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# A systematic review of academic bullying in medicine: behaviours, perpetrators, victims, and consequences



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**A systematic review of academic bullying in medicine: behaviours, perpetrators, victims, and consequences**

Averbuch T[a], Yousif E[b], Van Spall HGC[a, b, c]

**Corresponding author:** Harriette Gillian Christine Van Spall. Harriette.vanspall@phri.ca. 237 Barton Street East, Hamilton, ON L8L 2X2, Canada. Telephone: 905-521-2100 Ext: 40601 Fax: 905-538-8932

[a]Department of Medicine, McMaster University, Hamilton, Ontario; [b]Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, Ontario; [c]Population Health Research Institute, Hamilton, Ontario

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## ABSTRACT

**Objective:** To characterize academic bullying behaviours, perpetrators, victims, and interventions.

**Design:** Systematic review.

**Data sources:** We searched EMBASE and PsycINFO for articles published between January 1, 1999 and June 24, 2018.

**Study selection:** We included prospective studies conducted in academic settings in which victims were either consultants or trainees, and described: the method or impact of bullying; perpetrators or victims; and/or interventions. Study characteristics, quality, and data were assessed independently by 2 reviewers.

**Results:** We included 44 studies representing 36,262 consultants and trainees. We defined academic bullying as the abuse of authority in an academic setting through punishing behaviours that include overwork, destabilization, and isolation. Of 25,639 individuals (in 19 studies) who responded about bullying patterns, the most common (38.2% of respondents) was overwork. Of 9,181 individuals (20 studies) who reported the impact, the most common was psychologic distress (40.4%). Among bullies identified by 11,006 individuals (16 studies), consultants (55.1%) were most common. Of 6,923 victims who reported gender (17 studies), the majority were women (52.3%). Among 6,930 victims (in 15 studies) who described their response, 32.8% filed a report and most (52.3%) did not perceive a positive outcome. In the 7 before-after studies, anti-bullying committees (1 study) were associated with improvements.

**Conclusions**: Academic bullying commonly involves overwork, and is perceived as having a negative impact on well-being. Perpetrators were commonly male consultants and victims were commonly women. Only a minority of victims filed a report. Methodologically robust trials of anti-bullying interventions are needed.

**Limitations:** Most studies (27/44) had at least a moderate risk of bias. All interventions were uncontrolled before-after studies.

**Keywords:** Medical Education & Training, General Medicine, Health Services Administration & Management

**Strengths and limitations**

- This review is comprehensive, including 44 articles with 36,262 consultants and trainees, across several countries and including all levels of training.
- We explicitly defined inclusion criteria, and used established tools to assess the risk of bias of included studies
- The major limitations of the included studies include differing definitions of bullying and inappropriate sampling methods for survey studies, and a lack of a control group or appropriate statistical analysis for interventions

## Background

Bullying behaviours have been described as repeated attempts to discredit, destabilize, or instill fear in an intended target[1]. Bullying can take many forms from overt abuse to subtle acts that erode the confidence, reputation, and progress of the victim[2]. Bullying is common in medicine, likely impacting mental health, professional interactions, and career advancement[3–6]. It may also impact a physician's ability to care for patients. Surveys from the National Health Service (NHS) showed that 55% of staff experienced at least one type of bullying; 31% were doctors in training[7]. Bullying is closely related to harassment and discrimination, in which mistreatment is based on personal characteristics or a protected class such as sex or race[8]. Within academic settings, victims may experience all three and the distinction may be less clear.

The hierarchical structure of academic medicine – in which there are power imbalances, subjective criteria for recruitment and career advancement, and siloed departments with few checks in place for toxic behaviours – may offer an operational environment in which bullying may be more widespread than in non-academic medical settings. Academic bullying is a seldom-used term within the literature, but is intended to describe the forms of bullying that may exist in academic settings. The prevalence of academic bullying in medical settings is unknown likely due to a lack of definition of bullying behaviours, a fear of reporting, and insufficient research. There is not much known about the characteristics of perpetrators and victims, and about the impact of bullying on academic productivity, career growth, and patient care. Furthermore, institutional barriers and facilitators of bullying behavior have not been reported, and the effectiveness of interventions in addressing academic bullying have not been evaluated.

