**Influences of early shift work on the diurnal cortisol rhythm, mood and sleep: within-subject variation in male airline pilots**

* [Bostock S](http://www.ncbi.nlm.nih.gov/pubmed/?term=Bostock%20S%5BAuthor%5D&cauthor=true&cauthor_uid=22877997)1, [Steptoe A](http://www.ncbi.nlm.nih.gov/pubmed/?term=Steptoe%20A%5BAuthor%5D&cauthor=true&cauthor_uid=22877997).

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**Abstract**

We aimed to investigate how early and late work shifts influenced the diurnal cortisol rhythm using a within-subjects study design. Participants were 30 healthy male non-smoking pilots, mean age 39.4, employed by a short-haul airline. The standard rotating shift pattern consisted of 5 early shifts (starting before 0600 h), followed by 3 rest days, 5 late shifts (starting after 1200 h) and 4 rest days. Pilots sampled saliva and completed subjective mood ratings in a logbook 6 times over the day on two consecutive early shift days, two late days and two rest days. Sampling was scheduled at waking, waking+30 m, waking+2.5 h, waking+8 h, waking+12 h and bedtime. Waking time, sleep duration, sleep quality and working hours were also recorded. Cortisol responses were analysed with repeated measures analysis of variance with shift condition (early, late, rest) and sample time (1-6) as within-subject factors. Early shifts were associated with a higher cortisol increase in response to awakening (CAR(i)), a greater total cortisol output over the day (AUC(G)) and a slower rate of decline over the day than late shifts or rest days. Early shifts were also associated with shorter sleep duration but co-varying for sleep duration did not alter the effects of shift on the cortisol rhythm. Both types of work shift were associated with more stress, tiredness and lower happiness than rest days, but statistical adjustment for mood ratings did not alter the findings. Early shift days were associated with significantly higher levels of circulating cortisol during waking hours than late shifts or rest days.