

Severity and prevalence of various types of mental ill-health in a general adult population: Age and sex differences

Per Höglund (✉ per.o.hoglund@umu.se)

Umea Universitet Department of Psychology <https://orcid.org/0000-0002-2408-3205>

Camilla Hakelind

Department of Psychology Umeå University

Steven Nordin

Department of Psychology Umeå University

Research article

Keywords: Mental ill-health, Age- and sexrelated differences, Epidemiology, Prevalence

Posted Date: October 24th, 2019

DOI: <https://doi.org/10.21203/rs.2.16384/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published at BMC Psychiatry on May 11th, 2020. See the published version at <https://doi.org/10.1186/s12888-020-02557-5>.

Abstract

Purpose Taking a broad approach, the aim of this study was to better understand the extent of severity and prevalence in various types of mental ill-health across age groups and sexes in the general adult population. A first objective was to determine symptom severity of anxiety, depression, insomnia, burnout and somatization in combinations of different age groups and sex. A second objective was to determine prevalence of caseness of these types of mental ill-health in both absolute and relative terms in the combinations of age groups and sex. **Methods:** Cross-sectional data were used from the Västerbotten Environmental Health Study in Sweden. In total 3406 participants, aged 18 to 79 years, constituted a random sample stratified for age and sex.

Results The results show that severity and prevalence of anxiety, insomnia and burnout were high among women, in particular young women, but decreased with age. Men aged 30-49 years had the highest prevalence for mental ill-health compared to other age groups among men. Men and women aged 60-69 years had generally the lowest symptom severity and caseness. In contrast to many other studies the prevalence for depression shows a similarity between men and women in all age groups. The sex-related differences in extent were generally largest in the youngest age group, and gradually decreased with age.

Conclusion As mental ill-health starts early in life, interventions aimed at early detection and treatment are necessary to reduce the severity and prevalence of common types of mental ill-health in society.

Introduction

Mental ill-health is an increasing public health problem. A WHO (2014) report estimates that one in four persons worldwide will be affected by mental disorders at some point in life, placing mental disorders among the primary causes of ill-health, with a prevalence of 23–34% [1–4]. An early study showed that Sweden was placed on average in comparison with other industrialized countries regarding this prevalence [5]. Psychiatric diagnoses such as depression, anxiety and acute reactions to stress has since 2014 been the most common cause of sick leave in Sweden. The number of cases of sick leave in Sweden due to mental ill-health increased by 67% between years 2010 and 2015 [6].

A main finding in several studies is that the rates for mental ill-health with internalizing symptoms (e.g. anxiety, depression and long-term stress) are higher for women than for men [7]. Men are, on the other hand, considered more at risk for experiencing externalization symptoms, such as aggressive behavior and drug abuse [5,3] as well as oppositional defiant disorder and attention deficit hyper activity disorder [8,9]. The twelve-month prevalence for anxiety disorders is 5.6–18.1% (8.3–9.6% for men and 12.9–26.7% for women), and 6.6–11.9% (4.4% for men and 7.2% for women) for major depressive disorders (MDD) [10–12]. Burnout has a prevalence of 7.1–12.9% (9.3% for women and 4.6% for men) [13,14]. Studies indicate that 10–35% of the adult population suffer from symptoms of disturbed sleep, and that 5 - 10% meet the DSM-criteria for insomnia, with higher prevalence rates in women [15–19]. Somatization is a complex concept and has been defined in various ways, making it difficult to compare prevalence rates

when the definitions, methods and instruments differ [20]. Nevertheless, estimated prevalence of somatization syndromes in the general population is 6.3% according to a systematic review of somatoform symptoms [21]. When using the Patient Health Questionnaire 15-Item Somatic Symptom Severity Scale (PHQ-15), Kocalevent and colleagues (2013) estimated the prevalence in a general population to 9.3%, with significantly higher rates for women [22]. In primary care settings the prevalence for somatoform disorders is 8.6 - 25% depending on definition, method and instruments used [23,24]. One study in a healthcare setting reported prevalence as high as 30.3% [25].

Episodes of mental ill-health are obviously fairly common in the population, yet there is a gray zone of individuals outside the healthcare system who do not seek help, resulting in this system missing a large number of such cases [26,27]. This is, in particular, the case for men who are less likely to seek help for mental health problems [28].

A large majority of prior studies on these issues have investigated single, or possibly pairs of aspects of mental ill-health. Thus, there is a clear lack of studies that have taken a broad approach to simultaneously assess various aspects of mental ill-health regarding both severity and prevalence across age groups and sex in the general population. This would enable direct comparisons between types of mental ill-health, age groups and sexes. Given this, a first objective of the present study was to compare different types of mental ill-health in combinations of different age groups and sex with respect to symptom severity. A second objective was to determine prevalence of caseness of the different types of mental ill-health in combinations of different age groups and sex in both absolute and relative terms. In the relative comparison the different combinations of age and sex were directly compared with the group combination with the lowest. The different types of mental ill-health were anxiety, depression, insomnia, burnout and somatization. Caseness refers to scores meeting a certain cut-off and represents high probability of being a case [29].

Methods

Population and sample

The present study was conducted within the Västerbotten Environmental Health Study which consists of investigation of the same general population concerning various forms of health issues in Sweden [30]. The present study used cross-sectional data from the first collection in the spring of 2010. A random sample of individuals from a municipal register, aged 18–79 years, was invited to participate. The sample was stratified for sex and the following age groups: 18–29, 30–39, 40–49, 50–59, 60–69, and 70–79 years. The sample size was based on the prevalence of hypersensitivity to electromagnetic fields for men (1.1%). Precision was set to 0.55% [31] and with a level of confidence of 95% the sample size was calculated to 1382 men [32]. Because the sex distribution in Västerbotten was nearly equally distributed (50.3% men) in 2010 (Statistics Sweden, 2010) the number of women needed was rounded up to the same number as for men. With an expected response rate of 60% the sample size was estimated to 4607 participants. The study was the first part of a longitudinal survey,

with expected accessibility of 90% and expected response rate of 60% at follow-up. Thus, the sample size was estimated to fully 8530 participants which was rounded up to 8600. Eighty persons were excluded because they were identified as unknown by the post office, resulting in the sample size of 8520 persons. The number of responders and response rates for the age groups and sex are given in Table 1. The age and sex distribution in the sample is similar to that of Sweden in general [33].

Questionnaire instruments

The Hospital Anxiety and Depression Scale (HADS) was used, which has two subscales that measure symptoms of anxiety (HADS-A) and depression (HADS-D) during the past week based on seven items for each subscale. The items are responded to on a scale ranging from 0 to 3. A total score of 21 can be calculated for each subscale, with high score representing high level of anxiety and depression. A cut-off score of 8+ for both subscales has been shown to be the optimal balance between sensitivity and specificity for caseness (meeting cut-off for high probability of being a case) for depression or anxiety disorders [34]. The HADS has satisfactory internal consistency and concurrent validity (Bjelland et al., 2002 [35]).