The purpose of this systematic review is to define and classify patterns of academic bullying; assess the characteristics of perpetrators and victims; evaluate the impact of bullying on victims; review institutional barriers and facilitators of bullying; and identify possible solutions.

## Methods

### Data sources and searches

This study follows PRISMA reporting guidelines. Two reviewers searched two online databases (EMBASE and PsycINFO) for English-language articles published between January 1, 1999, to June 24, 2018 and relevant to academic bullying in medicine. An outline of the search is provided in Figure 1. A combination of medical subject heading (MeSH), title, and abstract text terms encompassing “Medicine”; “Bullying“ and “Academia” were used for the full search. The terms of the search are included in Supplementary figure S1. Two authors independently screened articles for inclusion. Differences were resolved by discussion, and if necessary, by a third author.

### Study selection

We included prospective studies conducted in academic settings in which victims were either consultants or trainees. Studies were included if they described: the method and impact of bullying; the characteristics of perpetrators and victims; or interventions used to address the bullying. We excluded editorials, opinion pieces, reviews, and grey literature. For the purposes of study selection,

academic bullying was defined as mistreatment in academic institutions with the intention or effect of disrupting the academic or career progress of the victim.

**Data extraction and quality assessment**

Two reviewers independently extracted data on: study design, setting (academic or non-academic), definition, description and impact of academic bullying, characteristics of perpetrators and victims, barriers and facilitators of bullying, and interventions and their outcomes. Two reviewers independently assessed studies for risk of bias. We assessed before-after studies using the National Heart, Lung, and Blood Institute quality assessment tool[9] and assessed prevalence surveys using the Joanna Briggs Institute critical appraisal tool[10]. We classified survey studies as low risk of bias if at least 8 of 9 criteria were met, medium risk of bias if 7 of 9 were met, and high risk of bias if less than 7 were met. We classified before-after studies as low risk of bias if at least 11 of 12 criteria were met, medium risk of bias if at least 9 of 12 were met, and high risk of bias if less than 9 were met.

**Data synthesis and analysis**

We pooled the results of surveys on the basis of similarity of survey themes to facilitate a descriptive analysis. For survey studies on the prevalence or impact of bullying, we solely pooled the results of studies that asked respondents about specific bullying behaviours or impacts, respectively. We then separated results by sex and level of training. Group selection was by consensus between authors. We presented our results as numbers and percentages. We calculated the denominators from the total number of individuals

who completed surveys on types of bullying behaviours, the impact of bullying, characteristics of bullies and victims, or barriers to addressing academic bullying. The numerators were calculated from the number of individuals who experienced a specific behaviour or impact, were bullied by a perpetrator at a specified level of training, or endorsed a specific reason for not making a formal report. We also reported the number of studies that described each specific bullying behaviour or impact, demographic characteristics of victims and perpetrators, barriers and facilitators of academic bullying, and specific reasons for not making a formal report. We could not perform a meta-analysis due to the conceptual heterogeneity between studies.



## Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting, or dissemination plans of our research.

## Results

### Screening results

We identified 933 unique articles, 44 of which met inclusion criteria. Reasons for exclusion are described in Figure 1.

### Characteristics of included studies

Studies were most frequently set in the USA (reported in 13 studies)[3,11–21] and the UK (reported in 5 studies)[7,22–25] and were set in academic hospitals (reported in 36 studies)[1,3–5,11–15,17–19,21–44] or in both teaching and non-teaching sites (reported in 8

studies)[7,16,20,45–48]. Sixteen studies included medical students[3–5,11,13–15,17,19,29,31,34,38–41], 12 included residents or fellows[1,12,24,25,30–33,35,36,42,43] and 17 included consultants[6,7,16,18,20–23,27,28,32,37,44–48] (Table 1).

