

Job Strain, Rank, and Mental Health in the UK Armed Forces

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We assessed whether job demand and job control have independent effects on psychological symptoms or whether job control modifies effect of job demand; we also assessed whether rank modified associations between job strain and psychological symptoms. We used the Post Traumatic Stress Disorder (PTSD) Checklist (PCL-C), General Health Questionnaire-12 (GHQ-12), Chalder Fatigue Scale, a checklist of 53 physical symptoms, and the WHO's Alcohol Use Disorders Identification Test (AUDIT). Job control, job demand, and rank were independently associated with PTSD, common mental disorders, multiple physical symptoms, and fatigue, but not with severe alcohol problems. Job control and demand had additive effects on psychological symptoms. Commissioned officers had lower risk of caseness for psychological symptoms than other ranks. Adjustment for rank had negligible effect on level of association between job strain and psychological symptoms. Reported job strain and rank contributed independently to psychological symptoms. *Key words:* job strain; military; rank; mental health

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INTRODUCTION

Job strain, which is defined as the combination of high job demand and low job control, has been shown to be associated with psychological distress in both cross-sectional and longitudinal studies.^{1,2} Such an association is unsurprising, especially in cross-sectional studies, as both job strain and psychological distress can impact on each other.¹ More unexpected are reports of only a small or moderate effect size in the association between job strain and psychological distress in longitudinal studies.^{1,3,4} There is, however, controversy regarding the way job demand and control are related in their effects on psychological distress. Some reports have demonstrated high job control to have a buffering or protective effect on associations between high job demand and psychological distress,^{2,5} but others have

concluded that an additive model is more appropriate.⁶

There is also uncertainty about the mechanism of the association between job strain and psychological stress. High-strain jobs are more commonly held by people from lower socioeconomic backgrounds with less educational attainment. Thus it has been suggested that the effect of job strain on health can be explained by socioeconomic position rather than the nature of the job.⁷ However, the association between job strain and psychological distress has persisted after adjustment for socioeconomic status and has also been demonstrated in studies of specific occupations requiring a fairly high degree of educational attainment, such as teaching and nursing.^{3,8-10}

Occupation-specific analyses may help to more accurately assess the nature of the association between job strain and psychological distress.^{3,9,11} The military offers an appealing model for studying the job strain paradigm in relation to mental illness at least in part because the level of job control of service personnel is constrained within the limits of a specific trade and rank. Ippolito and colleagues found an association between job strain and psychological distress using the General Health Questionnaire (GHQ) in the US military.¹² Their findings did not demonstrate that job control has a buffering effect on the association between high job demand and psychological distress; they did show an interaction favoring a buffering effect when social support was added to the model. Despite the usefulness of their findings, Ippolito and colleagues did not examine the interrelation between rank and job strain on psychological distress. Military rank is a proxy measure of socioeconomic status and it has been used previously for assigning Registrar General's social class to British Armed Forces personnel.¹³ Socioeconomic status is also highly associated with psychological distress.¹⁴⁻¹⁶ Rank provides further insight because of its highly standardized categories: commissioned officers (officers), non-commissioned officers (NCOs), and other ranks. NCOs and other ranks tend to come from a similar social background, but NCOs have succeeded in progressing in their military career. However, few in the lower ranks become officers. Approximately 500 people (0.3% of the regular Armed Forces) were commissioned from the ranks in 2005/2006.¹⁷

In assessing the mental and physical health effects of participating in the 2003 Iraq War among UK military

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personnel,¹⁸ participants completed a self-administered questionnaire that included a section on psychological symptoms and six questions based on Karasek's job demand and job control questionnaire.^{19,20} Based on these data, the aims of the analysis reported here were: to assess if the association between job strain and psychological symptoms is additive or whether it is explained by a buffering effect (that is, effect modification of job control suppressing an association between job demand and psychological symptoms); and to assess whether the association between job strain and psychological symptoms is modified after adjustment for rank.

