant.

2.6. In Model 2, we include appraisal key scores as independent variables. The variables entered as block account for just 3.5% of the variance in staff absenteeism. Only the key score variable ‘% having good quality appraisal in last 12 months’ is significant ($p < 0.05$). The sign of the Beta coefficient for this variable is negative, as we would expect – more appraisal is associated with lower absenteeism.

Table 1: The relationships between absenteeism and appraisal

	Model 1	Model 2	Model 3	Model 4	Model 5
	R ² =.168	R ² =0.035	R ² =0.164	R ² =0.162	R ² =0.162
SIZE	-.065 (.000)		-.074 (.000)	-.083 (.000)	-.077 (.000)
Specialist Status	-.139** (-.554)		-.140** (-.557)	-.139** (-.555)	-.140** (-.558)
London	-.357*** (-.799)		-.365*** (-.818)	-.351*** (-.786)	-.366*** (-.819)
Had appraisal in last 12 months? (apprais)	-.314 (-2.394)	-.328 (-2.504)	-.102* (-.781)		
Had a well-structured appraisal in last 12 months? (qualapp)	-.055 (-.716)	-.210* (-2.735)		-.095 (-1.243)	
Agreed PDP in the last 12 months? (pdp)	.261 (1.963)	.373 (2.803)			-.089 (-.673)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

2.7. Models 3, 4 and 5 incorporate four variables. The three key score variable are incorporated separately in each of these models. The value of R² is more or less equal in models 3, 4 and 5. Indeed, model 3 has a slightly higher R² value. The appraisal key score variable is significant (P<0.05) only in this model. This effect is relatively small, however, suggesting that for an extra 10% of the workforce having an appraisal, absenteeism decreases by 0.078%.

Patient Satisfaction and Appraisal

2.8. Table 2 presents the relationship between patient satisfaction and appraisal. Patient satisfaction is taken as the overall “quality of care” rating from the inpatient survey.

2.9. The predictor variables, entered as block, account for 54.6% of the variance in percentage of patient satisfaction (see Model 1). The size of hospitals, being of specialist status and being located in London are significant (P<0.001). In this model none of the appraisal key scores are significant.

2.10. In Model 2, we run the regression analysis by controlling only for appraisal key scores. Only 7% of the variance in patient satisfaction is explained by the appraisal key sores. Even so, none of the key score variables is significant.

Table 2: The relationships between Patient Satisfaction and Appraisal

	Model 1	Model 2	Model 3	Model 4	Model 5
	R ² =.546	R ² =.007	R ² =0.545	R ² =0.546	R ² =0.545
SIZE	.213*** (.000)		.208** (.000)	.213*** (.000)	.207** (.000)
Specialist Status	.721*** (12.708)		.725*** (12.782)	.721*** (12.714)	.724*** (12.770)

London	-.263*** (-3.496)		-.253*** (-3.369)	-.261*** (-3.467)	-.254*** (-3.375)
Had appraisal in last 12 months?	.007 (.338)	-.276 (-13.324)	.020 (.943)		
Had a well-structured appraisal in last 12 months?	.050 (4.637)	.048 (4.457)		.037 (3.467)	
Agreed PDP in the last 12 months?	-.023 (-1.172)	.284 (14.255)			.018 (.922)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

- 2.11. Models 3, 4 and 5 incorporate four predictor variables each. The three key score variables are incorporated separately in each of these models. The R² value has more or less equal value in models 3, 4 and 5.
- 2.12. None of the appraisal key score variables is significant. We will indeed run the regression analysis again to see if any other appraisal predicting variable(s) will yield a different result.

Quality of services & Appraisal

- 2.13. In table 3 we present the relationship between quality of services and appraisal. In Model 1, the variables entered as block account for 12.4% of the variance in the quality of services.
- 2.14. The appraisal key score variable ‘% having a well-structured appraisal in the last 12 months’ is significant (P<0.001). This suggests that when 10% more staff have a well-structured appraisal, the “quality of services” score increases by an average value of 0.52 points (where a change from “fair” to “good”, for example, equals one point).

