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Chronic stress among adults in Germany

Results of the German Health Interview and Examination Survey for Adults (DEGS1)

Background and purpose

Stress is a normal reaction to various stimuli and stressors. The stress response mobilises energy, increases blood circulation in the brain and muscles, and enhances alertness [1]. In industrial and service societies, human beings are increasingly exposed to complex pressures in their working and living environments to which they must react. According to a study commissioned by the *Techniker Krankenkasse* health insurance company, eight out of ten Germans consider their lives to be stressful and every third suffers from "constant stress" [2]. When the frequency and intensity of stress exceed the available individual resources for stress management, this can result in chronic overload in the form of chronic stress. Chronic stress has effects on the metabolism, the immune system and the cardiovascular system, and impairs sleep regulation as well as learning, memory and attention processes [1, 2, 3]. Stress also seems to contribute to the onset and progression of mental health problems and mental disorders. Up to approximately 10 years ago, however, a clear correlation between cause and effect was not possible due to a lack of longitudinal studies [1]. Today, the association between stressful life events and episodes of major depression is considered as proven [4]. An extensive meta-analysis of studies on work-related psychosocial stress including longitudinal studies identified risk factors for the development of mental disorders [5].

Chronic psychosocial stress poses particularly high risks for stress-related chronic changes and their interactions, which mainly correspond to processes in premature ageing, as has been shown with respect to the immune system [6].

The assessment of chronic stress in DEGS1 aims at examining more closely long-term or frequently recurring daily life stressors and their effects on health and mental wellbeing. Firstly, the prevalence of chronic stress in men and women in different age groups and in people with different socioeconomic statuses is reported. Further, associations between the prevalence of chronic stress and social support, sleep disturbances, depressive symptoms and the so-called burnout syndrome are examined.

Methods

Study population of DEGS1 and statistics

The German Health Interview and Examination Survey for Adults ("Studie zur Gesundheit Erwachsener in Deutschland", DEGS) is part of the health monitoring system at the Robert Koch Institute (RKI). The concept and design of DEGS are described in detail elsewhere [7, 8, 9, 10, 11]. The first wave (DEGS1) was conducted from 2008–2011 and comprised interviews, examinations and tests [12, 13]. The target population comprises the residents of Germany aged 18–79 years. DEGS1 has a mixed design which per-

mits both cross-sectional and longitudinal analyses. For this purpose, a random sample from local population registries was drawn to supplement former participants of the German National Health Interview and Examination Survey 1998 (GNHIES98), who re-participated. A total of 8,152 persons participated, including 4,193 first-time participants (response rate 42%) and 3,959 revisiting participants of GNHIES98 (response rate 62%). In all 7,238 persons attended one of the 180 examination centres, and 914 were only interviewed. The net sample [11] permits representative cross-sectional analyses for the age range of 18–79 years (n=7,988, including 7,116 in study centres) and time trend analyses in comparison with GNHIES98. The cross-sectional and trend analyses are conducted with a weighting factor which corrects deviations in the sample from the population structure (as of 31 Dec 2010) with regard to age, sex, region and nationality, as well as community type and education [11]. Calculation of the weighting factor also considered re-participation probability of GNHIE98 participants, based on a logistic regression model. A non-response analysis and a comparison of selected indicators with data from official statistics indicate a high level of representativeness of the net sample for the residential population aged 18–79 years of Germany [11].

In order to take into account both the weighing and the correlation of participants within a sample point, the confidence intervals and p values were deter-

Tab. 1 Prevalence of high chronic stress levels by sex, age and socioeconomic status (SES), n=5,793