Insomnia was assessed based on DSM-IV criteria, for which an insomnia index was used (M. Nordin et al., 2013) based on seven items of the two dimensions sleep quality and nonrestorative sleep of the Swedish version of the Karolinska Sleep Questionnaire (KSQ) (Akerstedt, Ingre, Broman, & Kecklund, 2008; Akerstedt et al., 2002). The KSQ has good reliability, construct validity, and criterion validity (M. Nordin, Akerstedt, & Nordin, 2013). The dimension of sleep quality measures disturbed sleep, premature awakenings, and repeated awakenings with difficulty going back to sleep. The dimension of non-restorative sleep consists of questions about not being well rested on awakening and difficulties waking up. Each item in the insomnia index was then dichotomized between response alternatives 3 (one to two times per week) and 4 (most of the time; three to four times per week) to reflect poor sleep quality at least three times per week, according to the DSM-IV criteria for insomnia. Thereafter, the index was summed and again dichotomized between 0 (no symptoms) and 1 (one or more symptoms) [36].

The Shirom–Melamed Burnout Questionnaire (SMBQ) was used that consists of 22 items, using a seven-point scale ranging from 1, “Never or almost never” to 7, “Always or almost always”. An average score is calculated, with high score representing high level of burnout. It measures different aspects of the burnout syndrome assessable by the dimensions of burnout, tension, listlessness, and cognitive difficulties. The SMBQ has good construct validity and reliability [37].

The PHQ–15 was used to assess somatization, and includes 14 of the 15 most common somatic complaints [38–41]. The PHQ–15 measures somatic symptom severity and is used to indicate caseness of somatization and somatoform disorders. The scale ranges from 0 (not bothered at all), to 1 (bothered a little), and 2 (bothered a lot), giving a total score range of 0–30 for women and 0–28 for men, with high score representing high level of symptom severity. The total score is higher for women since the item “Menstrual cramps or other problems with your periods” is used only for women. For this reason, to

obtain a common measure for men and women, the PHQ–15 scores in this study were presented in percent of total score. All items are responded to on a rating scale for extent to which the symptom has been bothering during the past four weeks. Kroenke et al. (2002) recommends three cutoff points: 5, 10, and 15, representing low, medium and high somatic symptom severity. The Swedish version of the PHQ–15 which was used in this study has displayed satisfactory reliability and validity [42].

As a supplement, the 10-item Perceived Stress Scale (PSS–10) was used that measures the degree to which situations in one’s life are appraised as stressful [43]. The PSS items were designed to capture the degree to which respondents found their lives unpredictable, uncontrollable, and overloading. Respondents are asked to estimate experienced stress during the past month. Items are rated on a 5-point scale that ranges from “never” (0) to “very often” (4). The scale ranges from 0 to 40 with high score representing high stress level. The Swedish version of the PSS–10 displays good reliability and construct validity [44].

Statistical analysis

Chi-square analysis was used to test differences between age and sex groups on background variables. The alpha level was set at 0.05. Scores on the HADS-A, HADS-D, KSQ insomnia index, SMBQ and PHQ–15 were transformed to z-scores to enable direct comparison. Significant differences between age and sex groups were tested with analysis of covariance (ANCOVA) with education, living conditions (living with partner or single household), smoking, physical exercise and alcohol consumption as covariates. The alpha level was set at 0.05 and eta-square was used as effect size. Established cut-off scores with good specificity and sensitivity were used (HADS-A and HADS-D ≥ 8 , SMBQ ≥ 4 , and PHQ–15 ≥ 10) to calculate prevalence of symptoms that are clinically relevant, referred to as caseness [35,45]. For the PHQ–15, no differences between sexes in cut-off scores has yet been recommended, despite women having a higher total score than men. Therefore, the recommended cut-off score was converted to percent of total score adjusted for man’s total score [38]. Logistic regression analyses were conducted, providing odds ratios (expressed as \log_{10} for graphic illustration) for each combination of age and sex group, adjusted for education, smoking, physical exercise and alcohol consumption. The combination of age and sex group with the lowest prevalence rate was used as reference group. Thus, the odds ratios were measures of relative ratios between combinations of age and sex groups. The alpha level was set at 0.001 due to a large number of analyses.

Results

The age- and sex groups are described in Table 2 regarding demographics, lifestyle factors, perceived stress, self-rated health and physician-based diagnoses. Significant differences between sex and/or age groups were found for all background variables, except for generalized anxiety disorder.

Symptom severity

Mean z-scores across sex and age groups for anxiety, depression, insomnia, burnout and somatization are presented in Figure 1. Standard errors are too small to be visible in the figure, and do not overlap between any combination of sex and age groups. The z-scores for anxiety and burnout among men and women were highest in the age group 18–29 years, and decreased with age, with the exception of the oldest age group. Especially in men, burnout symptoms increased in the age 70–79 years. The z-scores for depression show high similarity between men and women, implying no clinically relevant differences in the age span 30–69 years. Symptom severity for insomnia was higher for men aged 30–39 years, but decreased for both men and women in the age span 50–69 years, and then increased in the oldest age group. For somatization there was a large difference between women and men in the youngest age group, but symptom severity increased in the age group 70–79 years for both sexes.

Results from the ANOVAs are presented in Table 3. In accordance with the results in Figure 1, for all five measures of mental ill-health, the analyses showed significant main effects of age and sex, and age and sex interactions. However the effect sizes, all eta-square values, were small.

Absolute prevalence of symptom caseness

The overall prevalence rate of caseness was 13.9% for anxiety (10.0% for men, 17.0% for women), 6.4% for depression (5.5% for men, 7.1% for women), 28.6% for insomnia (23.5% for men, 32.7% for women), 17.5% for burnout (12.8% for men, 21.1 for women), and 17.4% for somatization (11.9% for men, 21.7% for women). Prevalence rates for caseness for the separate sex and age groups are presented in Figure 2. Based on non-overlap in 95% confidence intervals, several age groups differed from each other in prevalence, especially for anxiety and somatization, as did men and women. For insomnia and burnout there was an overlap in the age group 30–39 and 40–49 years. For depression no age groups differed from each other based on a 95% confidence interval. In the youngest age group there was a difference in prevalence between men and women in all types of mental ill-health, except depression. In the oldest age group there was an overlap of prevalence between sexes in all symptom groups.

Relative prevalence of symptom caseness

Figure 3 displays the odds ratios for caseness of mental ill-health with reference to the age and sex group with lowest prevalence, adjusted for confounding variables. The odds ratio for anxiety was largest for women in the youngest age group, and decreased with age. For depression the odds ratio for women and men of the same age were rather similar, except for men aged 50–69 years, who had lower odd ratio. Women were in general prone to higher risk for insomnia than men, with the highest risk for younger women and with a tendency to decrease with age. For men the highest risk for insomnia was in the 30–39 year age group, and decreasing with age until the age group 60–69 years. The risk for burnout in women was highest in the age group 30–49 years, and then decreasing with age. The risk for somatization in women was highest in the youngest age group, but rather stable in the age group 30–69 years. In men the highest prevalence of somatization symptoms was in the age group 70–79 years.