MATERIALS AND METHODS

This study was the first wave of a cohort study of UK Armed Forces personnel comparing the physical and mental health of those who participated in TELIC 1—the codename used by the UK military for the war fighting phase (January 18, 2003 to April 28, 2003)—to a group selected from those who did not participate in TELIC 1 but were serving in the UK military at that time (defined as Era).¹⁸ Further details can be found elsewhere.¹⁸ In brief, a random sample stratified according to the size of each branch of service and enlistment type (regulars or reserves) was asked to participate. We contacted those who were sampled, regardless of whether they had left the Armed Forces, at least three times to elicit completion of our questionnaire. In total, 4722 personnel who were deployed on TELIC 1 and 5550 who were in the Era sample completed a questionnaire, post-deployment, on their background, military experiences, and health outcomes. Data collection took place between June 2004 and March 2006. We omitted reservists and those who were no longer in service at time of questionnaire completion from this analysis as we wanted to assess job strain in relation to military jobs and not civilian jobs. The overall response rate for regulars was 60%. The final sample for these analyses was 7,766.

Outcome Measures

We used the following tools to assess participants: the 17-item National Center for Post Traumatic Stress Disorder Checklist (PCL-C) as a measure of symptoms of Post Traumatic Stress Disorder (PTSD)²³; the General Health Questionnaire-12 (GHQ-12) to measure symptoms of common mental disorders^{21,22}; the Chalder Fatigue Scale to measure fatigue symptoms²⁴; a checklist of 53 physical symptoms similar to those used in our previous study of Gulf War veterans²⁵; and the Alcohol Use Disorders Identification Test (AUDIT), developed by the World Health Organization (WHO).²⁶ Participants were considered positive for a particular outcome if the following measurements were recorded: a

score of four or above on the GHQ-12 and Chalder Fatigue Scale, a score of 50 or more in the PCL-C, 18 or more physical symptoms, and a score 16 or more for the AUDIT. According to the WHO this score corresponds to "severe levels of drinking," which will be referred to in this paper as a severe AUDIT case.²⁶

Independent Variables

Our choice of questions regarding job control and job demand was based on the recommendations of Landsbergis et al.²⁰ We had limited space within our questionnaire and thus had to identify the most pertinent questions for our study population. We have changed the wording of certain questions in places to suit our target population. We selected two items from Karasek's job demand domain: "I have to work very hard" and "I have an excessive amount of work to do." We selected four items on job control (decision latitude): "I have a lot to say about what happens on the job"; "I have a high level of skill"; "I have the freedom to decide how I do my work"; and "I have the chance to be creative." All the items presented four response options: "strongly agree" (score of 1); "agree" (score of 2); "disagree" (score of 3); and "strongly disagree" (score of 4).^{19,20} Scores from 2 to 8 were obtained for job demand, and a score from 4 to 16 for job control. Following recommendations,^{27,28} we divided the variables job demand and job control into three groups instead of dichotomizing each variable around their respective medians because we wanted to assess the pattern of associations in terms of trends for each component and the two factors taken together. The range of scores for the three groups are as follows: 2 to 4 (low job demand); 5 (medium job demand); 6 to 8 (high job demand); and 4 to 10 (low job control), 11 (medium job control) and 12 to 16 (high job control).

Regarding the other variables used in the analysis, we collected information on rank, which included officers; senior NCOs, such as sergeants and warrant officers; junior NCOs, such as corporals and lance corporals; and other ranks such as ratings, privates, aircraft men/women and junior technicians. We also collected information on sex, age, service branch (Naval Services, Army, and Royal Air Force), deployment to Iraq, and marital status.

Analysis

We carried out multivariable logistic regression analyses for each dependent variable corresponding to a positive result on the following: the PCL-C, the GHQ-12, the Chalder Fatigue Scale, multiple physical symptoms, and the AUDIT. Two separate models were carried out for each dependent variable. First, we adjusted for possible confounders: age, sex, service branch, Iraq deployment status, and marital status. Second, we also adjusted for

TABLE 1 Job Demand and Job Control, by Educational Status, Rank, and Service Branch