**Definition of academic bullying**

Four papers provided definitions for academic bullying[29,31,36,39]. Common themes included behaviours where the perpetrator abuses authority to punish the victim through isolation, blocked career advancement, and threats to academic standing. We defined academic bullying as the abuse of authority by a perpetrator who targets the victim in an academic setting through punishing behaviours that include overwork, destabilization, and isolation. Multiple studies used the complete or partial Negative Acts Questionnaire (NAQ), a standardized list of bullying behaviours (reported in 22 studies)[1,3,4,6,11–14,16,26,28–31,33–35,38,41,42,46,48].

**Patterns of academic bullying behaviours**

There were 25,639 consultant and trainee respondents to surveys of bullying behaviours (reported in 19 studies), but not all were offered the same options to select from (Table 2). Bullying behaviours were grouped into destabilization (reported in 13 studies), threats to professional status (reported in 15 studies), overwork (reported in 7 studies), and isolation (reported in 13 studies). Undue pressure to produce work was commonly reported (38.2% of respondents affected, reported in 7 studies)[12,16,25,26,28,30,48]. Of the 13 studies that described destabilization, common methods included being ordered to work below one's competency level (35.7%, reported in 9 studies)[16,25,28–30,32,34,37,48] and withholding information that affects performance (29.1%; reported in 7 studies)[12,16,26,28–

[30,48]. Of the 15 studies that described threats to professional status, common methods were excessive monitoring (28.8%; reported in 6 studies)[12,16,26,28,30,48] and criticism (24.9%; reported in 10 studies)[12,16,25,26,28,30,32,34,37,48]. Of the 13 studies that described isolation, the most common method was social and professional exclusion (26.9%; reported in 13 studies)[4,12,14,16,20,26,28–30,32,34,45,48].

There were 3,564 consultant and trainee respondents to surveys that separated the prevalence of bullying behaviours by sex (reported in 6 studies). A greater proportion of men experienced the intimidatory use of discipline procedures (18.5%, reported in 5 studies)[12,16,29,34,38] while a greater proportion of women experienced all other bullying behaviours (reported in 6 studies)[12,16,20,29,34,38] (Table 2). There were 24,876 respondents to surveys that analyzed results by level of training (reported in 17 studies) (Supplementary table S1). A greater proportion of consultants experienced refusal of applications for leave, training, or promotion (25.7%, reported in 2 studies)[16,28] and removal of areas of responsibility (27.8%, reported in 2 studies)[16,28] than residents (11.7%, reported in 2 studies; 10.7%, reported in 3 studies, respectively)[12,26,35] or medical students (not reported; 19.6%, reported in 1 study, respectively)[14]. Compared to medical students (4.2%, reported in 5 studies)[11,13,14,34,38] and consultants (3.4%, reported in 2 studies)[16,37], a greater proportion of residents experienced the intimidatory use of discipline procedures (21.1%, reported in 4 studies)[12,26,29,35]. A greater proportion of medical students experienced persistent criticism (71.4%, reported in 1 study)[34] than residents (26.3%, reported in 4 studies)[12,25,26,32] and consultants (20.8%, reported in 3 studies)[16,28,37].

**Characteristics of bullies**

Twenty-two studies representing 11,006 consultants and trainees described the characteristics of bullies, although not all were offered the same options to select from. Common perpetrators included consultants (55.9%, reported in 22 studies)[1,3,4,6,7,12,13,17,20,23,25,26,28–30,32,34,36,41,43,46,47], residents (21.6%, reported in 14 studies)[1,3,6,7,13,17,25,26,29,30,36,41,43], and nurses (14.3%, reported in 14 studies)[1,3,4,12,13,17,25,26,29,30,36,41,43,46]. Of the 4,277 individuals who identified the gender of their bullies, most reported primarily male (67.2%, reported in 5 studies)[7,16,23,28,32], followed by primarily female (26.1%, reported in 5 studies)[7,16,23,28,32], and both (6.7%, reported in 3 studies)[7,23,28]. Among 5,444 medical students, perpetrators were commonly consultants (45.2%, reported in 6 studies)[3,4,13,17,34,41], residents (37.6%, reported in 4 studies)[3,13,17,41], nurses (12.8%, reported in 5 studies)[3,4,13,17,41], and other medical students (4.4%, reported in 3 studies)[3,4,34]. Among 2,980 residents, perpetrators were commonly consultants (51.0%, reported in 8 studies)[1,12,25,26,29,30,36,43], nurses (29.2%, reported in 8 studies)[1,12,25,26,29,30,36,43], and other residents (16.4%, reported in 8 studies)[1,12,25,26,29,30,36,43]. Of the 1,500 consultants, perpetrators were their peers (39.2%, reported in 7 studies)[6,7,20,28,30,46,47], senior consultants (23.7%, reported in 5 studies)[6,7,20,23,46], and administration (17.7%, reported in 4 studies)[23,28,30,47].