Interaction effects between age and sex were most evident in anxiety, insomnia and burnout, for which there was a general decline across age in women, whereas men were more homogeneous across age. Notably, men aged 60–69 years had lowest odd ratios for anxiety, depression, insomnia and burnout.

Discussion

The objectives of this study were to compare different types of mental ill-health with respect to symptom severity and prevalence of caseness, the latter in both absolute and relative terms, in men and women in different age groups. Data from this large population-based survey (n = 3406) showed sex- and age-related differences in mental ill-health, which in several cases were of clinical relevance. Compared to men, women in most age groups had higher levels of symptom severity and caseness prevalence. For example, there was a three-fold increased risk for somatization caseness, and a two-fold increased risk for anxiety and burnout in women in general, compared to men, which is in line with previous studies [46–50].

Interaction effects between age and sex were clearly noted regarding both symptom severity and caseness prevalence. Young women constituted a particular risk group with high levels of severity in all types of mental ill-health, and high prevalence of caseness in both absolute and relative terms, and with a fairly linear decrease with age. The prevalence for anxiety, insomnia and somatization was higher than for the youngest men. This pattern has also been reported from prior studies [51,10,52]. In the oldest age group there were only very small differences between men and women regarding both severity and prevalence.

In men, the lowest symptom severity and prevalence was, in general, found in the age group 60–69 years, with an abrupt increase in the oldest age group. It is reasonable to expect that failing physical health, social isolation, bereavement, loss of status, loss of friends and reduced income are more common among older people, thus each condition being a risk factor for mental ill-health [53,54]. A tentative interpretation of the increase of symptoms among the oldest men, both in terms of somatization and depression can be explained by overlap between certain depressive symptoms (e.g. fatigue, diminished appetite, weight loss) and common somatization symptoms [55]. Men aged 30–39 years had the highest prevalence of insomnia compared to other men, and men 40–49 years had the highest prevalence of depression and burnout caseness in both absolute and relative terms. The age 40–49 years represents a consolidating career stage where work-life balance, family responsibilities, ageing parents all are part of a life puzzle that has to be solved [56,57].

With focus shifted to specific types of mental ill-health, the youngest women had very high symptom severity and prevalence of caseness for anxiety, with a 7-fold increased risk for caseness compared to men aged 60–60 years. These measures of extent decreased with age, and in the oldest age group the differences between men and women were rather small. Findings of similar kind have been reported in the past [58] [59] [60,11,12,10].

An unexpected result is the relatively small difference between men and women in depression. Earlier studies indicate that women experience depressive states more frequently than men, with the ratio of about 2:1 [61–63]. In this study the prevalence rate for depression was 5.5% for men, and 7.1% for women. There was no significant interaction effect between sex and age regarding depression, neither on severity nor prevalence. The results imply a pattern of symptom severity having a tendency to be highest in men 70–79 years. However, the prevalence of depression in absolute terms shows large overlap between men and women in all age groups, making the result somewhat different to other cross-sectional studies [64,58]. It is possible that men and women simply are rather similar in this respect in the studied population.

Insomnia, was a common condition in the sample. The overall prevalence rate was 28.6% when using the sleep index [36], and was particularly high among the young and middle-aged. The prevalence was high compared to other studies, which may be due to different ways of defining poor sleep [16,15,18,19,17]. Men aged 30–39 years peaked in symptom severity and prevalence, with higher prevalence than in women of the same age group, but there was a substantial overlap for prevalence. This sex difference is in line with other studies [65–67]. Moderate sized correlation coefficients (0.40–0.53) have been reported between sleep quality and anxiety, depression, stress, and mental/physical exhaustion, which is expected since sleep quality is a common complaint in in these conditions, and regarded as a transdiagnostic process in many psychiatric disorders. [68,69].

The overall prevalence of burnout (17.3%) was higher in this study than in others (7.1%–12.9%) [13,60], which partly may be explained by the relatively low cut-off (4.0) used in this study. The severity and prevalence was higher in women than in men, and decreased with age. This is coherent with mainstream theory about burnout [70]. The prevalence for burnout in men seems to have an age-span pattern that is similar to that for anxiety and depression, with a peak at 40–49 years and in the oldest age group. In contrast to Maslach's early definition of burnout and corresponding questionnaire instruments with focus on working life, SMBQ measures burnout due to general aspects in life and is appropriate also for older populations. Accordingly, and in line with other studies the present data suggest a non-linear association between age and burnout [71]

The prevalence of somatization indicates higher rate in this study (17.4%) than in another population studies by Koncalevent et al. (2013) (9.3%), also using the PHQ–15 instrument se also [21,22]. The prevalence rates in this study are more in line with those from healthcare settings outside Sweden [24]. The differences across age and sex for severity was very similar to that for prevalence. Similar to other studies, women generally reported more bodily distress and more frequent somatization symptoms than men [72]. All age groups had a non-overlap in 95% confidence intervals for prevalence, except for the oldest age group, where men and had an marked increase in symptoms.

A particular strength of this study lies in its broad approach to investigate both symptom severity and caseness prevalence in both absolute and relative terms of various types of mental ill-health in different age groups and in men and women. This enables direct comparisons between the two aspects of extent,

type of mental ill-health, age groups and sexes as well as their interactions in a general adult population. Other strengths of this study include being population-based, stratifying the sample for age and sex, having a large sample size, and that the study population had an age and sex distribution that is very similar to that of Sweden in general (Statistics Sweden, 2010).

There are also methodological limitations that need to be considered. Only 40% of the sample responded to the questionnaire, compromising the representativeness. This refers, in particular, to young men, with consequences for the overall mean severity scores and prevalence rates, which are likely to be somewhat overestimated and the interpretation of results from the youngest male cohorts (18–39 years) uncertain [36]. The sample size was large, resulting in statistically significant group differences even for small absolute differences, which highlights the importance of the effect sizes. In this study eta-square values were small, implying that sex and age do not show substantial differences in mental ill-health in a general population. This sums up that even though sex and age to some extent can explain differences in mental ill-health, complementary studies of other mediating and moderating factors are necessary. Diagnostic interviews could have provided more reliable results than presently used questionnaire instruments. However, as reviewed in the methods section, the reliability and validity of the instruments used are in general good.

Cross-sectional studies of this kind cannot answer the question as to whether an age-related variation in health status is due to environmental and societal change, or whether it is due to transition phases, e.g. developmental changes, thus seasons of a person's life [73]. For this reason the findings may not necessarily mean that ageing itself brings about a diminution in symptoms. However, the WHO argues for higher prevalence rates for anxiety and mood disorders in more recent cohorts in many countries (Andrade et al., 2000). Additional longitudinal studies covering the adult life span are needed to differentiate ageing from cohort effects [51].