	Job Control			Job Demand		
	Lowest (0) (n=2126) n (%)	Middle (1) (n=2106) n (%)	Highest (2) (n=3357) n (%)	Lowest (0) (n=2485) n (%)	Middle (1) (n=1358) n (%)	Highest (2) (n=3698) n (%)
Rank						
Commissioned officers (n=1455)	312 (21.7)	360 (25.1)	763 (53.2)	259 (18.2)	274 (19.2)	893 (62.6)
Senior NCOs (n=2388)	602 (25.6)	635 (27.0)	1113 (47.4)	482 (20.5)	433 (18.4)	1433 (61.0)
Junior NCOs (n=2524)	757 (30.9)	689 (28.1)	1004 (41.0)	918 (37.8)	438 (18.1)	1070 (44.1)
Other ranks (n=1399)	455 (33.6)	422 (31.2)	477 (35.2)	826 (61.6)	213 (15.9)	302 (22.5)
Total	2126	2106	3357	2485	1358	3698
Educational status						
O-level or no qualifications (n=3831)	1081 (29.0)	1089 (29.2)	1557 (41.8)	1377 (37.3)	627 (17.0)	1688 (45.7)
A-level or degree (n= 3544)	966 (27.7)	908 (26.1)	1608 (46.2)	1002 (28.9)	654 (18.8)	1816 (52.3)
Total ^a	2047	1997	3165	2379	1281	3504
Service						
Naval Service (n=1321)	388 (29.9)	393 (30.3)	517 (39.8)	458 (35.5)	252 (19.5)	581 (45.0)
Army (n=4811)	1191 (25.5)	1261 (27.0)	2221 (47.5)	1471 (31.7)	777 (16.8)	2387 (51.5)
Royal Air Force (n=1634)	547 (33.8)	452 (27.9)	619 (38.3)	556 (34.4)	329 (20.4)	730 (45.2)
Total	2126	2106	3357	2485	1358	3698

^aNumbers do not total in the educational status category due to missing data

rank, job control, and job demand. We did not carry out separate analyses for each sex, despite differences of job strain in women and men, because the proportion of women in the UK Armed Forces is small (approximately 10%). We also carried out the analysis of job strain stratified by rank to assess differences in the pattern of associations by rank. In doing so, we collapsed job control categories “medium” and “high” and job demands categories “low” and “medium” because of the smaller sample size in each rank, especially officers. We used the statistical software package STATA (version 10) to carry out the analyses.

RESULTS

Those with a higher rank reported a higher level of job control and job demand (see Table 1). Job strain patterns were broadly similar in officers and senior NCOs. Junior NCOs were intermediate between other ranks and senior NCOs/officers. Those with higher educational levels reported slightly higher job control and job demand. The perception of job strain was, in general, similar in the three services, with Army personnel reporting a higher level of job control and job demand than those in the other two services. Rank was markedly associated with educational level (data not shown), with 89% of the officers, 49% of the senior NCOs, 34% of the junior NCOs and 31% of the other ranks having a British equivalent of advanced levels (A-levels) or university degrees.

We also examined the role of Iraq deployment experience (data not shown). Our analyses showed that those with deployment experience in Iraq reported no difference in the level of job control once rank was

taken into account. However, those with deployment experience in Iraq reported having lower job demand than those without Iraq deployment experience. Consequently, we have adjusted for Iraq deployment experience in all the analyses presented in this paper.

Table 2 shows the prevalence of psychological symptoms among participants in each of the relevant categories in the analysis. With the exception of PTSD, the relative frequency for each type of psychological symptom was relatively high. Those with the highest level of demand have the highest prevalence of psychological symptoms, except for being a severe AUDIT case.

The regression models showed that those with the lowest job control and those with the highest job demand scores had a higher risk of caseness for most psychological symptoms after adjustment for demographic confounders. As shown in Table 3, one exception to these findings is the relationship between job demand and severe AUDIT case status. There was little difference between the middle and highest categories of job control, except for GHQ-12. There was a tendency for those with an intermediate level of job demand to have a lower risk of psychological symptoms which was significant in relation to GHQ-12 and Chalder Fatigue Scale status. There was a steep trend of psychological symptoms by rank, except in relation to AUDIT case status. Junior NCOs and other ranks had similar risks for being a multiple physical symptoms case, a severe AUDIT case, and a fatigue case (see Table 3). Senior NCOs had lower adjusted odds ratios (AORs) than junior NCOs for all psychological symptoms. Adjustment for rank had a negligible effect on the relationship between job control or job demand and psychological symptoms (data not shown). We

TABLE 2 Job Demand Score, Job Control Score, and Rank Status, Overall and by Health Status