Six studies representing 1,258 interns and medical students described the prevalence of academic bullying according to the specialty rotation of the learner. Academic bullying was common in surgery (34.9% of respondents, reported in 5 studies)[1,11,29,32,36,41], obstetrics and gynecology (25.5%, reported in 2 studies)[11,41] and internal medicine (21.4%, reported in 5 studies)[1,11,29,32,36,41].

**Characteristics of victims**

Twenty-five studies described the characteristics of victims, and 19 included the proportion of those who experienced bullying. Of the 6,689 women and 9,162 men who responded to surveys that analyzed results by sex, women were more likely to report being bullied than men (54.1% of all women compared to 36.1% of all men, reported in 17 studies)[3,4,12,16,18,21,28–36,38,43]. There were 8,454 consultant and trainee respondents to surveys that separated the results by demographic characteristics other than sex, but not all characteristics were captured by each study. A greater proportion of international graduates / non-citizens experienced bullying than citizens (55.2% compared to 50.6%, reported in 3 studies)[12,25,32], and a greater proportion of overweight participants (BMI >25) experienced bullying than those with a BMI ≤25 (17.8% compared to 11.8%, reported in 1 study)[33]. The relationship between age and bullying varied based on the cutoff used and the survey sample in each study. Among consultants, a greater proportion of those with full professorship experienced bullying than assistant professors (68.0% compared to 51.9%, reported in 1 study)[21].

**Impact of academic bullying**

There were 9,181 consultant and trainee respondents to surveys on the psychological (reported in 12 studies) and career impact (reported in 16 studies) of academic bullying (Table 3), although not all were offered the same options to select from. Respondents commonly reported psychiatric distress (40.4%; reported in 9 studies)[6,23,28,34,36,37,40,43,46], considerations of quitting (37.8%; reported in 5 studies)[23,28,32,45,47], and reduced clinical ability (29.3%; reported in 5 studies)[25,28,34,36,40]. No studies quantified the effect on patient safety. Five studies representing 2,688 individuals described the impact of bullying separated by sex (Table 3). A greater proportion of

women experienced loss of career opportunities (23.4%, reported in 5 studies)[16,18,20,21,34] while a greater proportion of men experienced decreased confidence (32.1%, reported in 2 studies)[21,34] and clinical ability (26.1%, reported in 1)[34].

There were 8,545 consultant and trainee respondents to surveys that separated results by level of training (Supplementary table S2). A greater proportion of medical students experienced psychiatric distress (72.9%, reported in 2 studies)[34,40] and decreased clinical performance (34.9%, reported in 2 studies)[34,40] than residents (48.2%, reported in 2 studies and 17.2%, reported in 1 study, respectively)[36,43] and consultants (17.9%, reported in 4 studies and 9.1%, reported in 1 study, respectively)[23,28,37,46]. A greater proportion of residents endorsed loss of career opportunities (36.2%, reported in 2 studies)[32,35] compared to medical students (16.0%, reported in 3 studies)[11,13,34] and consultants (23.7%, reported in 7 studies)[16,18,20,21,28,37,45].