Table 3: The relationship between Quality of Services and Appraisal

	Model 1	Model 2	Model 3	Model 4	Model 5
	R ² =.124	R ² =0.041	R ² =0.071	R ² =0.113	R ² =0.069
SIZE	.234*** (.000)		.202*** (.000)	.247*** (.000)	.209*** (.000)
Specialist Status	.078 (.306)		.084 (.330)	.081 (.320)	.084 (.332)
London	-.185*** (-.417)		-.114* (-.257)	-.166** (-.373)	-.114* (-.256)
Had appraisal in last 12 months?	.205 (1.564)	.451* (3.444)	.147 ** (1.122)		
Had a well-structured appraisal in last 12 months?	.398*** (5.238)	.249** (3.274)		.269 *** (3.533)	
Agreed PDP in the last 12 months?	-.361 (-2.710)	-.548* (-4.117)			.141 ** (1.061)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

2.15. In Model 2, we have included only the appraisal key score variables. Surprisingly, all of the variables are significant. The sign of the Beta Coefficient for the variable 'Agreed PDP in the last 12 months' is negative: this is due to the high intercorrelation of the appraisal variables, and does not reflect a negative impact

of PDPs. As expected, this same variable shows a positive sign in model 5 ($P < 0.01$), suggesting that on average, 10% more staff agreeing PDPs is associated with an increase of just over 0.1 points on the quality of services scale.

- 2.16. Models 3, 4 and 5 incorporate four predictor variables. The three key score variables are incorporated separately in each of these models.
- 2.17. The appraisal key score variables are significant in models 3, 4 and 5. The value of R^2 is more or less equal in models 3 and 5. Model 4 has the highest R^2 value, when compared with models 3 and 5. In model 4, the control variables, entered as block account for 11.3% of the variance in quality of services.

Use of Resources & Appraisal

- 2.18. In table 4 we present the relationship between use of resources and appraisal. In Model 1, the predictor variables account for 13.1% of the variance in use of resources.
- 2.19. The appraisal key score variable 'Had a well-structured appraisal in the last 12 months' is significant ($P < 0.001$). This means, when 10% more staff have a well-structured appraisal, on average use of services increases by 0.563 points.

Table 4: The relationship between Use of Resources and Appraisal

	Model 1	Model 2	Model 3	Model 4	Model 5
	$R^2 = .131$	$R^2 = 0.053$	$R^2 = 0.068$	$R^2 = 0.115$	$R^2 = 0.067$
SIZE	.219*** (.000)		.182*** (.000)	.230*** (.000)	.189*** (.000)
Specialist Status	.173*** (.674)		.179*** (.700)	.177*** (.691)	.180*** (.701)
London	-.124* (-.276)		-.046 (-.104)	-.099* (-.221)	-.046 (-.103)

Had appraisal in last 12 months?	.155 (1.175)	.374 (2.833)	.128 * (.966)		
Had a well-structured appraisal in last 12 months?	.432*** (5.629)	.326*** (4.244)		.267*** (3.481)	
Agreed PDP n the last 12 months?	-.355 (-2.641)	-.539* (-4.017)			.124 * (.921)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

- 2.20. In model 2, we ran the regression with only the appraisal key scores. In this model, the key score variable ‘Had a well-structured appraisal in the last 12 months’ is significant (P<0.001) and so is ‘Agreed PDP in the last 12 months’ (P<0.05).
- 2.21. The sign of the Beta Coefficient for the variable ‘Agreed PDP in the last 12 months’ is negative. On the contrary, this same variable shows a positive sign in model 5 (P<0.05). This difference is due to the high intercorrelation of the appraisal variables.
- 2.22. Models 3, 4 and 5 incorporate four predictor variables. The three key score variables are incorporated separately in each of these models. Appraisal key scores are significant in all of these three models. The value of R² in model 4 is the highest, when compared with models 3 and 5. In model 4, the control variables, entered as block account for 11.5% of the variance in percentage of quality of services. In each case, there is a positive relationship between the appraisal score and use of resources.