	Overall (N =7766) n (%)	PTSD Cases (PCL-C) (N=251) n (%)	Common Mental Illness Cases (GHQ-12) (N=1439) n (%)	Multiple Physical Symptoms Cases (N=789) n (%)	Severe AUDIT Cases (N=1207) n (%)	Fatigue Cases (Chalder Fatigue Scale) (N=2374) n (%)
Job control score ^a						
Lowest (0)	2126 (28.0)	123 (5.0)	690 (28.0)	324 (13.0)	522 (21.1)	922 (37.5)
Middle (1)	2106 (28.8)	37 (2.8)	257 (19.1)	127 (9.4)	208 (15.4)	417 (30.9)
Highest (2)	3357 (44.2)	82 (2.2)	460 (12.5)	321 (8.7)	446 (12.1)	988 (27.0)
Job demand score ^a						
Lowest (0)	2485 (33.0)	64 (3.0)	370 (17.5)	186 (8.8)	374 (17.7)	620 (29.4)
Middle (1)	1358 (18.0)	51 (2.4)	293 (14.0)	176 (8.4)	321 (15.3)	531 (25.5)
Highest (2)	3698 (49.0)	130 (3.9)	754 (22.7)	414 (12.3)	490 (14.7)	1187 (35.8)
Rank						
Commissioned officers	1455 (18.7)	15 (1.0)	200 (13.9)	69 (4.7)	87 (6.0)	331 (23.0)
Senior NCOs	2388 (30.8)	62 (2.6)	419 (17.7)	255 (10.7)	232 (9.8)	731 (31.0)
Junior NCOs	2524 (32.5)	101 (4.1)	499 (20.2)	314 (12.4)	517 (20.8)	851 (34.6)
Other ranks	1399 (18.0)	73 (5.4)	321 (23.4)	151 (10.8)	371 (27.2)	461 (33.7)

^aParticipant numbers may not total in job control scores and job demand scores due to missing data

tested for interactions of job demand and job control on each of the outcomes. Only the interaction with fatigue score was statistically significant ($p = 0.025$), but when we plotted the relevant coefficients, no meaningful pattern emerged. Adjustment for job control and job demand also had negligible effect on the association between rank and psychological symptoms, except that junior NCOs and ranks showed similar results for most psychological symptoms (data not shown).

Table 4 shows the combined effect of job demand and job control adjusting for confounding factors and rank. With the exception of severe AUDIT case status, low control and high demand were highly associated with psychological symptoms. Low job control or high job demands were also, in general, independently associated with PTSD symptoms, multiple physical symptoms, fatigue, and GHQ-12 status.

There were no significant interactions between rank and job strain (p -values ranged from 0.100 to 0.974). We carried out an analysis stratified by rank to provide a more detailed look at job strain using junior NCOs with greater job control and lower job demand as the reference group (see Table 5). The pattern in each rank was similar, but the ORs tended to be lower with higher rank. In officers, the only significantly increased association was found in relation to common mental illness cases (as measured by GHQ-12) among those with low job control combined with high job demand.

DISCUSSION

Perception of current job control and job demand is highly associated with psychological symptoms after adjustment for rank, a proxy for socioeconomic back-

TABLE 3 Ill-health by Job Demand Score, Job Control Score, and Rank Status

	PTSD Cases (PCL-C) AOR (95% CI) ^a	Common Mental Illness Cases (GHQ-12) AOR (95% CI) ^a	Multiple Physical Symptoms Cases AOR (95% CI) ^a	Severe AUDIT Cases AOR (95% CI) ^a	Fatigue Cases (Chalder Fatigue Scale) AOR (95% CI) ^a
Job control score					
Lowest (0)	1.0	1.0	1.0	1.0	1.0
Middle (1)	0.58 (0.40–0.85)	0.58 (0.49–0.69)	0.66 (0.53–0.83)	0.86 (0.71–1.03)	0.74 (0.64–0.85)
Highest (2)	0.48 (0.36–0.65)	0.35 (0.30–0.40)	0.58 (0.49–0.69)	0.74 (0.64–0.86)	0.60 (0.53–0.67)
Job demand score					
Lowest (0)	1.0	1.0	1.0	1.0	1.0
Middle (1)	0.81 (0.55–1.17)	0.75 (0.63–0.89)	0.94 (0.76–1.17)	0.87 (0.73–1.03)	0.81 (0.71–0.93)
Highest (2)	1.35 (0.99–1.84)	1.36 (1.18–1.57)	1.43 (1.19–1.72)	0.92 (0.79–1.08)	1.30 (1.16–1.47)
Rank					
Commissioned officers	0.26 (0.14–0.47)	0.60 (0.48–0.73)	0.25 (0.18–0.34)	0.41 (0.31–0.53)	0.55 (0.46–0.65)
Senior NCOs	0.63 (0.43–0.92)	0.79 (0.67–0.94)	0.65 (0.53–0.80)	0.69 (0.57–0.85)	0.83 (0.72–0.96)
Junior NCOs	1.0	1.0	1.0	1.0	1.0
Other ranks	1.57 (1.11–2.22)	1.40 (1.17–1.66)	1.18 (0.94–1.48)	0.99 (0.83–1.18)	1.14 (0.98–1.32)