**Barriers and facilitators of academic bullying**

Eighteen studies pertained to barriers to victims making a formal report (reported in 15 studies) and institutional facilitators (reported in 14 studies) of academic bullying (Table 4). There were 6,930 consultant and trainee respondents to surveys on their actions taken in response to bullying and reasons for not making a formal report, although not all were given the same options to select from. Victims commonly did not make a formal report[1,3,4,13,16,23,26,28,30–32,36,41,43,47]; only 32.8% made a formal report. Deterrents to reporting included concern regarding career implications (37.7%, reported in 12 studies)[1,4,13,15,28,29,31,32,36,43,45,47], not knowing who to report to (31.9%, reported in 9 studies)[1,4,28,29,31,36,43,45,47], and poor recognition of bullying (13.4%, reported in 7 studies)[5,13,15,17,22,29,36].

Of the 15 studies, 6 studies representing 1139 individuals reported the outcomes of reporting[1,16,23,28,30,32] although only a small range of outcomes were offered among options. Submitting a formal report often had no perceived effect on bullying (35.6%, reported in 5 studies);[16,23,28,30,32] a similar proportion of victims endorsed worsening (16.7%, reported in 2)[16,30] and improvement (13.7%, reported in 5 studies)[1,16,23,30,32] in bullying following reporting.

In the 11 studies that described institutional facilitators of bullying, common facilitators were lack of enforcement (reported in 8 studies)[1,16,23,26,28,30,31,36], the hierarchical structure of medicine (reported in 4 studies)[26,36–38], normalization of bullying (reported in 4 studies)[3,13,28,43] and lack of a formal reporting process (reported in 2 studies)[4,35]. Individual-level data was not pooled as institutional facilitators of bullying were most commonly elicited via free-response portions of surveys with varying completion rates.

**Interventions and outcomes**

Thirty-two studies reported strategies to address academic bullying, which included promoting anti-bullying policies (reported in 13 studies)[2,8,41,46,10,11,17,19,26,28,32,39], education to prevent academic bullying (reported in 13 studies)[2,3,46,48,4,12,13,20,24,25,28,31], establishing an anti-bullying oversight committee (reported in 5 studies)[2,15,17,35], institutional support for victims (reported in 2 studies)[10,41], and internal reviews where hospitals develop targeted solutions for their environment (reported in 2 studies)[14,45] (Supplementary table S3).

Of the 32 studies, 7 implemented interventions which included workshops with vignettes to improve recognition of bullying (reported in 3 studies)[17,22,24]; a gender and power abuse committee that established reporting mechanisms and held mandatory workshops on mistreatment (reported in 1)[3]; a gender equity office to handle reporting (reported in 1)[19]; zero-tolerance policies (reported in 1)[44]; and institutional-level tracking of mistreatment to provide targeted staff education (reported in 1)[14]. All 7 studies had an uncontrolled before-after design, and as such, did not establish causality. In the studies of vignettes, common bullying behaviours were demonstrated to improve recognition of both subtle and overt acts of bullying. Of the 3 studies that involved bullying recognition workshops, all reported an associated improvement in bullying recognition. In a study that developed a gender equity office, reporting was handled through an intermediary; decisions were binding with consequences for retaliation including termination of employment[19] and 96% of all formal reports were resolved. In a study where a Gender and Power Abuse committee was formed, there was an associated reduction in academic abuse[3]. In a study assessing the impact of a professionalism retreat about mistreatment for consultants, there was no reduction in medical student mistreatment[11]. In a study assessing the implementation of zero-tolerance policies, there was an associated improvement in awareness of bullying reporting processes[44].

**Assessment of bias**

Seventeen studies had a low risk of bias[4,7,11,16,21,25,28,30–37,46,47], 15 had a medium risk of bias[1,3,12,13,17,18,20,23,26,27,39,40,42,45,48], and 12 had a high risk of bias[5,6,14,15,19,22,24,29,38,41,43,44]. Among the 37 survey studies, 13 sampled participants inappropriately[5,6,12,15,20,26,27,29,38,39,41,43,48], 12 had inadequate sample sizes or did not justify their sample size[1,5,6,15,20,27,29,31,35,37,38,41], 5

