Do People Become Healthier after Being Promoted?

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Abstract

This paper examines the hypothesis that greater job status makes a person healthier. It begins by successfully replicating the well-known cross-section association between health and job seniority. Then, however, it turns to longitudinal patterns. Worryingly for the hypothesis, the data -- on a large sample of randomly selected British workers through time -- suggest that people who start with good health go on later to be promoted. The paper can find relatively little evidence that health improves after promotion. In fact, promoted individuals suffer a significant deterioration in their psychological well-being (on a standard GHQ mental ill-health measure).

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1. Introduction

Human beings with high occupational status have good health and low rates of premature mortality. Cross-section evidence for this correlation has been found many times (for example; Johnson, Sorlie and Backlund 1999; Macleod et al. 2005; Marmot, Shipley and Rose 1984). The difficulty, however, is to know how to interpret the association. Is it causal in the sense that job status somehow leads to a boost in a person's health?

Researchers such as Marmot (2004) and Wilkinson (2001) have argued for the interesting idea that there may be a cause-and-effect connection between status and health. According to this account, higher status can itself boost health: Psychosocial stressors – feelings of anxiety and inadequacy – that come from the having low status and little control of one's life can be detrimental to the human condition, particularly to cardiovascular health and the auto-immune system. Consistent with this argument is that greater control at work is associated at the cross-sectional level with better mental health (Griffin et al. 2002). It is argued that it is psychosocial factors, not the higher income and increased access to resources that high status often brings, which explain much of the social health gradient. The theory implies that an increase in status reduces the impact of psychosocial stressors and therefore improves an individual's health.

Surprisingly, there appears to be no published truly longitudinal test of this hypothesis – one in which the investigator is able to observe individuals' health both before and after an improvement to status. This paper attempts to design such a test.

The focus of this study is on individuals' job rank, and thus it specifically studies the degree of control an individual has within his or her workplace. This emphasis on occupational status helps get to the core of the status-cause-health argument. We draw upon a panel data set, collected annually between 1991 and 2007, with information on over 1000

individual occupational promotions. We follow what happens to the later health of those who gain seniority when compared to the health of those who are not promoted.

Our longitudinal study does not find compelling evidence in favour of a status-causes-health theory. Instead these British data suggest that

(i) it is the healthiest individuals who are promoted, and

(ii) in many instances a promotion brings about a worsening of mental health.

2. Earlier Research and Alternative Explanations

There are other explanations for the strong cross-sectional association between status and health. Whilst it is possible that there is a causal chain running from status to health, one may also operate in the opposite direction, with the healthiest individuals going on to obtain the highest status (Deaton 2003; Smith 1999; West 1991). Alternatively, a third unobservable influence, such as genetic factors, could cause both good health and job success (Adams et al. 2003; Cutler, Deaton and Lleras-Muney 2006). Longitudinal data is essential to discriminate between these competing explanations.

Using various indicators of socio-economic status (SES) attempts have been made to probe these concerns about causality. For example, using longitudinal data from the US (Adams et al. 2003) and from Sweden and the UK (Adda, Chandola and Marmot 2003) researchers have found no clear causal effects from SES to health once initial health is controlled for. Similarly, Gardner and Oswald (2004) control for initial health at T in an annual panel on individuals and find that income does not influence survival probability at T+10. Whilst they adjust for pre-existing health conditions, these studies cannot discount the possibility that individuals' early health led to their SES. Using instrumental variables, however, Ettner (1996) argues that more income appears to result in significantly better physical and mental health. However, it is difficult for the studies that focus exclusively on

income to isolate the impact that psychosocial stressors, the central component to the status-causes-health argument, might have on health.

Income has a strong correlation with health (recent econometric evidence includes Cantarero and Pascual (2005), Duleep (1986), Frijters, Haisken-DeNew and Shileds (2005), McDonough et al. (1997), Menchik (1993) and Wolfson et al. (1993)), and whilst this may primarily be due to individuals with higher incomes having a greater command of resources, there will also naturally be some correlation with the psychosocial aspects of status. Similarly, education, another indicator of SES, is also strongly correlated with health (Feldman et al. 1989; Lahelma and Valkonen 1990). Income, however, could be regarded as the preferable measure of SES (Duncan et al. 2002) and several studies have considered the impacts of both income inequality and having a low relative income on health. Studies such as these may implicitly capture elements of the psychosocial status-causes-health theory. Lorgelly and Lindley (2008) find, using fixed effects regressions, that although absolute income influences health there are no independent effects of either relative income or income inequality. Likewise, Gravelle and Sutton (2009) and Jones and Wildman (2008) find weak support for an effect of relative income. Perhaps more in line with the psychosocial argument, Wildman (2003) establishes that it is an individual's subjective financial status that contributes to inequalities in health.

Variables such as income, education and occupation are highly correlated and all will give fairly good indications of an individual's SES. This makes it difficult, but all the more important, to establish independent effects in order to understand the link between status and health (Fuchs 2004). Of all the SES indicators, it is probably occupation that isolates aspects of status that social epidemiologists suggest will improve an individual's health. There are several studies that centre on occupation as an indicator of SES. For example, Wilkinson (1986) examines the link between changes to both occupational mortality and occupational

incomes over a twenty year period and finds that there was an inverse relationship between changes in income and mortality rates. Ala-Mursula et al (2005) conclude that women with less work-time control have an increased risk of health problems and Fischer and Sousa-Poza (2009) show that increased job satisfaction improves the individual's health. Anderson and Marmot (2007) try to exploit differences in promotion rates across departments in the British civil service as an instrument for individual promotion.