^aAORs adjusted for age, sex, service branch, Iraq deployment status, and marital status

TABLE 5 Ill-health by a Combined Measure of Job Demand Score, Job Control Score, and Rank Status

	PTSD Cases (PCL-C)		Common Mental Illness Cases (GHQ-12)		Multiple Physical Symptoms Case	
	AOR (95% CI) ^a		AOR (95% CI) ^a		AOR (95% CI) ^a	
	Job Control Middle-High (1 or 2)	Low (0)	Job Control Middle-High (1 or 2)	Low (0)	Job Control Middle-High (1 or 2)	Low (0)
Commissioned officers						
Job demand						
Low-Middle (0 or 1)	0.31 (0.10–0.95)	0.39 (0.05–2.94)	0.53 (0.36–0.76)	1.32 (0.79–2.19)	0.19 (0.11–0.34)	0.30 (0.12–0.77)
High (2)	0.47 (0.19–1.16)	1.02 (0.30–3.52)	0.71 (0.51–1.00)	3.55 (2.37–5.32)	0.29 (0.18–0.46)	1.07 (0.61–1.88)
Senior NCOs						
Job demand						
Low-Middle (0 or 1)	0.55 (0.26–1.14)	1.66 (0.73–3.80)	0.63 (0.47–0.84)	1.73 (1.20–2.49)	0.48 (0.34–0.69)	0.89 (0.56–1.42)
High (2)	1.12 (0.59–2.10)	2.52 (1.20–5.28)	1.22 (0.93–1.61)	3.20 (2.27–4.50)	1.01 (0.74–1.39)	1.43 (0.93–2.18)
Junior NCOs						
Job demand						
Low-Middle (0 or 1)	1.00	1.79 (0.97–3.29)	1.00	1.59 (1.20–2.12)	1.00	1.23 (0.87–1.73)
High (2)	1.96 (1.10–3.51)	3.21 (1.75–5.88)	1.38 (1.04–1.82)	3.75 (2.79–5.05)	1.32 (0.96–1.82)	2.19 (1.54–3.11)
Other ranks						
Job demand						
Low-Middle (0 or 1)	1.83 (0.83–4.04)	2.91 (1.61–5.28)	1.31 (0.89–1.93)	2.55 (1.92–3.38)	1.17 (0.72–1.90)	1.60 (1.12–2.29)
High (2)	2.81 (1.33–5.97)	2.80 (1.36–5.73)	1.73 (1.16–2.58)	3.43 (2.44–4.87)	1.58 (0.97–2.58)	1.95 (1.26–3.02)

^aAORs adjusted for age, sex, service branch, Iraq deployment status, and marital status

effect is restricted to those with the lowest level of job control and the highest level of job demand.

In our study there was only weak evidence of an association between job strain and severe AUDIT case status. Those who perceived themselves to have high job control had a lower rate of severe alcohol problems. This was surprising because other studies have reported an association between job strain, substance abuse, and adverse health outcomes.^{12,27,29,30} In a military environment, alcohol use is a common leisure activity that may affect all groups,³¹ regardless of job characteristics.

