

# Does work stress predict the occurrence of cold and flu symptoms?

Phillips, Anna; Sheffield, D

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Does Work Stress Predict the Occurrence of Cold, Flu and Minor Illness Symptoms in Clinical  
Psychology Trainees?

Anna Phillips\* and David Sheffield  
University of Birmingham & Staffordshire University

\*Correspondence should be addressed to Anna Phillips, School of Sport and Exercise Sciences,  
University of Birmingham, Edgbaston, Birmingham, B15 2TT.

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### **Abstract**

**Objectives:** The present study examined the three/four-day lagged relationship between daily *work* stress and upper respiratory tract infection (URTI) and other minor illness symptoms.

**Methods:** Twenty-four postgraduate clinical psychology trainees completed work stress, cold/flu symptoms and somatic symptoms checklists daily for four weeks. **Results:** Increases in work stress were observed two days prior to a cold/flu episode but not three or four days preceding a cold/flu episode. Work stress was unrelated to peaks in somatic symptom reporting.

**Conclusions:** There was some evidence of a lagged relationship between work stress and symptoms, but not of the expected duration, suggesting that the relationship between work stress and URTI symptoms was not mediated by the immune system.

A number of daily diary studies have examined the relationship between daily hassles and uplifts and the onset of episodes of upper respiratory tract infections (URTI), notably the common cold (Evans, Pitts, & Smith, 1988; Evans & Edgerton, 1991; Stone, Reed, & Neale, 1987; Stone, Porter, & Neale, 1993). In three of these studies, the onset of infectious ailments was preceded three to five days earlier by a sharp decrease in the frequency of desirable events experienced (Evans et al., 1988; Evans & Edgerton, 1991; Stone et al., 1987). Additionally, undesirable events increased immediately preceding the incidence of illness (Stone et al., 1987; Evans & Edgerton, 1991). One parsimonious explanation for the observed association between daily events and URTI is that of mediation by the immune system, which is influential in a range of illnesses (Ader, Cohen, & Felten, 1995).

The relationship between daily events and health may depend upon the health outcome measure examined (Sheffield, McVey & Carroll, 1996). Undesirable, but not desirable, daily events were significantly correlated with somatic symptoms three or four days later (Sheffield et al., 1996). Similarly, daily hassles preceded the development of headaches in migraineurs (Spierings, Sorbi, Maassen, & Honkoop, 1997). Accordingly, the present study included a variety of health outcome measures.

No study to date has examined the effects of daily *work* stress on physical health even though work is frequently identified as a source of stress. The present study investigated the relationship between daily work stress and the occurrence of URTI and other minor illness symptoms in trainee clinical psychologists who experience a high intensity and variety of work stress (Kuyken, Peters, Power & Lavender, 1998). It was expected that an increase in the occurrence of URTI and other minor illness symptoms would be significantly associated with higher levels of daily work stress three to four days earlier.

## **Method**

### *Participants*

One male and 23 female postgraduate clinical psychology trainees with a mean age of 28.8 ( $SD = 4.4$ ) years were recruited from 100 approached at three postgraduate clinical psychology courses.

### *Measures*

Work stress was measured using two short 7-point Likert stress scales derived from two work stress questionnaires, the Mental Health Professionals Stress Scale (Cushway et al., 1996) and the Measures of Perceived Work Characteristics (Haynes et al., 1999). These scales have previously been validated for use with mental health professionals with Cronbach's alphas of 0.87 and 0.70 to 0.92, respectively. The checklists were adapted into two internally consistent daily measures of work stress. The client-related stress scale ( $\alpha = .83$ ) measured stress associated with trainees' clinical practice days such as difficulties with clients, for example, "To what extent have you felt inadequately skilled for dealing with difficult clients?". The organisational stress scale ( $\alpha = .73$ ) measured issues related to trainees' ongoing supervision, training and academic work, for example, "To what extent did your supervisor ask for your opinion before making decisions affecting your work?".