A clinical implication of the present results is that there is a gray zone of individuals outside the healthcare system who do not seek help. In this study the ratio in prevalence between those with caseness of a certain type of mental ill-health and a physician-based diagnosis (Table 2) varied from 4.17 to 6.85, indicating that these conditions are undertreated in the Swedish general population. The prevalence rates obtained in the current study are in line with prior prevalence studies in Sweden [12,74]. Many patients with mental ill-health present to their general practitioner with common somatic symptoms, that may result in their mental ill-health being missed in the assessment [75–77]. The high prevalence rates found in the current study calls for further efforts regarding development or validation of good prevention interventions and treatments in primary healthcare settings (R. C. Kessler et al., 1994). Such procedures may be particularly valuable for men since they seek healthcare to a lesser extent than women [28], and commit suicide more likely [78–80].

Conclusions

Some of the findings from this study are of particular interest. The results suggest that anxiety, insomnia and burnout are particularly severe and prevalent in young women, but decrease with age. Middle-aged

men have higher prevalence of mental ill-health compared to other age groups of men, with the lowest severity and prevalence in the age span 60–69 years, but increasing in the oldest age group. Since the results show that mental ill-health is relatively common in early adulthood, early assessment and interventions in this cohort may help prevent persistence and recess of mental ill-health. Longitudinal studies covering the adult life span are needed to understand mediation and moderating factors behind sex- and age-related risks factors for mental ill-health.

Declarations

Acknowledgements

We are thankful to Dr. Eva Palmquist for valuable help with the database.

Funding

No external funding was received in support of this work.

Availability of data and materials

Data at group level are available from the corresponding author at reasonable request.

Contributions

PH, SN and CH and conceptualized and designed the study. SN contributed to data acquisition. PH, SN and CH planned the statistical analyses. PH drafted the manuscript preparation and all co-authors contributed to interpretation and critically revising the manuscript for important intellectual content. All authors have read and approved this final version and are guarantors.

Ethics approval and consent to participate

The study was conducted in accordance with the Helsinki Declaration and approved by the Umeå Regional Ethics Board (Dnr 09–171M). All participants gave informed consent to participate.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no conflict of interest.

References

1. Wang PS, Aguilar-Gaxiola S, Alonso J, Angermeyer MC, Borges G, Bromet EJ, Bruffaerts R, de Girolamo G, de Graaf R, Gureje O, Haro JM, Karam EG, Kessler RC, Kovess V, Lane MC, Lee S, Levinson D, Ono Y, Petukhova M, Posada-Villa J, Seedat S, Wells JE (2007) Use of mental health services for anxiety, mood, and substance disorders in 17 countries in the WHO world mental health surveys. *Lancet* 370 (9590):841-850. doi:10.1016/S0140-6736(07)61414-7
2. Jacobi F, Hofler M, Strehle J, Mack S, Gerschler A, Scholl L, Busch MA, Hapke U, Maske U, Seiffert I, Gaebel W, Maier W, Wagner M, Zielasek J, Wittchen HU (2015) Twelve-months prevalence of mental disorders in the German Health Interview and Examination Survey for Adults - Mental Health Module (DEGS1-MH): a methodological addendum and correction. *Int J Methods Psychiatr Res* 24 (4):305-313. doi:10.1002/mpr.1479
3. Sartorius N, Ustun TB, Costa e Silva JA, Goldberg D, Lecrubier Y, Ormel J, Von Korff M, Wittchen HU (1993) An international study of psychological problems in primary care. Preliminary report from the World Health Organization Collaborative Project on 'Psychological Problems in General Health Care'. *Arch Gen Psychiatry* 50 (10):819-824
4. Murray CJL, Lopez AD (1996) Evidence-based health policy - Lessons from the global burden of disease study. *Science* 274 (5288):740-743. doi:10.1126/science.274.5288.740
5. Kringlen E, Torgersen S, Cramer V (2001) A Norwegian psychiatric epidemiological study. *Am J Psychiatry* 158 (7):1091-1098. doi:10.1176/appi.ajp.158.7.1091
6. Agency PH (2018) Varför har den psykiska ohälsan ökat bland barn och unga i Sverige? Utvecklingen under perioden 1985–2014. Public Health Agency of Sweden, Stockholm. doi:18023-2
7. Rosenfield S (1980) Sex differences in depression: do women always have higher rates? *J Health Soc Behav* 21 (1):33-42
8. Jackson DA, King AR (2004) Gender differences in the effects of oppositional behavior on teacher ratings of ADHD symptoms. *J Abnorm Child Psychol* 32 (2):215-224
9. Kessler RC, Wang PS (2008) The descriptive epidemiology of commonly occurring mental disorders in the United States. *Annu Rev Public Health* 29:115-129. doi:10.1146/annurev.publhealth.29.020907.090847
10. Gustavson K, Knudsen AK, Nesvag R, Knudsen GP, Vollset SE, Reichborn-Kjennerud T (2018) Prevalence and stability of mental disorders among young adults: findings from a longitudinal study. *Bmc Psychiatry* 18. doi:ARTN 65
10.1186/s12888-018-1647-5

11. Baumeister H, Harter M (2007) Prevalence of mental disorders based on general population surveys. *Soc Psych Psych Epid* 42 (7):537-546. doi:10.1007/s00127-007-0204-1
12. Johansson R, Carlbring P, Heedman A, Paxling B, Andersson G (2013) Depression, anxiety and their comorbidity in the Swedish general population: point prevalence and the effect on health-related quality of life. *PeerJ* 1:e98. doi:10.7717/peerj.98
13. Hallsten L, Bellaagh, K. & Gustafsson, K. (2002) Utbränning i Sverige en populationsstudie [Burnout in Sweden a population study]. Arbetslivsinstitutet,
14. Norlund S, Reuterwall C, Hoog J, Lindahl B, Janlert U, Birgander LS (2010) Burnout, working conditions and gender - results from the northern Sweden MONICA Study. *Bmc Public Health* 10. doi:Artn 326
10.1186/1471-2458-10-326
15. Linton SJ, Kecklund G, Franklin KA, Leissner LC, Sivertsen B, Lindberg E, Svensson AC, Hansson SO, Sundin O, Hetta J, Bjorkelund C, Hall C (2015) The effect of the work environment on future sleep disturbances: a systematic review. *Sleep Med Rev* 23:10-19. doi:10.1016/j.smr.2014.10.010
16. Jansson-Frojmark M, Linton SJ (2008) The course of insomnia over one year: a longitudinal study in the general population in Sweden. *Sleep* 31 (6):881-886
17. Mai E, Buysse DJ (2008) Insomnia: Prevalence, Impact, Pathogenesis, Differential Diagnosis, and Evaluation. *Sleep Med Clin* 3 (2):167-174. doi:10.1016/j.jsmc.2008.02.001
18. Morin CM, LeBlanc M, Daley M, Gregoire JP, Merette C (2006) Epidemiology of insomnia: prevalence, self-help treatments, consultations, and determinants of help-seeking behaviors. *Sleep Med* 7 (2):123-130. doi:10.1016/j.sleep.2005.08.008
19. Ohayon MM (2002) Epidemiology of insomnia: what we know and what we still need to learn. *Sleep Med Rev* 6 (2):97-111
20. De Gucht V, Fischler B (2002) Somatization: a critical review of conceptual and methodological issues. *Psychosomatics* 43 (1):1-9. doi:10.1176/appi.psy.43.1.1
21. Wittchen HU, Jacobi F, Rehm J, Gustavsson A, Svensson M, Jonsson B, Olesen J, Allgulander C, Alonso J, Faravelli C, Fratiglioni L, Jennum P, Lieb R, Maercker A, van Os J, Preisig M, Salvador-Carulla L, Simon R, Steinhausen HC (2011) The size and burden of mental disorders and other disorders of the brain in Europe 2010. *Eur Neuropsychopharmacol* 21 (9):655-679. doi:10.1016/j.euroneuro.2011.07.018
22. Kocalevent RD, Hinz A, Brahler E (2013) Standardization of a screening instrument (PHQ-15) for somatization syndromes in the general population. *BMC Psychiatry* 13:91. doi:10.1186/1471-244X-13-91

