



# Methodological aspects of international research on the burden of anxiety and depression in medical students



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## ABSTRACT

The burden of mental health impairment in medical students is among the important subjects of international research on mental health prevention. Evidence shows that medical students have a higher prevalence of symptoms of depression and anxiety than the general population. This paper describes some of the methodological aspects concerning research on the burden of anxiety and depression in medical students as an extract of a systematic review. One result of the systematic review is the highly heterogeneous country contexts, methods and instruments applied. Further research should explicitly address and control for these factors, to ease international comparison of prevalence rates.

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## 1. Introduction

Psychological morbidity in medical students has been an important issue of international research ever since the early 1980s. Numerous studies have indicated that both groups, medical students and physicians show higher prevalence rates of psychological distress, depression and anxiety than the general population (Dyrbye, Thomas, & Shanafelt, 2006; Fang et al., 2010; Jurkat et al., 2011).

Medical students may experience symptoms of depression and anxiety right from the beginning of their medical training (Ahmed, Banu, Al-Fageer, & Al-Suwaidi, 2009; Atekin et al., 2001; Dyrbye, Thomas, & Shanafelt, 2005; Guthrie et al., 1995) with the highest prevalence of depression found at middle stages of medical education (Chandavarkar, Azzam, & Mathews, 2007). In a large cross-sectional study with more than 2000 medical students and residents, Goebert et al., (2009) found that in comparison medical students had an even higher prevalence of depressive symptoms than medical residents.

These findings are crucial as a high and permanent level of psychological distress can cause feelings of fear, incompetence,

insufficiency, anger or guilt (Dyrbye et al., 2005). Additionally, stress could be shown to have negative effects on cognitive processes (Dahlin, Joneborg, & Runeson, 2005) e.g. distress can impair attention (Smith et al., 1990) and reduce concentration (Askenasy, Vivi, Tassini, & Navon, 1996). Symptoms of depression and anxiety could also be shown to have a negative impact on academic performance (Park et al., 2012), and depression could be linked to drop-out of medical school (Alexandrino-Silva et al., 2009; Dyrbye et al., 2011; Fan et al., 2012; Goebert et al., 2009).

To provide an overview on prevalence rates of symptoms of depression and anxiety in medical students in different country contexts, we performed a systematic Review. As extract of the systematic review, we summarize and discuss specific methodological aspects. The systematic review was prepared in accordance to the PRISMA Statement (Liberati et al., 2009; Moher, Liberati, Tetzlaff, & Altman, 2009) and Cochrane handbook for systematic reviews of interventions (Higgins & Green, 2008). The review aimed to provide an overview on prevalence rates of symptoms of depression and anxiety in medical students across different country contexts. The results of the review in terms of prevalence rates itself will be published elsewhere. This paper concentrates on the methodological issues identified during the assessment of included studies.

## 2. Included and excluded studies

The process of systematic retrieval and analyses of the relevant literature followed a four-step approach based on the guidelines of

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the PRISMA Statement (Liberati et al., 2009; Moher et al., 2009). Based on the systematic analysis of included full texts we summarized the specific methodological aspects of international research on the burden of anxiety and depression in medical students.

The first step was to define eligibility criteria to search for relevant literature. Accordingly, relevant studies should have been peer-reviewed and written in English or German. We did not include overviews, comments, special issues, editorials, case studies or letters to the editor. We also focused on quantitative cross sectional and longitudinal studies, consequently not reporting any qualitative studies like single interviews or focus groups, or interventional studies, respectively.

In the second step we searched for studies published between January 1994 and April 2014 using the online Sources Web of Science, PsychInfo and PubMed. The sample needed to consist of medical students. We used special Medical Subject Heading (MeSH) terms and combinations like “medical students”, “electives”, “interns”, and “depression”, “anxiety”, “distress” and “mental health” to search for relevant literature. Besides the search using online sources as described above, we retrieved additional articles via crosschecking reference lists of identified articles. Included studies had to report prevalence rates with cut-off points for relevant burden of depression and anxiety.

During step three—the screening process, all studies were checked on the basis of title and abstract and categorized into “eligible” and “ineligible” studies by two independent reviewers. Studies being declared as ineligible from both reviewers were excluded. Studies being declared as eligible from at least one reviewer were included. Cohen's kappa was calculated with  $\kappa=0,64$  to control for inter-rater reliability.

In step four, articles were assessed for eligibility on the basis of full-texts. If there was any dissonance between the two reviewers in this step of the process, a third reviewer decided upon in- or exclusion. All included studies were assessed concerning the following study information: specific study design, specific cohort, response rates, country context, applied instruments to measure symptoms of anxiety and depression, prevalence rate of relevant symptoms of anxiety and depression and the applied cut off values respectively.