Perhaps some of the strongest support for the status-causes-health argument comes from experiments conducted on animals. These types of studies are particularly interesting because it is relatively easy to exogenously manipulate status within the animal kingdom. Sapolsky (2004) documents that health benefits emerge relatively quickly after rank is established across groups of animals. Sapolsky (2004) further suggests that this pattern extends to humans. However, it must be considered that the social context has been shown to differ across species. For example, subordinate animals that embark in cooperative breeding (Abbott et al. 1998) generally do not suffer from elevated release of glucocorticoids, a classic negative stress response documented in Sapolsky, Romero and Munck (2000). Similarly, this stress response within species can also be dependent on whether the subordinate animals are subjected to high levels of harassment by dominant individuals and whether they have social support networks (Abbott et al. 2003).

Exogenous manipulation of a human individual's status is not possible, but near-experiments potentially provide a way in which one might try to uncover causal effects. For instance, both Rablen and Oswald (2008) and Redelmeier and Singh (2001) claim support for a causal effect, running from social status to health, among Nobel Prize and Academy Award winners respectively. Snyder and Evans (2006) focus on a quasi-experiment in the realm of income. They find, counter-intuitively, that those with higher incomes as a result of changes to social security payments also have greater mortality rates. This result is somewhat

consistent with the finding by Ruhm (2000) that temporary upturns in the economy can be bad for people's health.

Overall, there is mixed evidence in the published literature for the status-causes-health theory. Our test, by focusing specifically on occupational promotions, yet still controlling for the improved access to resources and health knowledge that may come from having a higher income and being better educated, tries to offer an explicit test of whether the psychosocial aspects of status do improve an individual's later health.

3. Methodology

Consider an individual who is promoted at time T. If causality runs solely from occupational status to health, then, after controlling for other factors correlated with health and promotion (such as age, education and gender), there should be no significant differences, at T-1, in the health of those who are promoted and those who are not promoted. At T+1 there should begin to be a difference. If there is only reverse causality -- that is, causality running from health to occupational status -- then promoted individuals should exhibit significantly better health to the same degree at both T-1 and after T+1. Were two-way causality to exist, a promoted group would exhibit a combination of these two effects.

Using longitudinal data, on a large sample of British workers, we use cross-sectional and difference-in-difference methods to explore these three hypotheses. Our promoted group includes those who improve their occupational status internally within their organization and those who gain extra seniority after a move to a different employer.

4. Data Set Construction and Estimation Issues

Seniority and job status come in myriad forms. An empirical inquiry has to make some taxonomic assumption.

In this study, an individual's role in the workplace is assumed to be captured by whether they report in the British Household Panel Survey that

: the job is one of… manager, supervisor, or neither of these.

In the data set, these are uniquely different classifications[1], which are similar to those used by Macleod et al. (2005). While our approach necessarily aggregates across sectors in a way that may produce some measurement error, it offers an indication of the seniority and hence the degree of control each individual can be expected to have in the job. This taxonomy of seniority assumes away complex role overlaps, and assumes too that an individual is employed, which means that any association between unemployment and poor health will be largely ignored in our main analysis. We return later to this issue.

In the data, we can observe who is promoted at time point T. Our study examines three possible types of promotions: workers promoted from

(1) non-supervisor to supervisor,

(2) supervisor to manager and

(3) those going directly from non-supervisor to manager.

All three promoted groups are of interest in this analysis; but specific attention is given to the third promotion type, which represents the largest upwards move in occupational status. The research design allows a focus upon longitudinal health in an individual's work setting.

Health typically declines as people age. For our test, simple within-promoted group comparisons are therefore likely to be insufficient; we cannot merely measure the same individual's health before and after promotion. It would be difficult to discern whether declining health across time is due to extraneous factors, or, perhaps more plausibly, to the natural process of ageing. We overcome this by comparing particular individuals' health levels with those among a control group. The sample is separated into treatment and control

[1] Those indicating neither of these are termed here as non-supervisors.

groups -- those promoted at T and those that remain in the non-promoted position -- with comparisons made between them.

Promoted individuals' health is contrasted with that of an appropriate control group, namely, equivalent individuals who remained as non-supervisors for promotion types 1 and 3 and supervisors for the 2nd promotion category. The comparison period, in this analysis, takes place across a 5-year period, from, in our notation, T-1 to T+3. Data come from the British Household Panel Survey (BHPS), a representative longitudinal sample of British households. Running from 1991-2007, the Survey tracks over 10,000 adults in each of 17 years. Our analysis concentrates on a particular proportion of this data set, namely, those who worked for at least five consecutive years. Individuals in employment and indicating their position at T were sourced from every wave of the BHPS. Each observation at T was then tracked from T-1 through to T+3 to create what we refer to here as a five-year "employment spell". Occupational position changes were analyzed within these employment windows, and two groups, both control and treatment, were created. The control group consisted of those not promoted in the five year employment spell i.e. those who maintained the same occupational position (non-supervisor or supervisor) for the full five years. Those who were initially in the control group position at T-1 but promoted at T, and maintained this position until at least T+3, made up our treatment group[2]. This gave us data on over 1000 promotions and an overall sample size of approximately 20,000 five year employment spells.