Participants reported daily whether they had experienced any URTI symptoms using a 14-item checklist derived from Evans, Doyle, Hucklebridge and Clow (1996). The symptoms thought to be most indicative of URTI illness, defined as a cough and/or sore throat, plus either a bunged up nose, runny nose, or sneezing (confirmed by the American Academy of Family Physicians Foundation, 2002) were taken as criteria for occurrence of an URTI. Physical symptoms were assessed by the somatic symptoms scale of the GHQ-28 (Goldberg & Hillier, 1979), which has high internal reliability and validity.

### *Procedure*

Following informed written consent, participants were asked to complete records at the end of each day for four weeks. The following instructions adapted from Evans et al. (1988) for missing days data were explained: a) 24-hour lapse: fill in record for the previous day, but clearly mark it as a late fill-in; b) greater than 24-hour lapse: leave record blank; c) if days were missed, participants were told not to be discouraged or drop-out, but to resume their record keeping. Two freepost envelopes were provided to return the first two weeks of data midway through the study and the final two weeks on completion of the study, and participants were followed up by email to encourage returns.

### Data Analysis

The analytic strategy used in this study has been used previously with similar data (Evans et al., 1988). Stress scores on the day of, and of the four days preceding an illness episode were compared with stress scores during a control period matched as the same day of the week but not preceding or including an illness episode, using paired t-tests. Effect sizes ( $d$ ) were conducted for the association between each work stress measure and each illness outcome. For interpretative purposes, effect sizes of .2, .5 and .8 were considered small, medium and large, respectively (Cohen, 1988).

### Results

Sixteen participants experienced a URTI based on their symptom report, with a mean duration of 3.44 ( $SD = 2.39$ ) days. Overall mean levels of work stress, measured on the client-related and organisational stress scales did not differ between individuals who did or did not experience a URTI,  $t(22) = .12, p = .91, d = .05$ , and  $t(22) = -.35, p = .73, d = -.16$ .

For participants with a URTI, work stress scores prior to illness were compared to matched control periods (see table 1). Contrary to the hypothesis that higher work stress, both client-related and organizational, would be associated with increased symptoms three to four days later, none of the four relationships of particular interest were statistically significant. Surprisingly, client-related stress was significantly greater two days before the URTI than on the matched control day,  $t(9) = 4.97, p = .001$ . Organizational work stress was also greater two days before the URTI when compared to the matched control day, and although this finding did not reach statistical significance, the effect size was large (see table 1). There was also a trend towards an increase in client-related work stress the day before illness onset,  $p = .06$ , and there were medium-sized (see Cohen, 1988) increases of both work stress measures the day before URTI illness onset. Using the GHQ somatic symptoms scale maximum score as an illness indicator revealed significantly *lower* organizational work stress four days before this illness outcome than on the matched control day,  $t(6) = -3.68, p = .01$ .

Insert Table 1 about here

### **Discussion**

Previous diary studies have reported a lagged relationship between daily stress and colds or other minor illnesses (e.g., Evans et al., 1996; Sheffield et al., 1996), however, this study was the first to focus on daily work stress. Based on previous similar work (Stone et al., 1987; Evans & Edgerton, 1991) it was expected that a three or four day lagged association would be present between the occurrence of daily work stress and the manifestation of URTI illness. Little evidence was found supporting this proposition since none of the four pertinent relationships were significant. Rather, both work stress measures were elevated two days before a URTI episode and there were modest increases the day before URTI illness onset.

Cold/flu symptoms tend to appear two to three days after infection (Cohen, Doyle & Skoner, 1999), thus the absence of an increase in work stress three-four days before URTI illness suggests that work stress may not have an immune-mediated influence on URTI illness. In contrast, the elevation of work stress two days and, to a lesser extent, one day before a URTI illness indicates that individuals may be more likely to report more stress when they are starting to feel unwell. This proposition is supported by the increase in symptoms in the one and two days before the URTI illness. In addition, most of the clinical psychology trainees in our study continued to work throughout their illness (only four of the 16 participants took a day off), thus it is likely that they felt more stressed while they were coping with the minor illness.