Mortality and Appraisal

- 2.23. In table 5, we present five different models in which investigate the relationship between mortality and appraisal.

- 2.24. In Model 1, size and the location variables (i.e. London) are significant. Nonetheless, none of the appraisal key score variables is significant. In fact, none of the appraisal key scores is significant in any of the five models presented in table 5.
- 2.25. Model 2 indicates that appraisal key score variables explain only 4% of the variance in standardised mortality ratio.
- 2.26. The values of R^2 in models 3, 4 and 5 are more or less equal. This indicates that even when the appraisal key score variables used in three different regression models are different, the R^2 values does not vary. In addition, none of the appraisal key scores in these three models is significant.
- 2.27. In order to improve the results, we have looked at the scatter plots to see anomalous cases. Since the dependent variable has no significant relationship with the appraisal key scores the task was not easy. Still we got rid of three cases in which the rates of mortality were significantly higher (this was evident in the scatter plot. We have also excluded 25 specialist from the data. The R^2 values and beta coefficients have improved as a result. But still the appraisal key scores are still not significant. We hope to control for a dummy variable which differentiates between teaching and non-teaching hospitals at a later stage.

Table 5: The relationship between Mortality and Appraisal

	Model 1	Model 2	Model 3	Model 4	Model 5
	R2=.167	R2=.010	R2=.155	R2=.154	R2=.153
SIZE	-.324*** (-.001)		-.327*** (-.001)	-.327*** (-.001)	-.323*** (-.001)
London	-.281*** (-7.523)		-.271*** (-7.262)	-.261** (-6.999)	-.269*** (-7.216)
Had appraisal in last 12 months?	-.521 (-51.335)	-.393 (-38.722)	-.060 (-5.881)		
Had a well-structured appraisal in last 12	-.060	-.050		-.043 (-8.269)	

months?	(-1.094)	(-9.704)			
Agreed PDP n the last 12 months?	.478 (49.693)	.429 (44.603)			-.034 (-3.544)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

3. Results of Regression Analysis: Leadership Key Scores as Predictors

3.1. We examined seven leadership key score variables in the regression analysis in which we assessed the association with the five outcome variables. These key score variables are ‘Satisfied with quality of work? (satis)’ ; ‘Role makes a difference? (differ)’; ‘Feel valued by colleagues? (value)’; ‘Have an interesting job? (interest)’ ; ‘Quality of job design (jobdes)’; ‘Work pressure felt (wkpres)’ and ‘Support from supervisor (supsup)’.

3.2. We run 2 models each of the outcome variables. These models included the following control variables⁵.

Model 1: Size, Specialist Status, London, satis, differ, value, interest, jobdes, wkpres, supsup.

Model 2: satis, differ, value, interest, jobdes, wkpres, supsup.

Absenteeism and Leadership

3.3. In table 6, we present two different models in which Absenteeism is the outcome variable.

3.4. In model 1, the control variables, entered as block account for 36.1% of variance in percentage of staff absenteeism. Out of the total 7 key score variables

⁵ There are additional 7 models in section 4.

incorporated into the model, only one variable is not significant. This variable is 'Satisfied with quality of work'.

- 3.5. Surprisingly, the sign of 'Support from supervisor' variable is positive. It maybe the case that staff working at the NHS find increased support to be stifling and therefore, become absent from work. On the contrary, this same key score variable is not significant in Model 2, suggesting that the relationship may be more complex than that, and that the negative coefficient may be due to high intercorrelations between predictors.
- 3.6. In model 2, the predictor variables entered as block account for 30.8% of variance in staff absenteeism. Unlike Model 1, only three key score variables are significant in this model. This suggests that model 1 is the more appropriate model to use for conclusions.