In total, 2232 studies were identified. 1934 articles were excluded on the basis of title and abstract. The remaining 298 articles were checked for eligibility on the basis of full-texts, leading to another 240 studies being excluded for defined reasons. In 101 studies, the authors did not specifically assess depression or anxiety but rather measured mental health as a global construct like “general psychological wellbeing”, “satisfaction with life” or un-specific “stress”. In another 30 studies the authors did not meet our sample criteria as they were looking e.g. at medical students in medical clerkship situations. Further studies were excluded as they assessed the burden of symptoms in specific situations: for instance, 15 studies measured mental health during an Objective Structured Clinical Examination (OSCE), or anxiety before and after an examination or during preparation courses, respectively. An additional 11 studies had to be excluded as they measured symptoms of depression or anxiety with self-created or not validated instruments, whereas another 13 studies had to be excluded because they had not been peer-reviewed during publication processes. Twelve studies were excluded due to languages other than English or German. In 2 cases the reason for exclusion was the studies' qualitative design using focus group analyses. We also excluded another 27 studies due to missing prevalence rates that describe whole samples independent of moderator variables. Finally, 29 intervention studies were excluded concerning to other reasons (e.g. studies primarily reporting results of interventions of e.g. Yoga or Mindfulness Based Stress Reduction (MBSR). Finally, 58

studies were included for further analyses and reporting in total.

### 3. Methodological aspects and consequences

We included 58 studies from different countries all over the world. Most of the included studies were conducted in the United States ( $n=21$ ). Studies from the context of Asia were second most common with  $n=11$  including countries such as India, China and Japan. Seven studies were conducted in Germany and 9 stemmed from other European countries like Serbia, Lithuania, Spain, France, United Kingdom, Norway and Sweden. Four studies stemmed from context of Brazil. A total of 6 studies came from the context of Israel, Turkey, Malaysia and United Arab Emirates. Fig. 1 also shows the country of origin of the included studies respectively.

Fig. 2 gives an overview on applied instruments assessing symptoms of depression and anxiety in medical students. Of the total of 58 studies 53 reported prevalence rates of symptoms of depression in medical students. Twenty-one studies reported prevalence rates of symptoms of anxiety.

The majority of the included studies ( $n=28$ ), used the Beck Depression Inventory (BDI) as an instrument to assess depression in medical students. Respectively, 7 studies used the Hospital Anxiety and Depression Scale (HADS) to additionally assess anxiety. Overall, BDI and HADS were the most frequently used instruments to assess depressive symptoms in this research context. Six studies used The Primary Care Evaluation of Mental Disorders (Prime-MD) or the Patient Health Questionnaire (PHQ-9). For assessing anxiety, 6 studies used the Beck Anxiety Inventory (BAI), another 3 studies used the Stait-Trait-Anxiety Inventory (STAI).

Due to differences in the instruments per se as well as the application of different cut-off values, direct comparison of the included instruments is difficult or impossible. Furthermore, instruments like HADS and PHQ-9 are screening tools that provide a time efficient indication of symptoms of anxiety and depression. However such screening instruments cannot replace the thorough diagnostic appraisal by more sophisticated standard interviews like structured clinical interview based e.g. on DSM-criteria.

In the following we describe and discuss the identified instruments to stipulate rational selection in future studies. Among the screening instruments most often applied in included studies are the Hospital Anxiety and Depression Score (HADS) and the Patient Health Questionnaire-9 (PHQ-9). Among the specific diagnostic instruments to assess symptoms of anxiety and depression are the Beck Depression Inventory (BDI) with BDI-II and the Beck Anxiety Inventory (BAI).

The Hospital Anxiety and Depression Scale (HADS) were developed by Zigmond and Snaith in 1983 to diagnose anxiety disorders and depression. It was divided into an Anxiety subscale (HADS-A) and a Depression subscale (HADS-D) both including seven items. All items are scored on a 4-point scale from 0 to 3, giving total scores ranging from 0 to 21 for each subscale and from 0 to 42 for overall distress. It demonstrated good validity and reliability with Cronbach alphas 0.83 for the anxiety and 0.82 for the depression subscales (Bjelland, Dahl, Haug, & Neckelmann, 2002; Herrmann, 1997). Optimal balance between sensitivity and specificity for HADS as a screening instrument was achieved most frequently at a cut-off score of  $\geq 8$  (Bjelland et al., 2002). More precisely, for the identification of suspicious cases with a cut-off score of  $\geq 8$  and for safe cases  $\geq 11$  on both subscales (Bjelland et al., 2002; Zigmond & Snaith, 1983).

The Patient Health Questionnaire (PHQ-9) based on the DSM-IV diagnostic criteria for Major Depression and is a self-administered version of the Prime-MD diagnostic instrument. Participants had to response 9 questions with categories ranging from 0 to 3 (“Not

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