23. Leiknes KA, Finset A, Moum T, Sandanger I (2007) Current somatoform disorders in Norway: prevalence, risk factors and comorbidity with anxiety, depression and musculoskeletal disorders. *Soc Psychiatry Psychiatr Epidemiol* 42 (9):698-710. doi:10.1007/s00127-007-0218-8
24. de Waal MW, Arnold IA, Eekhof JA, van Hemert AM (2006) [Somatoform disorders in general practice: prevalence, functional limitations and comorbidity with anxiety and depression]. *Ned Tijdschr Geneesk* 150 (12):671-676
25. Fink P, Sorensen L, Engberg M, Holm M, Munk-Jorgensen P (1999) Somatization in primary care. Prevalence, health care utilization, and general practitioner recognition. *Psychosomatics* 40 (4):330-338. doi:10.1016/S0033-3182(99)71228-4
26. Goldberg D (1991) *Common Mental Disorders: A Bio-Social Model*. Routledge, London
27. Goldberg D (1994) A bio-social model for common mental disorders. *Acta Psychiatr Scand Suppl* 385:66-70
28. Galdas PM, Cheater F, Marshall P (2005) Men and health help-seeking behaviour: literature review. *J Adv Nurs* 49 (6):616-623. doi:DOI 10.1111/j.1365-2648.2004.03331.x
29. Williams P, Tarnopolsky A, Hand D (1980) Case definition and case identification in psychiatric epidemiology: review and assessment. *Psychol Med* 10 (1):101-114
30. Palmquist E, Claeson AS, Neely G, Stenberg B, Nordin S (2014) Overlap in prevalence between various types of environmental intolerance. *Int J Hyg Envir Heal* 217 (4-5):427-434. doi:10.1016/j.ijheh.2013.08.005
31. Naing L, Winn, T., Rusli, B.N. (2006) Practical Issues in Calculating the Sample Size for Prevalence Studies. *Archives of Orofacial Sciences* 1:9-14
32. Daniel WW, Daniel D (2019) *Biostatistics : a foundation for analysis in the health sciences*. 9. ed.. edn. Hoboken, NJ : J. Wiley & Sons,
33. Sweden S (2012).
34. Bjelland I, Dahl AA, Haug TT, Neckelmann D (2002) The validity of the Hospital Anxiety and Depression Scale. An updated literature review. *J Psychosom Res* 52 (2):69-77
35. Hansson M, Chotai J, Nordstrom A, Bodlund O (2009) Comparison of two self-rating scales to detect depression: HADS and PHQ-9. *Br J Gen Pract* 59 (566):e283-288. doi:10.3399/bjgp09X454070
36. Nordin M, Nordin S (2016) Sleep and sleepiness in environmental intolerances: a population based study. *Sleep Medicine* 23:1-9. doi:10.1016/j.sleep.2016.06.014

37. Grossi G, Perski A, Evengard B, Blomkvist V, Orth-Gomer K (2003) Physiological correlates of burnout among women. *Journal of Psychosomatic Research* 55 (4):309-316. doi:10.1016/S0022-3999(02)00633-5
38. Kroenke K, Spitzer RL, Williams JB (2002) The PHQ-15: validity of a new measure for evaluating the severity of somatic symptoms. *Psychosom Med* 64 (2):258-266
39. Spitzer RL, Kroenke K, Williams JBW, Primary PHQ (1999) Validation and utility of a self-report version of PRIME-MD - The PHQ primary care study. *Jama-J Am Med Assoc* 282 (18):1737-1744. doi:DOI 10.1001/jama.282.18.1737
40. Hinz A, Ernst J, Glaesmer H, Brahler E, Rauscher FG, Petrowski K, Kocalevent RD (2017) Frequency of somatic symptoms in the general population: Normative values for the Patient Health Questionnaire-15 (PHQ-15). *J Psychosom Res* 96:27-31. doi:10.1016/j.jpsychores.2016.12.017
41. Kroenke K, Spitzer RL, Williams JBW, Lowe B (2010) The Patient Health Questionnaire Somatic, Anxiety, and Depressive Symptom Scales: a systematic review. *Gen Hosp Psychiat* 32 (4):345-359. doi:10.1016/j.genhosppsy.2010.03.006
42. Nordin S, Palmquist E, Nordin M (2013) Psychometric evaluation and normative data for a Swedish version of the Patient Health Questionnaire 15-Item Somatic Symptom Severity Scale. *Scandinavian Journal of Psychology* 54 (2):112-117. doi:10.1111/sjop.12029
43. Cohen S, Kamarck T, Mermelstein R (1983) A Global Measure of Perceived Stress. *Journal of Health and Social Behavior* 24 (4):385-396. doi:Doi 10.2307/2136404
44. Nordin M, Nordin S (2013) Psychometric evaluation and normative data of the Swedish version of the 10-item perceived stress scale. *Scandinavian Journal of Psychology* 54 (6):502-507. doi:10.1111/sjop.12071
45. Cameron IM, Crawford JR, Lawton K, Reid IC (2008) Psychometric comparison of PHQ-9 and HADS for measuring depression severity in primary care. *Brit J Gen Pract* 58 (546):32-36. doi:10.3399/bjgp08X263794
46. Williams JB, Spitzer RL, Linzer M, Kroenke K, Hahn SR, deGruy FV, Lavee A (1995) Gender differences in depression in primary care. *Am J Obstet Gynecol* 173 (2):654-659
47. Linzer M, Spitzer R, Kroenke K, Williams JB, Hahn S, Brody D, deGruy F (1996) Gender, quality of life, and mental disorders in primary care: Results from the PRIME-MD 1000 study. *Am J Med* 101 (5):526-533. doi:Doi 10.1016/S0002-9343(96)00275-6
48. Barrett JE, Barrett JA, Oxman TE, Gerber PD (1988) The Prevalence of Psychiatric-Disorders in a Primary Care Practice. *Arch Gen Psychiat* 45 (12):1100-1106