Table 6: The relationship between Absenteeism and Leadership

	Model 1		Model 2	
	Standardised	Unstandardised	Standardised	Unstandardised
	R ² = 0.361		R ² =0.308	
SIZE	-.059	.000		
Specialist Status	-.103*	-.412*		
London	-.261***	-.583***		
Satisfied with quality of work? (satis)	-.038	-.587	-.064	-.969
Role makes a difference? (differ)	.130*	4.671*	.001	3.203
Feel valued by colleagues? (value)	-.147*	-3.104*	.133	-1.626
Have an interesting job? (interest)	-.114*	-2.881*	.186*	-1.807*
Quality of job design (jobdes)	-.641***	-4.893***	-.476***	-6.366***
Work pressure felt (wkpres)	-.223***	-1.612***	-.551***	-1.799***
Support from supervisor (supsup)	.360***	2.182***	.212	2.826

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

Patient Satisfaction and Leadership

- 3.7. In table 7, we present two different models with patient satisfaction as the outcome variable.
- 3.8. In model 1, the control variables, entered as block account for 61.4% of variance in patient satisfaction. The value of R^2 is significantly lower in model 2, indicating that the leadership key scores explain only 27.5% of the variance in patient satisfaction.
- 3.9. Key score 'Have an interesting job? (interest)' is significant ($P<0.05$) in both Models 1 and 2. The sign of this variable is positive as we would expect.
- 3.10. Key score variables 'Quality of job design (jobdes)' and 'Work pressure felt (wkpres)' are also significant in both models.

Table 7: The relationship between Patient Satisfaction and Leadership

	Model 1		Model 2	
	$R^2=0.614$		$R^2=0.275$	
	Standardised	Unstandardised	Standardised	Unstandardised
SIZE	.135*	.000*		
Specialist Status	.647***	11.416***		
London	-.151*	-2.014*		
Satisfied with quality of work? (satis)	.009	1.055	-.064	-7.283
Role makes a difference? (differ)	.001	.125	.001	.218
Feel valued by colleagues? (value)	.133	18.982	.133	18.921

Have an interesting job? (interest)	.132*	19.593*	.186*	27.740*
Quality of job design (jobdes)	-.242*	-16.924*	-.476***	-33.380***
Work pressure felt (wkpres)	-.282***	-13.131***	-.551***	-25.626***
Support from supervisor (supsup)	.012	.687	.212	12.024

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

Quality of Services and Leadership

- 3.11. In table 8, we present two different models with Quality of Services as the outcome variable.
- 3.12. In model 1, 15.3% of the variance in quality of services is explained by ten independent variables. In addition to size of trust and location, three key scores appear significant. It is surprising to see that the key score ‘Staff feel valued by colleagues’ has a negative relationship with the outcome variable, but this may be due to high intercorrelations with other predictors
- 3.13. In model 2 only the leadership key score variables are incorporated as predictors in the regression model. The result indicates that only 9% of variance in quality of services is explained by these key scores. In this model only the ‘Work pressure felt’ key score is significant.

Table 8: The relationship between Quality of Services and Leadership

	Model 1		Model 2	
	Standardi sed	Untandar dized	Standardi sed	Untandar dized
	R2=.153		R2=.090	
SIZE	.174*	.000*		
Specialist Status	.014	.055		
London	-.187**	-.421**		

Satisfied with quality of work? (satis)	-.015	-.248	.014	.223
Role makes a difference? (differ)	.047	1.774	-.005	-.181
Feel valued by colleagues? (value)	-.160*	-3.366*	-.111	-2.343
Have an interesting job? (interest)	.010	.258	.023	.584
Quality of job design (jobdes)	.231*	1.754*	.138	1.048
Work pressure felt (wkpres)	-.268***	-1.959***	-.281***	-2.057***
Support from supervisor (supsup)	-.102	-.624	-.122	-.744

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

Use of Resources and Leadership

- 3.14. In table 9, we present two different models with Use of Resources as the outcome variable.
- 3.15. In model 1, 16.3% of variance in use of resources is explained by the ten independent variables in the regression analysis. In addition to size of trust and location, only one key score variable is significant – work pressure felt by staff.
- 3.16. In model 2 we used only leadership key scores. The result indicates that 11.3% of variance in use of resources is explained by the leadership key scores presented in the table. In this model, the key scores ‘Quality of job design’ and ‘Work pressure felt’ key score are significant.
- 3.17. It is interesting to see that the variable ‘Work pressure felt’ has a negative relationship with the outcome variables, suggesting that the more work pressure there is on staff, the less efficient the use of resources.