did not sufficiently describe the participants[1,13,15,29,39], 7 had coverage bias[6,12,20,26,29,38,43], 3 did not have an appropriate statistical analysis[13,15,48], and 2 had a low response rate[1,5,12,13,15,16,23,25,28,30,32,34,36,38,40–43,45,47,48] (Supplementary figure S2). Among the 7 before-after trials, 1 did not have pre-specified inclusion criteria[24], 4 had low sample sizes or did not justify their sample size[14,17,22,24], 2 did not have clearly defined, pre-specified, consistently measured outcomes[14,24], 7 did not blind pariticipants[3,14,17,19,22,24,44], 3 did not account for loss to follow-up in their analysis[22,24,44], and 5 lacked statistical tests to assess for significant pre- to post-intervention changes[14,19,22,24,44] (Supplementary figure S3).

## Discussion

In this systematic review, we established a definition for academic bullying, identified common patterns of bullying, and assessed the impact on victims. We defined academic bullying as the abuse of authority by a perpetrator who targets the victim in an academic setting through punishing behaviours that include overwork, destabilization, and isolation. Victims reported that academic bullying often resulted in stalled career advancement and thoughts of leaving the position. A majority of academic bullies were senior men, and a majority of victims were women. Barriers to reporting academic bullying included fear of reprisal, perceived hopelessness, and institutional non-enforcement of anti-bullying policies. Strategies to overcome academic bullying, such as anti-bullying committees and workplace reassignment were associated with an improvement in the prevalence of bullying and resolution of formal reports.

Several factors contribute to the prevalence of bullying within academia. The hierarchical structure lends itself to power imbalances and prevents victims from speaking out, especially when the aggressor is tenured[51]. The relative isolation of departments within universities allows poor behaviour to go unchecked. Furthermore, the closed networks within departments lend themselves to mobbing behaviour and causes victims to fear being blacklisted for speaking out[52].

A lack of clarity around the definition can limit awareness and reporting[31]. The Graduation Questionnaire administered to all American medical students found that in years where respondents were asked if they had been bullied, the estimated prevalence was lower than when they were asked about specific bullying behaviours[13]. Surveys on bullying should include a list of defining behaviours to increase clarity and accuracy in responses[53]. Even in institutions with established reporting systems, respondents were often unaware of how to file a report[28]. We found that victims of academic bullying rarely filed reports, primarily due to fear of retaliation. Reporting was not consistently effective and was equally likely to worsen bullying.

We found that consultants were the most common sources of bullying at all levels of training, although residents often bullied medical students. No studies assessed the relative contribution of fellows and senior residents to resident bullying. Among studies that analyzed bullying among consultants by seniority, senior consultants were a more commonly reported source of bullying[6,7,20,23,46]. Women and ethnic minorities reported higher rates of bullying among demographic groups surveyed, although racial factors were infrequently assessed in the surveys included in this study.

Our review illustrates the self-reported harms of academic bullying. Victims experienced depressive symptoms, self-perceived loss of clinical ability, and termination of employment. Academic bullying has been linked to depression[33], substance abuse[54], and hospitalization for coronary artery or cerebrovascular disease[55]. Bullying costs the National Health Service (NHS) of the United Kingdom £325 million annually due to reduced performance and increased staff turnover[56]. Disruptive behavior, linked to bullying in the perioperative setting has been linked to 27% of patient deaths, 67% of adverse events, and 71% of medical errors[57]. Reasons for consultant error include intimidation leading to a fear of communicating sources of harm and slow response times[58] .

Anti-bullying committees involving staff and learners can research bullying within their institution and address the most common disruptive behaviours through targeted interventions[48]. We found that anti-bullying committees typically included three elements: (1) a multidisciplinary team that includes clinicians and other front-line staff; (2) development of anti-bullying policies and a reporting process; and (3) an education campaign to promote awareness of policies. Owing to the their multifaceted nature, it is challenging to evaluate the relative contributions of their components. Furthermore, without well-designed trials, the effect of anti-bullying committees is unknown.