| | 18–29 years % (95% CI) | 30–44 years % (95% CI) | 45–64 years % (95% CI) | Total % (95% CI) |
|------------------------|---------------------------|---------------------------|---------------------------|---------------------|
| Women (n=3,078) | | | | |
| Low SES | 18.0 (11.5–27.1) | 22.2 (13.3–34.6) | 20.8 (14.4–29) | 20.2 (15.9–25.3) |
| Medium SES | 16.3 (12.0–21.7) | 12.9 (9.7–17) | 11.4 (9.2–14.1) | 13.0 (11.3–14.9) |
| High SES | 12.3 (6.3–22.7) | 12.4 (8.6–17.5) | 10.1 (6.9–14.6) | 11.3 (8.9–14.4) |
| Total | 16.1 (12.8–20.1) | 14 (11.3–17.3) | 12.6 (10.6–15.0) | 13.9 (12.3–15.6) |
| Men (n=2,715) | | | | |
| Low SES | 17.3 (10.0–28.2) | 13.5 (7.4–23.3) | 13.4 (8.5–20.6) | 14.6 (10.9–19.1) |
| Medium SES | 8.7 (5.8–12.7) | 6.9 (4.3–11.0) | 7.8 (5.8–10.4) | 7.8 (6.2–9.7) |
| High SES | 3.8 (0.8–15.6) | 4.4 (2.0–9.4) | 4.7 (3.0–7.2) | 4.4 (2.9–6.8) |
| Total | 9.8 (7.1–13.4) | 7.1 (5.0–10.0) | 8.0 (6.5–9.9) | 8.2 (6.9–9.6) |
| Total (n=5,793) | | | | |
| Low SES | 17.7 (12.5–24.3) | 17.7 (12.0–25.2) | 16.9 (12.7–22.1) | 17.3 (14.6–20.4) |
| Medium SES | 12.3 (9.8–15.3) | 10.1 (8.0–12.6) | 9.7 (8.2–11.5) | 10.4 (9.3–11.7) |
| High SES | 8.0 (4.3–14.4) | 7.9 (5.3–11.7) | 7.2 (5.4–9.6) | 7.6 (6.0–9.6) |
| Total | 12.9 (10.8–15.4) | 10.5 (8.7–12.6) | 10.3 (9.0–11.8) | 11 (10.0–12.1) |

Tab. 2 Prevalence of high chronic stress levels by sex and social support, n=5,774

| | Poor social support % (95% CI) | Moderate social support % (95% CI) | Strong social support % (95% CI) |
|------------------------|-----------------------------------|---------------------------------------|-------------------------------------|
| Women (n=3,067) | 32.5 (25.3–40.5) | 13.3 (11.3–15.7) | 9.5 (7.6–11.7) |
| Men (n=2,707) | 20.8 (15.2–27.7) | 8.4 (6.6–10.5) | 4.3 (2.9–6.3) |
| Total (5,774) | 26.2 (21.6–31.4) | 10.8 (9.4–12.3) | 7 (5.7–8.5) |

Tab. 3 Prevalence of high chronic stress levels by sex and mental health problems

| | Burnout syndrome in last 12 months | | | Current depressive symptoms | | | Sleep disturbances | | |
|--------------|------------------------------------|-----------------------|---------------------------|-----------------------------|-----------------------|---------------------------|--------------------|-----------------------|---------------------------|
| | N | Present % (95% CI) | Not present % (95% CI) | N | Present % (95% CI) | Not present % (95% CI) | N | Present % (95% CI) | Not present % (95% CI) |
| Women | 3,044 | 51.5 (37.3–65.4) | 12.9 (11.5–14.6) | 2,987 | 57.7 (49.8–65.2) | 8.5 (7.3–9.8) | 3,007 | 24.4 (20.7–28.6) | 9.7 (8.3–11.4) |
| Men | 2,705 | 36.1 (20.2–55.9) | 7.8 (6.5–9.2) | 2,654 | 47.4 (39.2–55.7) | 5.4 (4.3–6.7) | 2,678 | 18.9 (15.0–23.5) | 5.4 (4.3–6.9) |
| Total | 5,749 | 45.9 (35.2–57.1) | 10.3 (9.4–11.3) | 5,641 | 53.7 (48.2–59.2) | 6.9 (6.1–7.7) | 5,685 | 22.1 (19.3–25.2) | 7.5 (6.6–8.4) |

mined using the SPSS-20 procedures for complex samples. Differences are regarded as statistically significant if the 95% confidence intervals do not overlap. In case the 95% confidence intervals are only slightly overlapping, the statistical significance of differences in prevalence was calculated based on a corrected chi-squared test for independence according

to Rao and Scott [14], here regarding a p value of <0.05 as statistically significant.