Table 9: The relationship between Use of Resources and Leadership

	Model 1		Model 2	
	R ² =.163		R ² =.113	
	Standardised	Untandardi	Standardise	Untandardi

		zed	d	zed
SIZE	.202***	.000***		
Specialist Status	.122**	.476**		
London	-.079	-.176		
Satisfied with quality of work? (satis)	-.003	-.044	.048	.767
Role makes a difference? (differ)	.001	.028	-.043	-1.602
Feel valued by colleagues? (value)	-.095	-1.991	-.082	-1.715
Have an interesting job? (interest)	.068	1.747	.069	1.763
Quality of job design (jobdes)	.186	1.402	.194*	1.460*
Work pressure felt (wkpres)	-.273***	-1.976***	-.284***	-2.056***
Support from supervisor (supsup)	-.039	-.237	-.121	-.729

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

Mortality and Leadership

- 3.18. In table 9, we present two models in which mortality is the outcome variable. In the first model, 23.9% of the variance in mortality rate is explained by the control variables. The R^2 value for model 2 is .105 indicating that the leadership key score variables explain only 10.5% of the variance in mortality.
- 3.19. The results in model 1 indicate that the key scores ‘Quality of job design’ and ‘Work pressure felt’ are significant. Work pressure unexpectedly has a negative relationship with mortality: this may be due to high intercorrelations between the predictors.
- 3.20. In model 2 ‘quality of job design’ and ‘Support from supervisor’ are significant.

Table 10: The relationship between Mortality and leadership

	Model 1	Model 2
	R ² =.239	R ² =.105
Size	-.378***	
London	-.143	
Satisfied with quality of work? (satis)	.025	-.006
Role makes a difference? (differ)	-.082	-.147
Feel valued by colleagues? (value)	-.159	-.154
Have an interesting job? (interest)	.127	.160
Quality of job design (jobdes)	-.443*	-.350*
Work pressure felt (wkpres)	-.230*	-.155
Support from supervisor (supsup)	.224	.257*

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

4. Results of Regression Analysis: Leadership Key Scores as Predictors (Additional Models)

- 4.1. For each of the five outcome variables, we ran an additional seven models in which each leadership key score variable is incorporated individually into the regression analysis. We also controlled for trust size, trust status (specialist vs. non-specialist) and location (London vs. other regions).

Absenteeism and Leadership

Table 11: The relationship between Absenteeism and Leadership

	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	R ² = .154	R ² = .154	R ² = .217	R ² = .174	R ² = .250	R ² = .163	R ² = .176
SIZE	-.061	-.060	-.143**	-.090	-.116**	-.045	-.119**

	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Specialist Status	-.142** (-.565)	-.140** (-.557)	-.167*** (-.664)	-.141** (-.563)	-.117** (-.465)	-.148** (-.591)	-.150** (-.596)
London	-.374*** (-.836)	-.370*** (-.828)	-.420*** (-.940)	-.403*** (-.903)	-.294*** (-.659)	-.368*** (-.825)	-.378*** (-.846)
Satisfied with quality of work? (satis)	.008** (.127)						
Role makes a difference? (differ)		-.013 (-.481)					
Feel valued by colleagues? (value)			-.267*** (-5.624)				
Have an interesting job? (interest)				-.147** (-3.721)			
Quality of job design (jobdes)					-.327*** (-2.495)		
Work pressure felt (wkpres)						-.095* (-.685)	
Support from supervisor (supsup)							-.159** (-.961)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

- 4.2. We ran seven models in which absenteeism is the outcome variable and leadership key scores are included individually as predictors along with trust size, specialist status and location.
- 4.3. The R² values are the highest in models 3 and 5. In these two models more than 21% of the variance in absenteeism is explained by the predictor variables. Models 1 and 2 have the lowest R² values.