Job Strain, Rank and Psychological Symptoms

Our analyses suggest that rank, as a proxy of socioeconomic background, does not alter the association between job strain and psychological ill-health. It is true that officers, many of whom have a university degree, have a lower risk of psychological symptoms, but they had a similar stratification of risk in relation to job strain. Thus, regarding occurrences of common mental illness, the model proposed by Adler,⁸ in which material and psychosocial factors are complementary in their effects on common mental health, seems relevant to our military population. A similar result has also been reported in relation to quality of life^{9,16} and

depression in central and Eastern European countries.¹⁵ The model proposed by McLeod and colleagues⁷ in which objective social status and not subjective social status is the main determinant of health is too restrictive an explanation to understand the differences in psychological health in the UK military. However, although the stratification by job strain was found in each rank stratum, the level of risk was much lower in the officers' stratum. The marked difference in psychological health between senior NCOs and junior NCOs and other ranks can be explained by selection to the highest NCO ranks and this was reflected by their higher educational attainment. Thus, the stratification of risk by job strain within categories of rank suggests that socioeconomic background has a unique role in impacting common mental illness, as suggested by studies measuring other health outcomes.^{7,32} Despite the lack of interaction between rank and job strain on psychological health in our study, our results show some support for a neo-material explanation by providing a nuanced account of the interrelation between socioeconomic status and mental health.

Strength and Weaknesses

The strengths of our study are that our results are based on a large sample randomly selected from the

UK military, we included a wide range of psychological health outcomes, and this type of analysis has been rarely carried out among service personnel. The response rate was reasonably good, taking into account that this sample is largely composed of highly mobile young males with a large percentage being recruited from deprived backgrounds,¹⁸ characteristics associated with poor response rates.

Those with psychological symptoms may retain and ruminate over memories of job strain for a long time, while those who are in good mental health may be more inclined to downplay or forget work events of the same nature. This would exaggerate the true effects of the associations reported in this study. In the military, this type of phenomenon has been studied in relation to combat exposures during deployment. There is inconsistency between studies on the effect of mental health (such as PTSD) on reported exposures using a longitudinal approach, but in those studies which reported a bias the effect was small.³³⁻³⁵

A weakness of our study is that we used a cross-sectional analysis, and the associations may be inflated by subjective reporting of job strain in those with depressed mood, as demonstrated by the small effect sizes of this association in longitudinal studies.^{1,5} However, longitudinal analyses are also problematic because many do not capture the changes in job content over time that can also affect mood; nor do such studies account for selection bias since those who are more satisfied with their jobs may be more likely to remain in them. We would maintain that by giving effect sizes, epidemiological studies provide an indication of probable effect and that the true effect is somewhere between estimates using a cross-sectional design and those using a prospective design. Wainwright and Calnan³⁶ were critical of the epidemiological approach to the study of work stress because the lack of historical and cultural context may lead to a reductionist assumption that a job *per se* is a sufficient cause of disease, a model in which the individual plays a passive role. It is the nature of quantitative approaches that there are limits to the number of variables that can be explored within a study, but future studies can add new criteria to map out the characteristics of job strain that are even more salient and related to subjects' susceptibility.¹²

Another limitation is that we omitted Karasek's questions on social support that would have given us an overview on the role of protective factors in decreasing the level of association between job strain and psychological symptoms. We would have wanted to use the effort-reward and cognitive appraisal scales which would have allowed us to explore the meaning of job experience and the individual's ability to cope with job challenges.³⁶⁻³⁸ However, we were forced to limit the length of our questionnaire to increase its acceptability.

Implications

Rank has been used as a confounder in most analyses based on UK Armed Forces. We would maintain that it deserves to be included as a causal factor to understand fully the context of job characteristics in the military as a proxy for cultural context. Our results suggest that there may be health gains in developing jobs in the military which are perceived to be worthwhile and reasonably demanding. Given the highly hierarchical organization of the military, in which the chain of command plays a pivotal role, consideration should be given to job fulfillment. Further, it is also important to consider that a well-balanced job may not only have an impact in improving mental health, but also on retention.

CONCLUSION

Job strain is associated with psychological ill-health in the military and this is not accounted for exclusively by rank; however, both rank and job strain do appear to have additive effects on psychological symptoms. As job strain and psychological symptoms rely upon subjective reporting, it is necessary to be cautious about the meaning of this association and to further assess the constituents of this association, especially since malaise in an organization could compromise its effectiveness.

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