49. Murphy JM (1986) Trends in depression and anxiety: men and women. *Acta Psychiatr Scand* 73 (2):113-127
50. Regier DA, Boyd JH, Burke JD, Jr., Rae DS, Myers JK, Kramer M, Robins LN, George LK, Karno M, Locke BZ (1988) One-month prevalence of mental disorders in the United States. Based on five Epidemiologic Catchment Area sites. *Arch Gen Psychiatry* 45 (11):977-986
51. Jorm AF (2000) Does old age reduce the risk of anxiety and depression? A review of epidemiological studies across the adult life span. *Psychol Med* 30 (1):11-22. doi:Doi 10.1017/S0033291799001452
52. Mroczek DK, Kolarz CM (1998) The effect of age on positive and negative affect: A developmental perspective on happiness. *J Pers Soc Psychol* 75 (5):1333-1349. doi:Doi 10.1037/0022-3514.75.5.1333
53. Ernst C, Angst J (1995) Depression in Old-Age - Is There a Real Decrease in Prevalence - a Review. *Eur Arch Psy Clin N* 245 (6):272-287. doi:Doi 10.1007/Bf02191869
54. Skoog I, Waern, M., Sigström, R., Bucht, G. (2017) Anxiety and depression in older adults (Forskning i korthet: Ångest och depression hos äldre). vol No 8/2016. FORTE, Stockholm
55. Drayer RA, Mulsant BH, Lenze EJ, Rollman BL, Dew MA, Kelleher K, Karp JF, Begley A, Schulberg HC, Reynolds CF, 3rd (2005) Somatic symptoms of depression in elderly patients with medical comorbidities. *Int J Geriatr Psychiatry* 20 (10):973-982. doi:10.1002/gps.1389
56. Finegold D, Mohrman S, Spreitzer GM (2002) Age effects on the predictors of technical workers' commitment and willingness to turnover. *J Organ Behav* 23 (5):655-674. doi:10.1002/job.159
57. Darcy C, McCarthy A, Hill J, Grady G (2012) Work-life balance: One size fits all? An exploratory analysis of the differential effects of career stage. *Eur Manag J* 30 (2):111-120. doi:10.1016/j.emj.2011.11.001
58. Henderson AS, Jorm AF, Korten AE, Jacomb P, Christensen H, Rodgers B (1998) Symptoms of depression and anxiety during adult life: evidence for a decline in prevalence with age. *Psychol Med* 28 (6):1321-1328
59. Chen HN, Cohen P, Chen S (2010) How Big is a Big Odds Ratio? Interpreting the Magnitudes of Odds Ratios in Epidemiological Studies. *Commun Stat-Simul C* 39 (4):860-864. doi:Pii 920967562
10.1080/03610911003650383
60. Jonsdottir IH, Nordlund A, Ellbin S, Ljung T, Glise K, Wahrborg P, Wallin A (2013) Cognitive impairment in patients with stress-related exhaustion. *Stress-the International Journal on the Biology of Stress* 16 (2):181-190. doi:10.3109/10253890.2012.708950
61. Culbertson FM (1997) Depression and gender. An international review. *Am Psychol* 52 (1):25-31

62. Maier W, Gansicke M, Gater R, Rezaki M, Tiemens B, Urzua RF (1999) Gender differences in the prevalence of depression: a survey in primary care. *J Affect Disord* 53 (3):241-252
63. Kuehner C (2017) Why is depression more common among women than among men? *Lancet Psychiat* 4 (2):146-158. doi:10.1016/S2215-0366(16)30263-2
64. Bebbington P, Dunn G, Jenkins R, Lewis G, Brugha T, Farrell M, Meltzer H (2003) The influence of age and sex on the prevalence of depressive conditions: report from the National Survey of Psychiatric Morbidity. *Int Rev Psychiatry* 15 (1-2):74-83. doi:10.1080/0954026021000045976
65. Klink ME, Quan SF, Kaltenborn WT, Lebowitz MD (1992) Risk-Factors Associated with Complaints of Insomnia in a General Adult-Population - Influence of Previous Complaints of Insomnia. *Archives of Internal Medicine* 152 (8):1634-1637. doi:DOI 10.1001/archinte.152.8.1634
66. Johnson EO, Roth T, Schultz L, Breslau N (2006) Epidemiology of DSM-IV insomnia in adolescence: lifetime prevalence, chronicity, and an emergent gender difference. *Pediatrics* 117 (2):e247-256. doi:10.1542/peds.2004-2629
67. Ford DE, Kamerow DB (1989) Epidemiologic study of sleep disturbances and psychiatric disorders. An opportunity for prevention? *JAMA* 262 (11):1479-1484
68. Nordin M, Akerstedt T, Nordin S (2013) Psychometric evaluation and normative data for the Karolinska Sleep Questionnaire. *Sleep Biol Rhythms* 11 (4):216-226. doi:10.1111/sbr.12024
69. Dolsen MR, Asarnow LD, Harvey AG (2014) Insomnia as a transdiagnostic process in psychiatric disorders. *Curr Psychiatry Rep* 16 (9):471. doi:10.1007/s11920-014-0471-y
70. Maslach C, Schaufeli WB, Leiter MP (2001) Job burnout. *Annu Rev Psychol* 52:397-422. doi:DOI 10.1146/annurev.psych.52.1.397
71. Lindblom KM, Linton SJ, Fedeli C, Bryngelsson IL (2006) Burnout in the working population: Relations to psychosocial work factors. *Int J Behav Med* 13 (1):51-59. doi:DOI 10.1207/s15327558ijbm1301_7
72. Barsky AJ, Peekna HM, Borus JF (2001) Somatic symptom reporting in women and men. *J Gen Intern Med* 16 (4):266-275
73. Twenge JM, Cooper AB, Joiner TE, Duffy ME, Binau SG (2019) Age, Period, and Cohort Trends in Mood Disorder Indicators and Suicide-Related Outcomes in a Nationally Representative Dataset, 2005-2017. *Journal of Abnormal Psychology* 128 (3):185-199. doi:10.1037/abn0000410
74. Rorsman B, Grasbeck A, Hagnell O, Lanke J, Ohman R, Ojesjo L, Otterbeck L (1990) A prospective study of first-incidence depression. The Lundby study, 1957-72. *Br J Psychiatry* 156:336-342