- 4.4. In these seven models, specialist status and location are always significant. These two control variables have negative relationships with staff absenteeism. This indicates that when the absenteeism is lower in specialist hospitals and in London.
- 4.5. The leadership key scores are significant in all of the models, except for model 2.
- 4.6. It is interesting to see that ‘work pressure felt’ has a negative relationship with absenteeism. Moreover, ‘Quality of job design’ has a negative relationship with absenteeism, as we would expect.

Patient Satisfaction and Leadership

Table 12: The relationship between Patient Satisfaction and Leadership

	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	R ² = .560	R ² = .556	R ² = .564	R ² = .560	R ² = .549	R ² = .576	R ² = .550
SIZE	.201** (.000)	.198** (.000)	.204*** (.000)	.210*** (.000)	.220*** (.000)	.186** (.000)	.216*** (.000)
Specialist Status	.702*** (12.377)	.714*** (12.587)	.718*** (12.667)	.720*** (12.705)	.713*** (12.582)	.659*** (11.623)	.708*** (12.493)
London	-.300*** (-3.989)	-.277*** (-3.690)	-.220*** (-2.921)	-.223*** (-2.965)	-.279*** (-3.704)	-.275*** (-3.659)	-.252*** (-3.355)
Satisfied with quality of work? (satis)	.134* (15.126)						
Role makes a difference? (differ)		.110* (25.090)					
Feel valued by colleagues? (value)			.145** (20.605)				
Have an interesting				.137*			

job? (interest)				(20.328)			
Quality of job design (jobdes)					.078 (5.497)		
Work pressure felt (wkpres)						-.189** (-8.813)	
Support from supervisor (supsup)							.077 (4.345)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

- 4.7. We ran seven models in which patient satisfaction is the outcome variable and leadership key scores are included individually as predictors along with trust size, specialist status and location.
- 4.8. The R² values are more or less equal across the board. It is interesting to see that more than 54% of the variance in patient satisfaction is explained by these predictors.
- 4.9. The size of the trust and specialist status and region are significant in all models.
- 4.10. Hospital status has also a positive relationship with patient satisfaction, indicating that patient satisfaction is generally higher in specialist hospitals.
- 4.11. Out of the total seven key scores, 'Quality of job design' and 'Support from supervisor' are not significant. Other effect sizes are relatively small.

Quality of Services and leadership

4.12. We ran seven models in which quality of services is the outcome variable and leadership key scores are included individually as predictors along with trust size, specialist status and location.

Table 13: The relationship between Quality of Services and Leadership

	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	R ² = .064	R ² = .053	R ² = .050	R ² = .050	R ² = .078	R ² = .131	R ² = .066
SIZE	.152** (.000)	.182*** (.000)	.173** (.000)	.177** (.000)	.209*** (.000)	.219*** (.000)	.229*** (.000)
Specialist Status	.054 (.212)	.081 (.318)	.080 (.314)	.082 (.322)	.069 (.271)	.049 (.194)	.091 (.358)
London	-.133* (-.299)	-.114* (-.256)	-.109* (-.245)	-.108* (-.243)	-.147* (-.332)	-.097* (-.218)	-.100* (-.225)
Satisfied with quality of work? (satis)	.128* (2.045)						
Role makes a difference? (differ)		.057 (2.128)					
Feel valued by colleagues? (value)			-.021 (-.439)				
Have an interesting job? (interest)				-.012 (-.321)			
Quality of job design (jobdes)					.177* (1.344)		
Work pressure felt (wkpres)						-.290*** (-2.117)	

Support from supervisor (supsup)							.135* (.820)
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Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

- 4.13. The R² values are low across the board. Model 6 has the highest R² value, indicating that 13% of the variance in quality of services is explained by the predictor variables. In this particular model, the key score ‘Work pressure felt’ has a negative relationship with the outcome variable.
- 4.14. In these seven models trust size and location are always significant. Trust size and quality of services have a positive relationship. The location dummy has a negative association with quality of services, indicating that quality tends to be higher outside London on average.
- 4.15. Four key scores are significant, but it is only ‘Work pressure felt’ that has a reasonably sizeable relationship.