Chronic stress

The Screening Scale of the Trier Inventory for the Assessment of Chronic Stress (TICS-SSCS) was used to measure stress [15]. This standardised questionnaire

consisting of 12 items was used only in participants up to 64 years (N=5,850). The analyses in this article are therefore limited to participants in the age group from 18–64 years. The TICS-SSCS captures the frequency of self-perceived stress in the last 3 months in five different domains of stress: chronic worrying, work-related and social overload, excessive demands, and lack of social recognition. The frequency of stress in these five domains is measured as “never” (0 points), “rarely” (1 point), “sometimes” (2 points), “often” (3 points) and “very often” (4 points). A total score is calculated by summing all item scores; answers are allowed to be missing for up to 3 items. The total score ranges from 0–48 points, where a score of 0 points represents no stress and a score of 48 points represents frequent stress in all five stress domains. Total scores for TICS-SSCS were available for 5,802 participants. Based on the distribution of the points values of the total score in the overall sample, the following categories of stress were defined: 0–11 points (\leq median) “below-average to average”, 12–22 points, “above-average”, 23–48 points (\geq 90th percentile) “high”.

Burnout syndrome

In the computer-assisted personal interview (CAPI) conducted by a study physician, participants were asked whether a burnout syndrome had ever been diagnosed by a physician or psychotherapist. If they answered this question with yes, they were also asked when this was diagnosed for the first time, whether it was present in the last 12 months, and which treatment they received.

Depressive symptoms

Current depressive symptoms in the last 2 weeks were assessed with a self-administered questionnaire using the depression module of the Patient Health Questionnaire (PHQ) [16]. The PHQ-9 is a self-assessment instrument for measuring the presence and frequency of nine depressive symptoms within the last 2 weeks based on the diagnostic criteria for major depression as defined in DSM-IV [16, 17]. Each symptom is measured as “not at all”

(0 points), “several days” (1 point), “more than half the days” (2 points) or “nearly every day” (3 points). Item scores are summed for the PHQ-9 total score, which ranges from 0–27 points. A total score of 10 or more points indicates current depressive symptoms [16, 17, 18].

Sleep disturbances

Current sleep disturbances were defined as problems in sleep onset and maintaining sleep and were assessed by self-reports of participants for the last 4 weeks [19].

Definition of covariables

Socioeconomic status (SES) was determined using an index which was based on information from on formal education and vocational training, occupational status and net household income (need-weighted), permitting classification into low, medium and high SES [20]. Self-perceived social support in private life was assessed with the internationally used Oslo-3 three-item social support scale [21]. Based on the total score, the categories “poor support” (3–8 points), “moderate support” (9–11 points) and “strong support” (12–14 points) were defined [20].

Results

Results on the prevalence of high stress levels according to age, sex and SES are shown in **Tab. 1**. With 13.9%, women report significantly higher stress levels than men (8.2%). There are no significant differences between age groups. The overall prevalence of high stress levels decreases with a higher SES, namely from

17.3% (low socioeconomic status) to 7.6% (high socioeconomic status). Among women, the difference in the prevalence of high stress levels between medium and high socioeconomic status (SES) is not significant ($p=0.326$).

High stress levels and social support

High chronic stress levels are particularly common (26.2%) in persons with poor

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Chronic stress among adults in Germany. Results of the German Health Interview and Examination Survey for Adults (DEGS1)

Abstract

The German Health Interview and Examination Survey for Adults (DEGS1) was conducted from 2008–2011 and comprised interviews, examinations and tests. The target population was the resident population of Germany aged 18–79 years. A total of 8,152 persons participated. Chronic stress was assessed to examine its effects on health and mental wellbeing. The Screening Scale of the Trier Inventory for the Assessment of Chronic Stress was used to assess stress burden among participants up to the age of 64 years (N=5,850). High levels of stress are significantly more often reported by women (13.9%) than by men (8.2%). The prevalence of high stress levels decreases with a higher socioeconomic status (SES);

it falls from 17.3% with low SES to 7.6% with high SES. High chronic stress levels are particularly common (26.2%) in persons who report low levels of social support. Depressive symptoms, burnout syndrome and sleep disturbances are more common in people who have high levels of chronic stress than in those without high levels of stress. The results confirm the importance of chronic stress as a health risk and underline the public health relevance of chronic stress.