By the nature of our sample construction, it is possible for some individuals to contribute multiple employment spells. This occurs in two circumstances. First, an individual may maintain a role for longer than 5 years. Second, a single individual may enter on a number of occasions if they experience a break in employment of which at least five years of employment exist either side. It should therefore be noted that it is possible for one

[2] Inevitably, since requiring a full five years of data, waves 1, 15, 16 and 17 could not be included.

individual to contribute multiple employment spells to both control and treatment groups[3]. Within the control group 91.8% of individuals contributed more than one employment spell, with an average of 6.4 spells. In the promoted groups 11.7% of individuals contributed more than one employment spell, with an average of 1.1 spells. It is difficult to know which observations should be included as each employment spell contains valuable information. In the main analysis we therefore use all available observations but use robust standard errors that adjust for both clustering, at the individual level, and heteroskedasticity. Later, however, we carry out a robustness test whereby only the first employment spell contributed by each individual is analyzed.

There is some loss to our research design, because we are unable to say whether those who left work entirely, or subsequently changed role again, went on as a result to have better or worse health. We later test for this possibility in Section 6; so we also code individuals who were promoted at T but who, because they changed role again or left work entirely, did not remain in the promoted position for all three years.

The BHPS contains several indicators of an individual's health. Here, we make use of two measures:

(i) subjective ill-health,

(ii) mental ill-health.

In the data, in both instances, higher values indicate worse health. Subjective ill-health is a self rating of one's health on a cardinal 5-point scale, where 5=very poor through to 1=excellent. Mental ill-health is captured here using a General Health Questionnaire (GHQ) measure of mental stress, on a 0 to 36 scale. The same variable has been used in a large medical and psychiatric literature such as Cardozo et al (2000) and Pevalin and Ermisch

[3] For example, an individual with 9 continuous years of employment from 1996 to 2004 and who is never promoted will contribute 4 control group employment spells. Another individual, also with 9 years of continuous employment between 1996 and 2004, who was promoted in 2001, would contribute 1 control spell (starting in 1996) and 1 treatment spell (starting in 2000).

(2004), and in health-economics research by, for example, Shields and Wheatley Price (2005) and Gardner and Oswald (2004). Both of the health variables have positive skew; most individuals mark themselves in surveys as relatively healthy. Individuals' mean rating of their subjective ill-health is 2.02. They have mean mental ill-health of 10.75 on a 0-36 scale.

In our analysis we ensure that individuals gave answers to the health question for each of the five years. The panel is therefore balanced but the sample size varies depending on the health variable under analysis. The health measures across the entire sample from T-1 to T+3 are shown in Table 1.

Sheer aging has an effect. Table 1 shows, as perhaps might be expected, that both subjective ill-health and mental ill-health deteriorate over a five-year period. From T-1 to T+3 the mean level of subjective ill-health worsens by 0.06 points and mental ill-health by 0.35 points. This observed health deterioration highlights the importance of not relying merely on a within-promoted group comparison. Some form of difference-in-difference inquiry is needed.

We carry out ill-health regressions using these two measures both with and without various demographic controls. Among these controls we include the alternative measures of status: income and education. This enables us to focus exclusively on the effect of improved status within the workplace, once the individual's command over resources or their health knowledge is factored out. We also control for the individual's smoking status, an important contributor to poor health, but also a variable that is likely to be endogenous to an individual's promotion – promotion is likely to be correlated with an individual's decision to smoke. The summary statistics for these control variables are shown in Table 1 accompanied by a full description.

Although the subjective ill-health variable is given in an ordinal fashion, we choose to report cardinal regression equations (so use simple integer values for the dependent variable).

Extensive research has been carried out on such 5-point self-assessed health variables and Doorslaer and Jones (2003) assess a number of alternative approaches. We find that ordered probit regressions produce similar results to regressions with the cardinality assumption. Hence, as none of our results change substantively, for pedagogical simplicity this study will report only the results from cardinal regression equations.

5. Results

We begin by depicting the cross-sectional differences in health across levels of seniority. This is demonstrated, across both ill-health measures, with gradual inclusion of a set of control variables, in Table 2. Table 2's evidence reveals the positive association commonly seen in empirical studies of socio-economic status and health. Managers in column 1 of Table 2 report themselves 0.166 points healthier than non-supervisors (on a scale that runs from one to five). Similarly, in column 4 of Table 2, managers have better mental health by 0.738 points (on a scale that runs from zero to thirty six). Importantly, managers' health remains statistically significantly different from that of the other occupational grades in each of the ill-health measures even when other socio-economic variables, such as income and education, are added to the cross-section regression equations. This suggests that there might be aspects of status that are important for health that go beyond the individual's access to resources and health knowledge.

In Table 2, smoking appears to have the negative consequences for physical health than would be expected. Females have lower levels of mental health. Education does not appear here to be correlated strongly with an individual's health. Income, however, is strongly significant across both ill-health measures. We can evaluate the importance of a position of control in the workplace in light of these other variables. Being a manager, for instance, appears to have a similar health impact to smoking on an individual's subjective ill-health and appears to be more beneficial for mental health than being married. In this cross-

section, even once we control for the individual's access to resources and his or her education level, large benefits from job seniority are still evident.

Although consistent with decades of previous research on the positive association between health and socio-economic status, Table 2 should not be viewed as proof of causality.

Later tables move to longitudinal patterns. They draw upon samples of approximately 20,000 5-year individual spells and more than 1000 individual promotions.