In the present study there was little evidence of a lagged relationship between work stress and somatic symptoms, with only one significant association emerging in a direction contrary to expectation, i.e. decreases in organizational work stress were reported four days before maximum reports of somatic symptoms. This finding contrasts with a previous study that revealed a lagged relationship between stress and somatic symptoms in a student sample (Sheffield et al., 1996), however, methodological differences might explain the apparent contradiction. A stricter within-subjects design was used in the present study rather than the

between-subjects design employed previously. Further, the idiomatic approach used here should more accurately reveal true relationships between stress and symptoms.

Finally, there were no differences in the mean level of work stress reported between those who did or did not report a URTI illness. Previous studies (e.g., Evans et al., 1996; Graham, Douglas & Ryan, 1986) have illustrated that highly stressed individuals experience more URTI episodes and symptom days than low stressed individuals. However, in these studies stress was measured once rather than daily over four weeks. In addition, previous studies have been substantially larger and, given the large effect sizes observed here, it is likely a larger study would have revealed similar differences.

### *Limitations*

One limitation of the present study is that the work stress scales used might not be sensitive enough to detect a three–four day lagged relationship. Clinical psychology trainees experience various different workdays during their working week including placement; training and study days, thus the measures, while appropriate generally, might have been less applicable in the daily context. However, care was taken to ensure the validity and reliability of these scales by adapting them from existing valid measures and piloting them on an appropriate sample in advance. Further, the measures also showed variation across days suggesting that they were sensitive to perceived changes in stressors. Second, it was not possible to match all illness episodes with appropriate work stress data from lagged days and equivalent control periods. This was due in part to the occasional unanswered question, although more data was missing as a result of weekends. Consequently, the present study may have had more missing data than previous diary studies because of its focus on work stress, resulting in reduced power to detect effects. Finally, the small sample size of the study also contributed to the reduction in power to detect effects. Unfortunately low response rates appear to be a characteristic of this particular participant group, (see e.g., Phillips, Hatton & Gray, 2004). However, despite this, the majority of comparisons were based on similar participant numbers to previous diary studies.

### *Conclusions*

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The present study suggests that daily work stress may be related to URTI symptoms two days prior to an illness episode. Thus, in addition to the type of illness symptoms measured affecting the emergence of a stress-symptom relationship, the type of stress assessed might be pertinent too. This observation finds accord with the original diary studies of stress and URTI symptoms that have more consistently found relationships with desirable events (uplifts) than undesirable events (hassles). More complete investigations of the types of desirable and undesirable events, including work stress, as they relate to a range of symptom types are recommended, and additional attention should be focused on work stress, particularly in the United Kingdom where working hours are longer than ever before (Trade Union Congress, 2002). A consideration of the potential pathways should also inform which lagged relationships might merit examination.

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**Table 1**

Effect Sizes (d) for Comparisons of Work Stress in the Period Preceding Illness Onset versus a Control Period

	<b>4 days before</b>	<b>3 days before</b>	<b>2 days before</b>	<b>1 day before</b>	<b>Illness onset</b>
<b>Client-related stress</b>					
Cold symptom criteria	d = -.09 (N=9)	d = .37 (N=12)	d = .82* (N=9)	d = .55# (N=9)	d = .09 (N=16)
GHQ somatic max. score	d = 0.12 (N=10)	d = -.03 (N=10)	d = .21 (N=13)	d = -.02 (N=16)	d = .11 (N=10)
<b>Organisational stress</b>					
Cold symptom criteria	d = -.44 (N=4)	d = .19 (N=9)	d = .97 (N=7)	d = .51 (N=6)	d = -.06 (N=10)
GHQ max. score	d = -.34* (N=6)	d = -.17 (N=8)	d = -.08 (N=8)	d = -.13 (N=12)	d = .09 (N=6)

N.B. negative signs indicate direction of effect against the expectation that days preceding illness will have higher levels of self-reported work stress than the control period

\*  $p < .05$ , #  $p = .06$