Keywords

Stress burden · Burnout syndrome · Depression · Sleep disturbances · Health survey

Chronischer Stress bei Erwachsenen in Deutschland. Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1)

Zusammenfassung

Die Studie zur Gesundheit Erwachsener in Deutschland (DEGS1) wurde von 2008 bis 2011 durchgeführt und umfasste Befragungen, Untersuchungen und Tests. Zielpopulation war die in Deutschland lebende Bevölkerung im Alter von 18 bis 79 Jahren. Insgesamt nahmen 8152 Personen teil. Chronischer Stress wurde erfasst, um seine Auswirkungen auf die Gesundheit und das psychische Wohlbefinden zu untersuchen. Zur Messung der Stressbelastung wurde die Screening-Skala des Trierer Inventars zum chronischen Stress der Altersgruppe bis einschließlich 64 Jahre zur Beantwortung vorgelegt (N=5850). Frauen geben mit 13,9% signifikant häufiger eine starke Stressbelastung an als Männer (8,2%). Die Prävalenz starker Stressbelastung nimmt mit steigendem sozioökonomischem Status ab; sie fällt

von 17,3% bei niedrigem auf 7,6% bei hohem sozioökonomischem Status. Eine starke Belastung mit chronischem Stress ist besonders häufig (26,2%), wenn eine geringe soziale Unterstützung vorliegt. Menschen mit einer starken Belastung durch chronischen Stress zeigen deutlich häufiger eine depressive Symptomatik, ein Burnout-Syndrom oder Schlafstörungen als Menschen ohne starke Belastung durch chronischen Stress. Die Bedeutung von chronischem Stress als Gesundheitsrisiko wird durch die Daten bestätigt. Das Thema hat somit eine hohe Public-Health-Relevanz.

Schlüsselwörter

Stressbelastung · Burnout-Syndrom · Depression · Schlafstörungen · Gesundheitssurvey

social support (**Tab. 2**) in both men and women. Conversely, the prevalence of high stress levels is significantly lower in persons with strong social support (7%).

High stress levels and mental health problems

Current depressive symptoms, diagnosed burnout syndrome and sleep disturbanc-

es are much more frequent in people with a high chronic stress level than in those without. This applies to both men and women. More than one in two adults with current depressive symptoms feels greatly affected by chronic stress (53.7%). This also applies to almost every second person (45.9%) who has been diagnosed with burnout syndrome and to every fifth person (22.1%) with sleep disturbances (**Tab. 3**).