The sub-tables in Table 3 report both the raw means and the differences between groups -- both with and without controls[4] -- for subjective ill-health and mental ill-health (GHQ). The data here run from T-1 to T+3. In other words, the job promotion itself occurs at time period T, and data are also given on the person the year before that promotion, and for each of three years after that.[5]

Table 3 deliberately studies 'large' promotions. These are for people who move right up to become managers. The case is particularly interesting because these people initially begin in a non-supervisory role: this group of individuals, it might be said, are given the greatest boost to their status.

Importantly, in Table 3 there is immediate evidence that the (future) promotees begin with better health than the other workers in the non-promoted control group. Subjective health is significantly better -- compare a mean of 1.86 with a mean of 2.02. This difference of -0.16 in the mean health across groups is statistically significantly at the 1% level. It remains so after correcting for other influences (dropping slightly to a difference of -0.13). Thus people who will go on to be promoted seem to be innately healthier. This is a concern for any version of a status-causes-health theory and implies that cross-section correlations are

[4] The regressions with controls are available upon request

[5] It is possible to start and end the analysis at different time points, but that greatly reduces the sample size without affecting our principal findings. The results of extending the analysis up until T+5, for example, are shown in Table 5.

likely to suffer from reverse causality. In the far right column of the top panel of Table 3, the regression-corrected gap in health between the two groups stays approximately constant through time, which again seems inconsistent with what might be expected from a status-causes-health theory. However, the raw difference, in the second-last column of Table 3, does widen a little through time.

At period T, the promoted group depicted in Table 3 have significantly better mental health. There appear to be some benefits to mental health in the run up to promotion at T. The promoted group have significantly better psychological health at T and the value -0.64* from T to T-1 indicates that this improvement is statistically significant. However, as soon as the promoted group reach T+1, any improvements in the lead-up to becoming a manager have dissipated. By T+3 these individuals have the same mental health levels as those who were not promoted, and when compared to time point T there is strong evidence that the promoted group suffer a relative worsening in their mental health. Note again, for instance, the difference in Table 3 of 0.83 points on a GHQ mental ill-health score by period T+3. This is a substantial deterioration compared to the non-promoted controls who remain at their original level of seniority across the time period.

Such a result runs counter to the hypothesis that promotion improves health: those who obtain the largest boost to status here show the clearest deterioration in GHQ mental health.

Other factors are associated with health and promotion. The second-last column in Table 3 shows the differences once time dummies, age, education, gender, marital status, smoking status, income (both personal and household), hours worked and household size at the relevant time period are held constant.

Similar results are found -- though sometimes, as would be expected, less sharply -- in the full sample of all job-promotions (many of which are 'smaller' promotions, such as from

non-supervisor to supervisor[6]). These results are depicted in Table 4. Here mental health among promotees has worsened in T+3 by 0.47 GHQ points.

A possible conclusion from these results is that causality does not run from status to health. In part, it seems that the healthiest individuals get promoted, but this result alone does not fully explain the social health gradient initially observed in Table 3. Arguably the cross-sectional association is driven by a third unobservable factor, such as behavioural or genetic factors. If there is a large benefit from being promoted, as potentially suggested by the Whitehall studies, then it is undetectable across our observed time frame. Good health, at least in the long term, apparently does not follow from job promotion.

6. Objections and Counter Arguments

There is, inevitably, some noise in the data. Hence (Issue #1) the findings might in principle be the result of a Type II error. In addition our sample construction enables one individual to contribute multiple employment windows to the sample (Issue #2). Moreover, selection into our dataset and promotion may be non-random in influential ways (Issue #3). These include the possibility that (Issue #4) the promoted groups endured substantial health deterioration relative to the control group in the years leading up to the promotion, with promotion merely restoring it. Alternatively (Issue #5) those that really improve in health might somehow be missed from our sub-sample completely. This could occur if individuals promoted at T went on to then get demoted or promoted within the three years, left the work-force or even left the BHPS altogether.

We probe these possible explanations.

Issue #1: Noise

A simple check on the possibility that our negative conclusions stem from sheer noise and Type II errors is temporarily to ignore standard errors and focus on coefficient signs.

[6] When the smaller promotion groups are analysed separately, there is no support for the status-causes-health theory.

When this is done, even the coefficient signs do not greatly support a status-causes-health theory.

Our data set necessarily aggregates across different kinds of work and different sectors. Therefore a further argument could be made against the occupational status variable. Whilst we expect the individual's answer to the status variable to have a large degree of internal consistency, there may be some variation across industries. We test this possibility by carrying out the same analysis on individuals who work and remain in the manufacturing industry, and again separately for the public sector. In the second column of Table 5, interestingly, there is some evidence that status may lead to improved subjective health within the manufacturing industry; however, here the 'treatment' group declines substantially in size, to only 42 workers, so it is sensible to be cautious about this conclusion.

Table 5 further shows the difference-in-difference estimates for those who stayed at the same address for the full period and separately for those who stayed in the promoted position until T+5. We examine these groups of individuals specifically -- since those people who stay at the same address are more likely to have gained a promotion within the same company than those who moved, and the period of analysis in our main analysis may have been too small to observe later health benefits. The sample sizes remain reasonably large but there are no significant differences in either of these tests; again, therefore, the data do not seem to favour a status-causes-health theory.

Issue #2: Sample construction

The nature of our sample construction enables individuals to contribute multiple employment spells to any one analysis. Any one individual can contribute multiple spells to the control group and it is also feasible that they will appear simultaneously in both control and treatment groups. However, excluding any of the employment spells would have resulted in a loss of information and there would be some difficulty in choosing which employment

spell to include. We therefore rerun our analysis only selecting each individual's first employment spell. The result of this test is shown in the final column of Table 5. Again there is no evidence of status causing health.