Use of Resources and Leadership

- 4.16. We ran seven models in which use of resources is the outcome variable and leadership key scores are included individually as predictors along with trust size, specialist status and location.

Table 14: The relationship between Use of Resources and Leadership

	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	R ² = .065	R ² = .056	R ² = .057	R ² = .055	R ² = .098	R ² = .148	R ² = .089
SIZE	.138** (.000)	.165** (.000)	.184** (.000)	.175** (.000)	.200*** (.000)	.206*** (.000)	.239*** (.000)
Specialist Status	.152**	.176**	.185***	.178***	.161**	.142**	.192***

	(.591)	(.688)	(.720)	(.695)	(.628)	(.555)	(.747)
London	-.064 (-.144)	-.048 (-.107)	-.026 (-.059)	-.026 (-.058)	-.092 (-.207)	-.030 (-.067)	-.031 (-.069)
Satisfied with quality of work? (satis)	.119* (1.897)						
Role makes a difference? (differ)		.061 (2.256)					
Feel valued by colleagues? (value)			.069 (1.438)				
Have an interesting job? (interest)				.058 (1.484)			
Quality of job design (jobdes)					.225*** (1.697)		
Work pressure felt (wkpres)						-.315*** (-2.286)	
Support from supervisor (supsup)							.206*** (1.245)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

- 4.17. Model 6 has the highest R² value. On the other hand, model 4 has the lowest R² value.
- 4.18. Out of all the leadership key score variables incorporated in each model individually, four have a significant association. Indeed 'Quality of job design' has a positive association with the outcome variable. On the other hand, 'Work pressure felt' has a negative association with the outcome variable.

4.19. In all seven models, the size of trust and specialist status are significant.

Mortality and Leadership

4.20. We ran seven models in which mortality is the outcome variable. The leadership key scores are included individually as predictors along with trust size, specialist status and location.

Table 15: The relationship between Mortality and leadership

	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
	R ² = .149	R ² = .161	R ² = .176	R ² = .150	R ² = .167	R ² = .152	R ² = .149
SIZE	-.307*** (-.001)	-.299*** (-.001)	-.307*** (-.001)	-.309*** (-.001)	-.338*** (-.002)	-.313*** (-.001)	-.312*** (-.001)
London	-.267** (-7.661)	-.249** (-7.139)	-.325*** (-9.330)	-.287*** (-8.228)	-.226** (-6.479)	-.280*** (-8.046)	-.277*** (-7.936)
Satisfied with quality of work? (satis)	-.023 (-5.944)						
Role makes a difference? (differ)		-.114 (-56.167)					
Feel valued by colleagues? (value)			-.174* (-58.348)				
Have an interesting job? (interest)				-.043 (-14.900)			
Quality of job					-.151		

design (jobdes)						(-24.430)	
Work pressure felt (wkpres)							-.056 (-6.166)
Support from supervisor (supsup)							-.031*** (-3.968)

Note: Values in brackets indicate standardised beta coefficients. The significance values are the same for both standardised and unstandardised beta coefficients.

*0.01<p<0.05 ;**0.001<p<0.01;***p<0.001

- 4.21. The R² values indicate that at least 15% of the variance in mortality is explained by the control variables.
- 4.22. The size of trusts and location are significant across all models. Both of these variables have a negative relationship with mortality. This means that mortality tends to be lower in larger trusts and in London.
- 4.23. Two leadership key score variables have also significant values (i.e. 'Feel values by colleagues' and 'Support from supervisor'). These variables have a negative relationship with mortality and this is what we normally expect; however, these relationships are small.