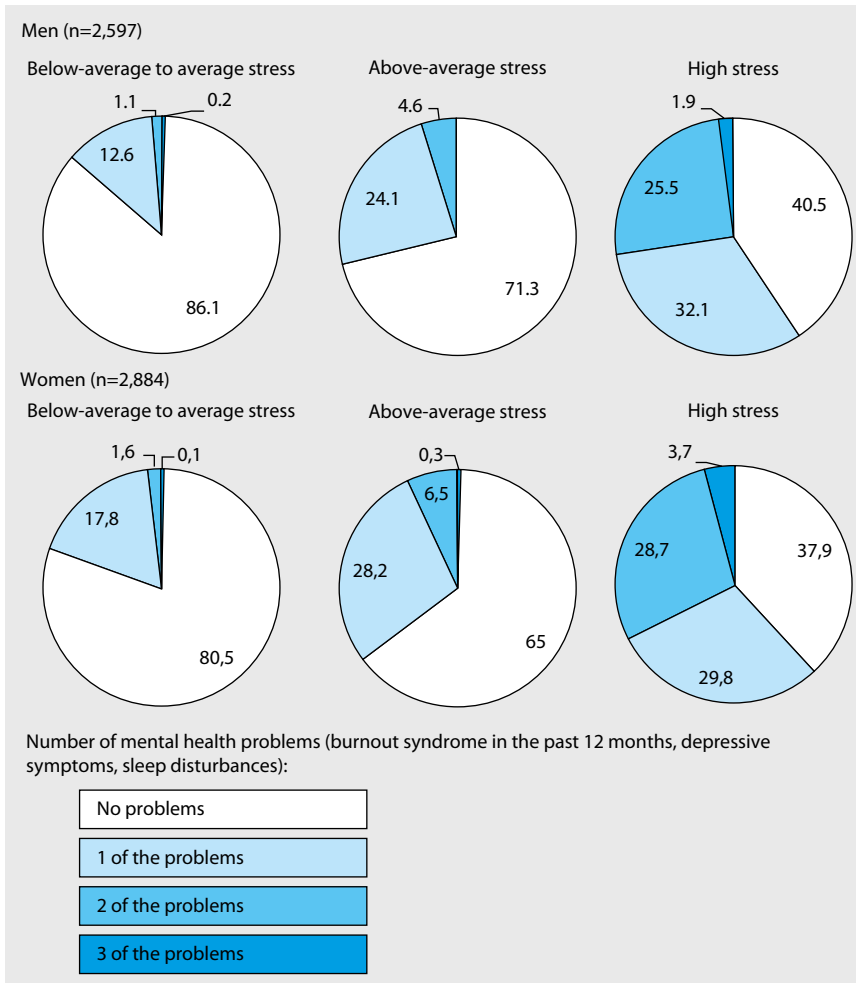


Fig. 1 ▲ Number of mental health problems by chronic stress levels, n=5,481

High stress levels and multiple mental health problems

Fig. 1 shows that the prevalence of burnout syndrome, depressive symptoms or sleep disturbances increase with higher stress levels. About 16.4% of people with below-average to average stress levels report at least one of these problems; among people with high stress levels, however, this value increases to 61.1%. At the same time, the prevalence of multiple (two or three) mental health problems increases with increasing stress levels. Overall, multiple mental health problems in the presence of high stress levels are more common among women than men.

Discussion

In the first wave of DEGS, self-perceived chronic stress was for the first time measured in 5,802 participants aged 18–64 years using a standardised instrument (TICS) [15]. The screening version (SSCS) used covers five interrelated domains of chronic stress. With TICS, an instrument validated for population studies with respect to factor structure and psychometric properties was used [22].

In DEGS1, the health effects of chronic stress were examined with a focus on mental health problems. The results convincingly demonstrate a strong association between high levels of chronic stress and mental health problems, such as depressive symptoms, burnout syndrome and sleep disturbances. In our sample, the occurrence of chronic stress decreases

with higher socioeconomic status. However, in the sample which had been used to develop the TICS instrument, no significant correlation between formal education and TICS-SSCS scores were found. [15]. Future in-depth analyses of our data will presumably be able to identify specific socioeconomic factors which are associated with lower stress levels.

The results showing higher stress levels among women and people in younger age groups are consistent with the results that were published in the initial methodological publication of TICS [15]. With respect to social support, it was possible to confirm the differences reported in the test publication. According to the interpretation of the test authors, social support serves as a resource for stress management and acts as a buffer in the case of chronic stress.

With regard to reduced sleep quality in persons with chronic stress, our results can probably be interpreted as indicating a causal link. A corresponding longitudinal study could demonstrate an effect of chronic stress on sleep quality, but conversely sleep quality did not have an effect on self-perceived chronic stress [23].

The association between chronic stress and mental health problems, in particular with depressive symptoms, is consistent with earlier findings [15]. It should be noted here that this association may be overrated by overlapping contents of the PHQ-9 and TICS-SSCS questionnaires [15]. One example is the SSSC item “Times when I worry a lot and cannot stop worrying”; 61% of participants who responded with “very often” here have current depressive symptoms according to PHQ-9. Overall, however, the prevalence of depressive symptoms was high (53.7%) in the presence of high stress levels. An Australian study could show that both chronic stress (6 months) and acute stress are associated with the onset of a depressive episode in women [24].

Burnout syndrome is defined as a state of emotional exhaustion, depersonalisation and reduced performance which has developed due to stress-related overload in the working environment. In this sense, burnout syndrome is closely linked to the concept of stress in the sense of work-related stress. Today, the evalu-

ation and clinical diagnosis of burnout syndrome is still not standardised, which makes the comparison of studies in this regard more difficult [25]. The fact that high stress levels were found in almost every second participant with burnout syndrome in our study is not surprising. Differentiated insights can be expected in the future from a detailed analysis of work-related stress.

However, there is no doubt that impaired mental health is a significant health risk. Recently, a meta-analysis of ten prospective English cohort studies comprising almost 70,000 participants from the general population was able to prove that the all-cause mortality increases by 21% in association with psychological distress [26].

Conclusion

This study based on DEGS1 addresses an issue of high public health relevance, identifying population groups particularly affected by chronic stress and focusing more closely on the relationship between chronic stress and mental health impairments.

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