Issue #3: Endogeneity

An important issue is that promotion is potentially non-random and endogenous. We try to overcome this issue by using the variation in promotion rates in each year across industries as an instrument for promotion. It is assumed that promotion varies across industries but that ability of the individuals within the industry does not. A similar approach has been taken by Anderson and Marmot (2007). The results of using instrumental variables are appended for the any-promotion group in the final column of the previous table, Table 4. Generally the coefficients are larger than the previous estimates and are consistent with the paper's earlier findings; healthy individuals get promoted and promotion brings on substantial deterioration in mental health.

A further endogeneity concern arises from the construction of our dataset. Inevitably there is some unavoidable selection bias, with those included in our data set being neither a random sample of the population, nor a random sample of the working population. Therefore initial health conditions (e.g. Stewart and Swaffield 1999) are non-random and this may create some bias in our results.

It is perhaps also worth noting that the published literature on the cross-section association, which argues promotion has a causal effect, largely ignores possible endogeneity bias.

Issue #4: Poor health as a predictor

To deal with the third objection, it is necessary to determine whether, prior to promotion, poor health predicts promotion at T. Table 6's evidence suggests not. The reverse holds.

Issue #5: Sample changes

Promoted individuals are lost from the sample on three accounts: they leave the workforce; they get further promoted or demoted within the three years; or they exit the BHPS completely.

On the last point, that individuals leave the dataset altogether, not a great deal can be done. However, it is hard to see, intuitively, why particularly healthy people should exhibit high health-related attrition from the panel. Nevertheless, we examined whether individuals promoted at any given time-point in the BHPS were more likely to be absent from the subsequent wave. Whilst the raw data suggested that promoted individuals were more likely to leave the dataset, this difference went away once controls were included. In addition Contoyannis, Jones & Rice (2004) report that health-related attrition in the BHPS does not distort estimates of the socioeconomic gradient.

On the other two points – that individuals either left the workforce or alternatively got further promoted or demoted – we can compare the health of these individuals against the control and treatment groups. Table 7 mirrors the previous estimation of health changes from T-1 to T+3. A separate comparison is made for those who stay in employment, and those who leave the workforce. There is little evidence that those who subsequently change roles become healthier. The only clear outcomes arise for those who leave the workforce completely; with the coefficients indicating that there may have been some subjective health improvement, but that there was a worsening in mental health as measured on a GHQ scale.

7. Conclusions

This paper is, to our knowledge, one of the first longitudinal inquiries into the interesting hypothesis that status makes people healthy. It draws upon data from a nationally representative sample of employees. The paper finds little evidence that a person's health

improves after he or she is promoted.[7] Indeed, after they gain seniority at work, the GHQ mental health levels of those individuals who become managers typically worsen, and in a way that goes beyond a short-term change. This conclusion seems to be a new one in the literature.[8]

We find evidence -- as in Tables 3, 4 and 6 -- that good health seems to predict later promotion. This is a concern for the status-causes-health theory, because it alone could generate a positive cross-section correlation between health and job seniority.

Nevertheless, this is a complex topic. We would recommend that the paper's results be treated with caution. Further research will be needed before researchers have a complete understanding of the links between human status and human health.

[7] Our negative findings have one interpretive advantage: the likely bias goes in the other direction. If promotion really improves people's health, then to make sense of our results using a status-causes-health theory it would be necessary to believe, against common intuition, that individuals with a high probability of deteriorating health are the ones most likely to gain an increase in workplace seniority.

[8] We are not sure how to reconcile these results with the more supportive ones that have been found, using data on Oscar and Nobel Prize winners and nominees, in the work of Redelmeier and Singh (2001) and Rablen and Oswald (2007). One conjecture might be that it takes a major change in status to make a difference to physical and mental health; perhaps health does not respond in a linear dose-response way, but rather is a strongly convex function of status.

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Table 1: Summary statistics of the main sample and description of variables at T (N = 20,526) - unless specified otherwise

Variable		Mean (Standard Deviation)	Description of Variable
Subjective Ill-Health at:	**T-1**	2.01 (0.80)	An individual's rating of their health status over the last twelve months, where 1=excellent, 2=good, 3=fair, 4=poor, 5=very poor
	T	2.02 (0.80)	
	T+1	2.04 (0.81) N = 20508	
	T+2	2.05 (0.81)	
	T+3	2.07 (0.82)	
Mental Ill-Health at:	**T-1**	10.65 (4.80)	This variable is a 1 to 36 scale of an individual's mental ill-health obtained from the General Health Questionnaire (GHQ). There are 12, zero to 3 point questions that include; among others, an individuals ability to overcome problems, their decision capabilities, sleep, concentration and general feelings of depression.
	T	10.75 (4.79)	
	T+1	10.85 (4.86) N=19220	
	T+2	10.91 (4.92)	
	T+3	11.00 (4.98)	
Age		39.31 (11.56)	Individual's age
Female		0.55 (0.50)	Individual is female (excluded dummy: male)
Married		0.62 (0.49)	Individual is married (excluded dummy: all non married individuals including single, widow, divorced and separated)
Smoker		0.27 (0.44)	Individual is a smoker (excluded dummy: all non-smoking individuals)
Education Level:	**School**	0.40 (0.49)	Indicates an individual's highest academic qualification: *School* (the highest qualification obtained was O-levels or CSEs), *College* (the highest qualification obtained was A-levels or HND) and *Graduate* (the highest qualification obtained was a degree or higher degree), with an excluded dummy for those who recorded none of the these.
	College	0.26 (0.44)	
	Degree	0.09 (0.29)	
Work Hours		35.95 (12.97)	The logarithm of the number of hours an individual works in a typical week, including overtime
Personal Income		13,351 (8,716)	The logarithm of an individual's personal annual income
Household Size		3.07 (1.20)	The logarithm of the size of the household that the individual resides in
Household Income		29,666 (16,886)	The logarithm of the annual income of the household that the individual resides in
Non-Supervisor		0.87 (0.34)	Individual's managerial duties are neither manager or supervisory, yet they are still in employment
Supervisor		0.09 (0.28)	Individual's managerial duties are that of a supervisor or foreman
Manager		0.04 (0.21)	Individual's managerial duties are that of a manager
Promoted at T		0.06 (0.24)	Individuals promoted at T (to supervisor or manager) and remained until T+3
Promoted at T but Left Workforce		0.0004 (0.02) N = 23978	Individuals promoted at T (to supervisor or manager) but did not remain until T+3 as they left the workforce at some point
Promoted at T but Subsequently Changed Role		0.14 (0.35) N = 23978	Individuals promoted at T (to supervisor or manager) but did not remain until T+3 as they subsequently changed role through further promotion or demotion