75. Olariu E, Forero CG, Castro-Rodriguez JI, Rodrigo-Calvo MT, Alvarez P, Martin-Lopez LM, Sanchez-Toto A, Adroher ND, Blasco-Cubedo MJ, Vilagut G, Fullana MA, Alonso J (2015) Detection of Anxiety Disorders in Primary Care: A Meta-Analysis of Assisted and Unassisted Diagnoses. *Depress Anxiety* 32 (7):471-484. doi:10.1002/da.22360
76. Buszewicz MJ, Chew-Graham C (2011) Improving the detection and management of anxiety disorders in primary care. *Br J Gen Pract* 61 (589):489-490. doi:10.3399/bjgp11X588259
77. Kessler D, Lloyd K, Lewis G, Gray DP (1999) Cross sectional study of symptom attribution and recognition of depression and anxiety in primary care. *BMJ* 318 (7181):436-439
78. Biddle L, Brock A, Brookes ST, Gunnell D (2008) Suicide rates in young men in England and Wales in the 21st century: time trend study. *Brit Med J* 336 (7643):539+. doi:10.1136/bmj.39475.603935.25
79. Gunnell D, Middleton N, Whitley E, Dorling D, Frankel S (2003) Why are suicide rates rising in young men but falling in the elderly? a time-series analysis of trends in England and Wales 1950-1998. *Social Science & Medicine* 57 (4):595-611. doi:Pii S0277-9536(02)00408-2
- Doi 10.1016/S0277-9536(02)00408-2
80. Riggs JE, McGraw RL, Keefover RW (1996) Suicide in the United States, 1951-1988: Constant age-period-cohort rates in 40- to 44-year-old men. *Compr Psychiat* 37 (3):222-225. doi:Doi 10.1016/S0010-440x(96)90039-5

Tables

Table 1. Number of responders and response percentages in parentheses.

Age group (years)	Women	Men	All
18-29	307 (32.1)	179 (17.3)	486 (24.2)
30-39	266 (40.3)	177 (24.7)	443 (32.2)
40-49	288 (40.5)	230 (31.0)	518 (35.7)
50-59	367 (50.9)	295 (39.5)	662 (45.1)
60-69	405 (58.4)	356 (50.7)	761 (54.6)
70-79	265 (53.8)	271 (63.6)	536 (58.3)
Total	1898 (45.2)	1508 (34.9)	3406 (40.0)

Table 2. Description of the participants' demographics, lifestyle and diagnoses with percentage in parentheses. Differences between age groups and sex were tested with chi-square analysis.

	Age			Sex		All
	(years)			Women	Men	(n=3406)
	18-39 (n=929)	40-59 (n=1180)	60-79 (n=1297)			
Married/living with partner	740 (80)***	1015 (87)	989 (77)	1522 (81) ^{ns}	1222 (82)	2744 (81)
Education						
Compulsory school	39 (4)***	136 (12)	648 (51)	425	398 (27)	823 (24)
Senior high school	347 (38)	511 (44)	279 (22)	(23)***	572 (38)	1137 (34)
University	533 (58)	524 (44)	348 (27)	565 (30)	521 (35)	1405 (42)
				884 (47)		
Smoking regular	50 (5)***	122 (10)	126 (10)	186 (10)*	112 (7)	298 (9)
Physical exercise ≥2 times a week						
	558 (61)***	748 (64)	949 (74)	1345 (72)***	910 (61)	2255 (67)
Alcohol consumption ≥2 times a week						
	52 (5.6)***	189 (16)	185 (14)	212 (11)***	214 (14)	426 (12)
Perceived stress						
	156 (28)***	147 (15)	95 (9)	273 (17)***	125 (10)	398 (14)
Excellent, very good or good self-rated health						
	802 (87)***	914 (78)	785 (31)	1514 (75) ns	1135 (75)	2501 (74)
Self-reported physician-based diagnosis						
Generalized anxiety disorder	9 (0.9) ^{ns}	14 (1)	9 (0.6)	23 (1) ^{ns}	9 (0.5)	32 (0.9)
Depression	65 (1.9)***	68 (2.0)	37 (1.1)	125 (3.7)***	45 (1.3)	170 (5.0)
Exhaustion syndrome	22 (0.6)***	79 (2.3)	43 (1.3)	109 (3.2)***	35 (1)	144 (4.2)
Panic disorder	21 (0.6)**	21 (0.6)	8 (0.2)	36 (1.1)*	14 (0.4)	50 (1.5)
PTSD	4 (0.1)**	17 (0.5)	6 (0.2)	23	4 (0.1)	27 (0.8)

(0.7)**

ADHD	9 (0.3)*	7 (0.2)	1 (0.03)	9 (0.3) ns	8 (0.2)	17 (0.5)
------	----------	---------	----------	------------	---------	----------

* $p < .05$; ** $p < .01$, *** $p < .001$, ^{ns}non-significant

Table 3 Results from analyses of covariance controlled for confounding variables.

	Age			Sex			Age xsex		
	<i>F-value</i>	<i>P-value</i>	η^2	<i>F-value</i>	<i>P-value</i>	η^2	<i>F-value</i>	<i>P-value</i>	η^2
ity	17.785	<0.001	0.025	66.042	<0.001	0.019	1.809	0.108	0.002
ession	2.359	0.0380	0.003	0.306	0.580	<0.001	2.803	0.016	0.004
nia	3.620	0.003	0.005	28.901	<0.001	0.008	1.714	0.128	0.002
out	10.444	<0.001	0.014	42.929	<0.001	0.012	3.445	0.004	0.004
atization	6.210	<0.001	0.009	116.981	<0.001	0.033	5.290	<0.001	0.007

Figures

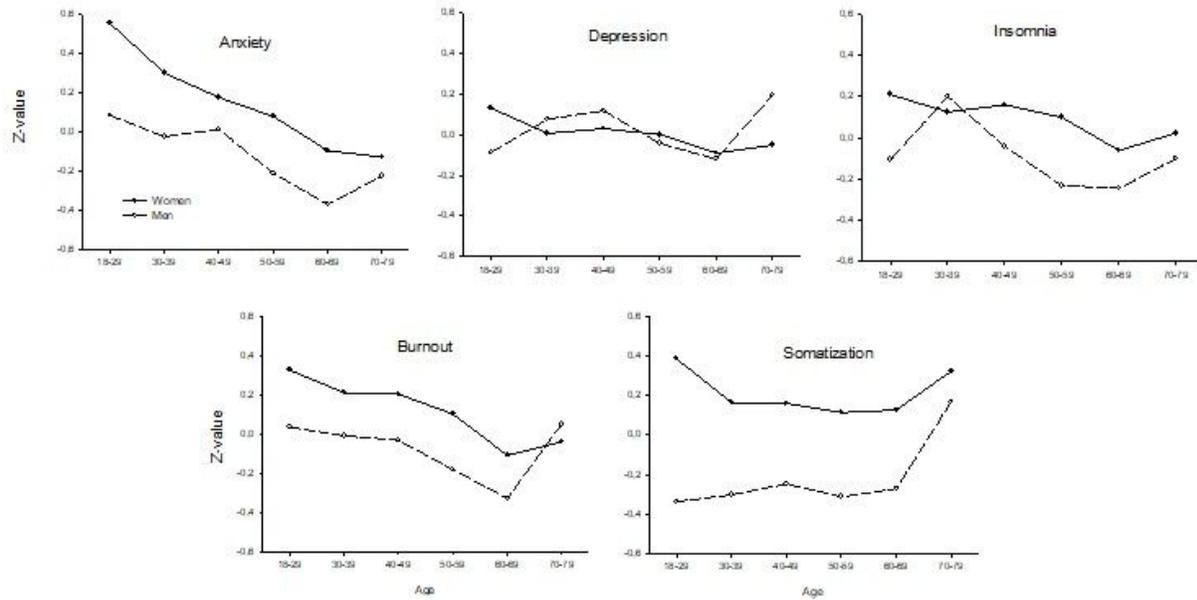


Figure 1

Mean z-scores for women and men and different age groups on the various types of mental ill-health. Standard errors ranged from 0.018 to 0.033.