Table 2: Cross-section Regression Equations for Subjective Ill-Health and Mental Ill-Health

Explanatory Variables	1	2	3	4	5	6
	Subjective Ill-Health			**Mental Ill-Health (GHQ)**		
Manager	-0.166	-0.138	-0.099	-0.738	-0.508	-0.632
	(5.92)**	(4.93)**	(3.35)**	(4.45)**	(3.04)**	(3.54)**
Supervisor	-0.031	-0.028	-0.014	-0.236	-0.083	-0.113
	(0.99)	(0.89)	(0.45)	(1.32)	(0.47)	(0.65)
Year Dummies		Jointly Significant	Jointly Significant		Jointly Significant	Jointly Significant
Regional Dummies		Jointly Significant	Jointly Significant		Jointly Significant	Jointly Significant
Age		0.002	0.001		0.018	0.018
		(2.61)**	(0.74)		(3.52)**	(3.01)**
Female		0.041	0.043		1.416	1.589
		(2.04)*	(1.98)*		(12.24)**	(12.26)**
Married		-0.024	-0.003		-0.260	-0.268
		(1.15)	(0.15)		(2.03)*	(1.97)*
Smoker		0.157	0.137		0.073	0.073
		(7.62)**	(6.55)**		(0.59)	(0.58)
Education Level						
School			-0.095			0.022
			(3.47)**			(0.13)
College			-0.058			0.204
			(1.93)			(1.15)
Graduate			-0.117			0.455
			(2.94)**			(1.73)
Logarithm of Personal Income			-0.019			0.455
			(1.26)			(4.53)**
Logarithm of Work Hours			0.029			-0.126
			(1.24)			(0.87)
Logarithm of Household Income[a]			-0.092			-0.737
			(4.70)**			(6.12)**
Logarithm of Household Size			0.023			0.479
			(0.94)			(3.20)**
Constant	2.030	1.675	2.730	10.805	9.948	12.922
	(186.83)**	(20.04)**	(12.72)**	(164.52)**	(17.12)**	(10.04)**
Observations	20508	20508	20508	19220	19220	19220
R-squared	0.0019	0.04	0.04	0.0012	0.04	0.04

Absolute value of t-statistics, adjusted for clustering and heteroskedasticity, in parentheses; * significant at 5% level; ** significant at 1% level
This is a full-sample regression that combines all promoted control and treatment group samples. These are separated in some of the subsequent analyses.
a – At the request of a reviewer we include both the individual's personal income and the income of the household within which they reside. Substantively the results are the same if only one income variable is used.

Table 3: Ill-health Among the Individuals Promoted to Manager from a Non-Supervisory Position (at time T) Compared to a Non-Promoted Control Group

Subjective Ill Health

	Promoted Group			Non-Promoted Control Group				Difference in Mean across Groups
Time Period	**N**	**Mean**	**Standard Deviation**	**N**	**Mean**	**Standard Deviation**	**Difference in Mean across Groups**	**(with Controls[a])**
T-1	400	1.86	0.82	17782	2.02	0.80	-0.16**	-0.13**
T	400	1.83	0.74	17782	2.03	0.80	-0.20**	-0.14**
T+1	400	1.85	0.72	17782	2.05	0.81	-0.20**	-0.13**
T+2	400	1.87	0.78	17782	2.06	0.81	-0.19**	-0.10*
T+3	400	1.86	0.78	17782	2.08	0.82	-0.22**	-0.12**
Change Across Time Periods								
From T-1 to T	400	-0.03	0.81	17782	0.01	0.81	**-0.04**	**-0.01**
From T-1 to T+3	400	0.00	0.90	17782	0.06	0.90	**-0.06**	**-0.03**
From T to T+1	400	0.02	0.73	17782	0.02	0.81	**0.00**	**-0.00**
From T to T+3	400	0.03	0.82	17782	0.05	0.88	**-0.02**	**-0.01**

Mental Ill-Health (GHQ)

	Promoted Group			Non-Promoted Control Group				Difference in Mean across Groups
Time Period	**N**	**Mean**	**Standard Deviation**	**N**	**Mean**	**Standard Deviation**	**Difference in Mean across Groups**	**(with Controls[a])**
T-1	386	10.34	5.64	16626	10.69	4.82	-0.35	-0.19
T	386	9.82	4.68	16626	10.81	4.83	-0.99**	-0.85**
T+1	386	10.65	4.80	16626	10.89	4.90	-0.24	-0.11
T+2	386	10.85	5.56	16626	10.95	4.93	-0.10	0.07
T+3	386	10.87	5.06	16626	11.02	4.99	-0.15	0.03
Change Across Time Periods								
From T-1 to T	386	-0.52	5.82	16626	0.11	5.02	**-0.64***	**-0.67***
From T-1 to T+3	386	0.53	7.01	16626	0.33	5.58	**0.20**	**0.08**
From T to T+1	386	0.83	4.36	16626	0.08	5.01	**0.74****	**0.74****
From T to T+3	386	1.05	5.86	16626	0.22	5.45	**0.83****	**0.75***

Numbers subject to rounding

Standard errors adjusted for clustering and heteroskedasticity; * significant at 5% level; ** significant at 1% level

a - For the time-period regressions, time dummies, age, gender, smoking and marital status, education, income and hours of work are used as controls at the appropriate time point. For the change across time periods regressions, controls include time dummies, age, gender, smoking and marital status, education at T and also the changes that took place in income, household income, household size and hours of work across the relevant time periods. Full regression results are available upon request.

Table 4: Ill-health Among the Individuals Promoted to Any Position (at time T) Compared to Non-Promoted Control Groups

Subjective Ill Health

	Promoted Group			Non-Promoted Control Group				Difference in Mean across Groups	Instrumental Variables
Time Period	**N**	**Mean**	**Standard Deviation**	**N**	**Mean**	**Standard Deviation**	**Difference in Mean across Groups**	**(with Controls[a])**	**Estimation**
T-1	1307	1.90	0.81	19201	2.02	0.80	-0.12**	-0.08**	-0.39**
T	1307	1.89	0.77	19201	2.03	0.80	-0.14**	-0.09**	-0.13
T+1	1307	1.90	0.75	19201	2.05	0.81	-0.15**	-0.09**	0.04
T+2	1307	1.94	0.79	19201	2.06	0.81	-0.12**	-0.05*	0.07
T+3	1307	1.95	0.79	19201	2.07	0.82	-0.13**	-0.05*	0.00
Change Across Time Periods									
From T-1 to T	1307	-0.01	0.82	19201	0.01	0.81	**-0.02**	**-0.00**	**0.12**
From T-1 to T+3	1307	0.05	0.92	19201	0.06	0.90	**-0.01**	**0.00**	**-0.03**
From T to T+1	1307	0.01	0.77	19201	0.02	0.81	**-0.01**	**-0.01**	**0.08**
From T to T+3	1307	0.06	0.86	19201	0.05	0.88	**0.01**	**0.01**	**-0.16**

Mental Ill-Health (GHQ)

	Promoted Group			Non-Promoted Control Group				Difference in Mean across Groups	Instrumental Variables
Time Period	**N**	**Mean**	**Standard Deviation**	**N**	**Mean**	**Standard Deviation**	**Difference in Mean across Groups**	**(with Controls[a])**	**Estimation**
T-1	1241	10.34	5.09	17979	10.67	4.78	-0.33*	-0.20	-1.68
T	1241	10.12	4.43	17979	10.79	4.81	-0.67**	-0.55**	0.87
T+1	1241	10.63	4.66	17979	10.87	4.87	-0.23	-0.11	1.23
T+2	1241	10.74	5.08	17979	10.92	4.91	-0.19	-0.04	1.05
T+3	1241	10.86	5.04	17979	11.01	4.97	-0.15	-0.02	1.60
Change Across Time Periods									
From T-1 to T	1241	-0.22	5.30	17979	0.12	4.98	**-0.34***	**-0.37***	**0.96**
From T-1 to T+1	1241	0.29	5.46	17979	0.20	5.23	**0.10**	**0.05**	**1.23**
From T-1 to T+2	1241	0.40	5.86	17979	0.25	5.42	**0.15**	**0.08**	**1.00**
From T-1 to T+3	1241	0.52	6.17	17979	0.34	5.54	**0.19**	**0.10**	**1.64***
From T to T+1	1241	0.51	4.53	17979	0.08	4.98	**0.44****	**0.43****	**0.03**
From T to T+3	1241	0.74	5.48	17979	0.22	5.42	**0.53****	**0.47****	**0.39**

Numbers subject to rounding

Standard errors adjusted for clustering and heteroskedasticity; * significant at 5% level; ** significant at 1% level

a - For the time-period regressions, time dummies, age, gender, smoking and marital status, education, income and hours of work are used as controls at the appropriate time point. For the change across time periods regressions, controls include time dummies, age, gender, smoking and marital status, education at T and also the changes that took place in income, household income, household size and hours of work across the relevant time periods. Full regression results are available upon request.