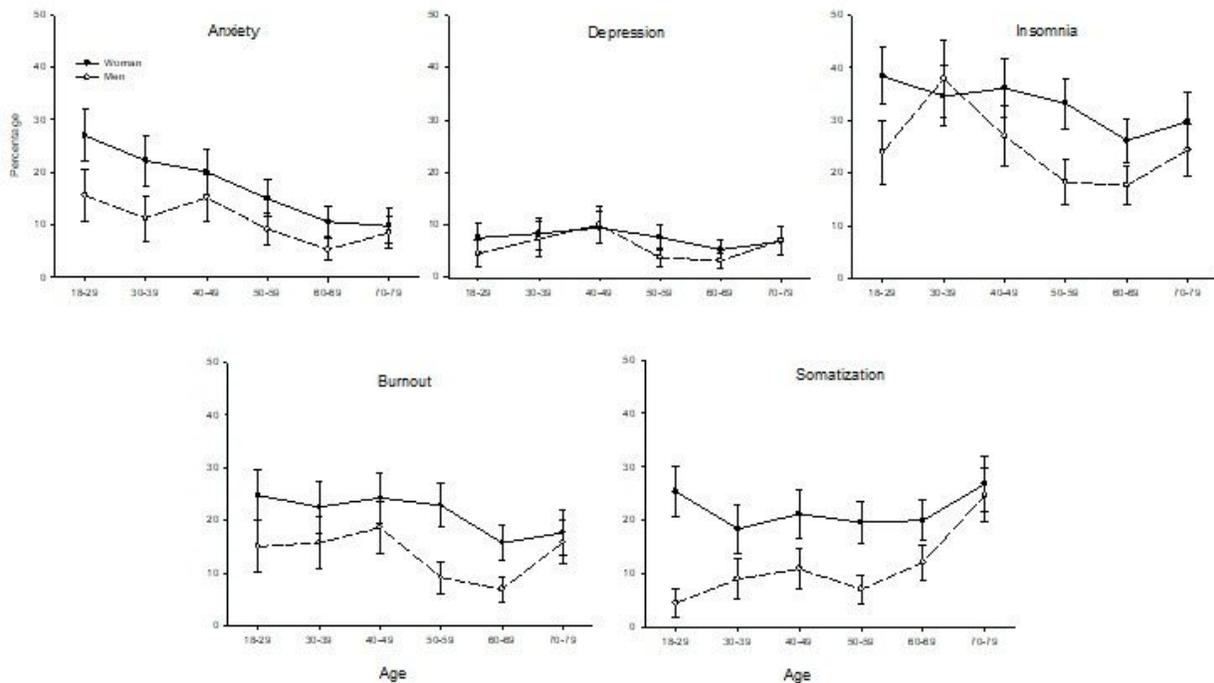


Figure 2

Prevalence (95% confidence intervals) of caseness of various types of mental ill-health for women and men and age groups.

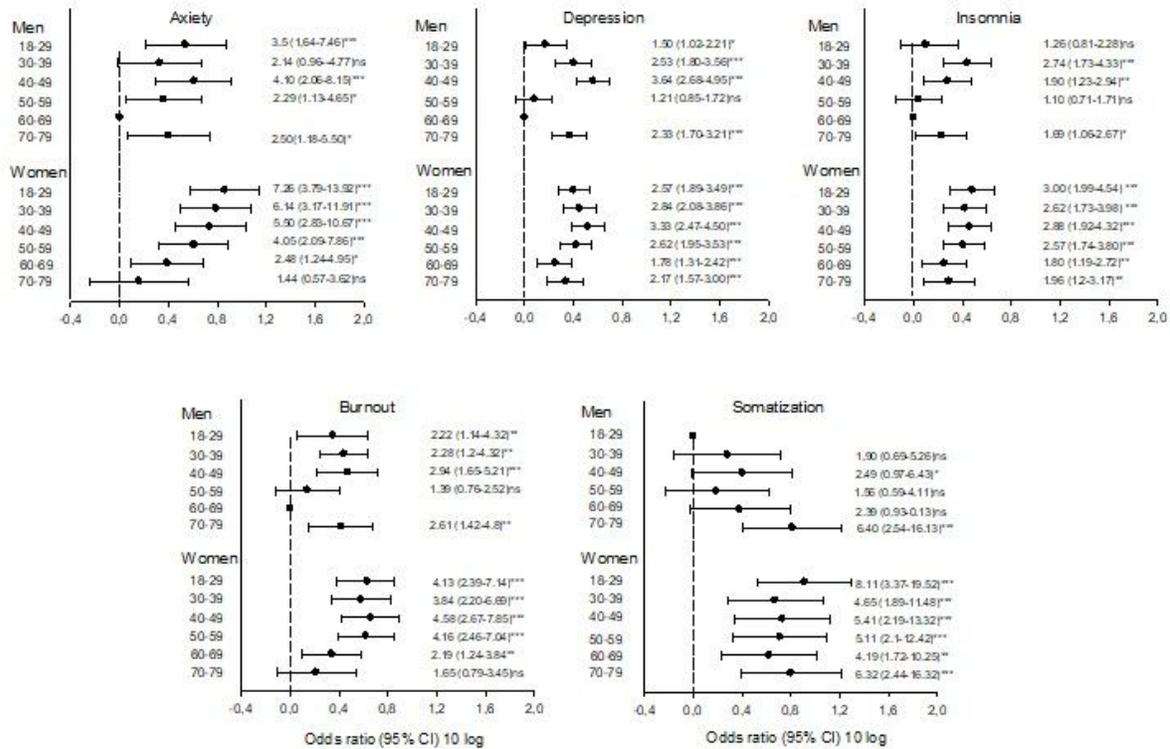


Figure 3

Odds ratios for caseness of mental ill-health with reference to the age and sex group with lowest prevalence, adjusted for confounding variables (*p<.05; **p<.01, ***p<.001, nsnon-significant).