Table 5: Difference-in-Difference (From T-1 to T+3) Estimates Across Different Groups of Individuals: Individuals Working in Public Sector and Manufacturing Jobs, Individuals Who Remain at the Same Address across all 5 years, Individuals Who Stay in the Promoted Position up until T+5 and Using Each Individual's First Employment Window

Promoted Group	Ill-Health Measure	Public Sector[a] From T-1 to T+3	Manufacturing Industry[a] From T-1 to T+3	Same address across all 5 years[a] From T-1 to T+3	Remain in promoted position until T+5[a] From T-1 to T+5	Using each individual's first employment window From T-1 toT+3
Promoted to Manager (from Non-supervisor)	Subjective Ill-Health	0.27 (21/943)	-0.29* (42/2531)	-0.06 (203/11590)	-0.07 (174/9814)	-0.08 (302/4370)
	Mental Ill-Health (GHQ)	0.65 (21/883)	0.20 (41/2388)	-0.22 (194/10758)	0.08 (166/9100)	-0.10 (290/4006)
Any Promotion at T	Subjective Ill-Health	0.06 (79/1039)	-0.08 (175/2812)	-0.04 (719/12576)	-0.02 (580/10390)	0.02 (1020/4657)
	Mental Ill-Health (GHQ)	-0.17 (78/975)	-0.38 (164/2656)	0.01 (680/11695)	-0.04 (539/9646)	-0.10 (961/4276)

Standard errors adjusted for clustering and heteroskedasticity; * significant at 5% level; ** significant at 1% level

a - The numbers in brackets refer to the numbers in treatment/control group. As an aid to reading this table, the top left number of 0.27 (21/943) means that in the public sector a promotion to manager increases subjective ill-health by 0.27 points, and there are 21 people in this category, with 943 in the control group. All regressions include controls and the full regression results are available upon request.

Table 6: Probit Equations using Ill-Health at T-1 as a Predictor of Promotion

	1	2
	Any Promotion at T	
Dependent Variable:	Subjective Ill-Health	Mental Ill-Health (GHQ)
Explanatory Variables at T		
Ill-Health at T-1	**-0.068**	**-0.004**
	(3.38)**	**(1.06)**
Year Dummies	Jointly Significant	Jointly Significant
Regional Dummies	Jointly Significant	Jointly Significant
Age	-0.004	-0.004
	(2.35)**	(2.20)*
Female	-0.216	-0.217
	(6.54)**	(6.36)**
Married	0.096	0.095
	(2.56)**	(2.46)**
Smoker	0.033	0.025
	(0.87)	(0.65)
Education Level		
Scool	0.261	0.250
	(5.04)**	(4.68)**
College	0.503	0.487
	(9.29)**	(8.75)**
Graduate	0.979	0.960
	(15.22)**	(14.47)**
Constant	-1.072	-1.123
	(5.95)**	(6.21)**
Observations	20508	19220
Pseudo R-squared	0.07	0.06

Absolute value of t-statistics, adjusted for clustering and heteroskedasticity, in parentheses;
* significant at 5% level; ** significant at 1% level

Table 7: Regressions Showing Health Differences across Promoted Groups, and those who Subsequently Left the Workforce or Changed Role (From T-1 to T+3)

	1	2	3	4
	Promoted to Manager at T (from Non-Supervisor)		Any Promotion at T	
Dependent Variable:	Subjective Ill-Health	Mental Ill-Health (GHQ)	Subjective Ill Health	Mental Ill-Health (GHQ)
Explanatory Variables at T				
Promoted at T	**-0.032**	**0.072**	**0.003**	**0.086**
	(0.69)	**(0.20)**	**(0.10)**	**(0.47)**
Promoted at T but Left Workforce	**-0.040**	**8.944**	**0.433**	**3.232**
	(1.04)	**(35.95)****	**(1.19)**	**(1.67)**
Promoted at T but Subsequently Changed Role	**-0.021**	**0.120**	**-0.130**	**0.74**
	(0.59)	**(0.51)**	**(0.75)**	**(0.66)**
Year Dummies	Jointly Significant	Jointly Significant	Jointly Significant	Jointly Significant
Regional Dummies	Jointly Significant	Jointly Significant	Jointly Significant	Jointly Significant
Age	0.002	-0.022	0.002	-0.019
	(3.05)**	(4.86)**	(3.46)**	(4.87)**
Female	0.005	-0.041	0.006	-0.044
	(0.35)	(0.50)	(0.49)	(0.60)
Married	0.021	0.568	0.014	0.520
	(1.40)	(5.38)**	(1.05)	(5.70)**
Smoker	0.021	0.002	0.024	-0.020
	(1.36)	(0.02)	(1.81)	(0.23)
Education Level				
School	0.000	-0.017	-0.009	-0.006
	(0.01)	(0.15)	(0.54)	(0.06)
College	0.016	-0.005	0.014	0.045
	(0.78)	(0.04)	(0.76)	(0.40)
Graduate	0.001	0.135	-0.012	0.088
	(0.06)	(0.74)	(0.55)	(0.57)
Logarithm of Personal Income	0.008	0.300	0.004	0.312
	(0.58)	(3.49)**	(0.35)	(3.96)**
Logarithm of Work Hours	-0.024	-0.152	-0.020	-0.155
	(1.29)	(1.17)	(1.14)	(1.30)
Logarithm of Household Income	-0.013	-0.056	-0.019	-0.113
	(0.77)	(0.46)	(1.22)	(1.02)
Logarithm of Household Size	0.032	0.015	0.049	0.097
	(1.23)	(0.08)	(2.17)*	(0.61)
Constant	0.088	1.027	0.131	1.447
	(0.97)	(1.30)	(1.59)	(2.27)*
Observations	18837	17626	23958	22457
R-squared	0.03	0.01	0.03	0.01

Absolute value of t-statistics, adjusted for clustering and heteroskedasticity, in parentheses;
* significant at 5% level; ** significant at 1% level