The need for a confidential reporting process was raised in the studies included in this review, but few described how confidentiality could be maintained when the report has to describe details of the bullying that may be only privy to the perpetrator

and victim. The reporting process could take the form of the Office of Gender Equity at the University of California, where the accuser and the accused do not meet face to face; the discipline process is through an intermediary[19]. A unique, non-punitive approach is the restorative justice approach used at Dalhousie University where victims, offenders, and administrators work collaboratively to address sexual harassment and re-integrate offenders[59]. Reporting may have been ineffective in this review due to the impunity offered to prominent consultants. Senior personnel, particularly those who are well-known and successful in grant funding, are often considered "untouchable", beyond reproach by their institutions[60]. Behaviour is often learned and modeling positive behaviours may break the cycle of bullying in medicine[61]. One approach would be making professionalism a requirement for promotion and career advancement, as in the Department of Medicine at the University of Toronto in Canada[62].

**Strengths and limitations**

The strengths of this review include its broad scope; capturing several aspects of academic bullying, and its size (n = 44 studies, 36,262 consultants and trainees). The cohort included was diverse, comprising several specialties and countries. We explicitly defined eligibility criteria and extracted data in duplicate. We used established tools to assess the risk of bias.

There are multiple limitations to this review. Most studies used questionnaires that did not appear to have been validated. The survey instruments across studies differed from each other, and we pooled responses according to themes to synthesize the results. We could not account for differences in instutional culture and hospital systems in the responses of survey participants. Data on

bully/victim demographics were underrepresented. Selection bias was a significant concern:13 studies used convenience sampling, and 2 included voluntary focus groups for victims of bullying to sign up for. Overall, the response rate was 59.2%, with a range of 12% to 100%. Surrogate outcomes were used such as awareness of bullying, and the reporting of outcomes was inconsistent. As such, the effect of anti-bullying interventions must be interpreted cautiously.

**Future directions**

Significant gaps exist in the quality of the academic bullying literature, particularly with inconsistent definitions and limitations in study methodology. Our definition may be used to provide the breadth and granularity required to sufficienctly capture cases of academic bullying in medicine. Studies on the impact of academic bullying would benefit from standardized, validated survey instruments. Although randomization and blinding are not always possible to test the effect of interventions, a control group should be included in anti-bullying intervention studies.

**Conclusions:**

Academic bullying refers to specific behaviours that disrupt the learning or career of the intended target and commonly consists of exclusion and overwork. The consequences include significant psychiatric distress and loss of career opportunities. Bullies tend to be male senior consultants, whereas victims tend to be females. The fear of reprisal and non-enforcement of anti-bullying policies are the greatest barriers to addressing academic bullying. Results of bullying interventions must be interpreted with caution

due to their methodological quality and reliance on surrogate measures. There is a need for well-designed trials with transparent reporting of relevant outcomes and accounting for temporal trends.

**Author contributions**

TA contributed to study design, informed the search strategy, extracted and synthesized study data, and drafted and edited the manuscript. YE informed the search strategy, extracted and synthesized study data, and edited the manuscript. HV conceived the study idea, informed the search strategy, analyzed the data, drafted and edited the manuscript, and supervised the conduct of the study. HV affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

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None.

**Competing interests**

All authors have reported that they have no relationships relevant to the contents of this paper to disclose.

## Ethical approval

Not required.

## Data sharing

All data relevant to the study are included in the article.

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**Table 1. Summary of studies investigating bullying in academic medicine**

| Author (year), Country | Study design | Setting | Definition of academic bullying | Target | Perpetrator | Source of bias | Risk of Bias |
|---|---|---|---|---|---|---|---|
| Benmore et al. (2018), England | Before-after | Academic hospital* | Data not provided | Residents | Senior consultants | Insufficient enrollment, inadequate sample size, no blinding of outcome assessors, high loss to follow-up, lack of statistical analysis or ITS† design | High |
| Duru et al. (2018), Turkey | Survey | Academic hospital | Data not provided | Consultants, researchers, administrators, nurses | Specific occupations of bullies not specified | Inappropriate sampling and inadequate sample size | Moderate |
| Chambers et al. (2018), New Zealand | Survey | Academic and non-academic hospitals | Data not provided | Specialist consultants | Primarily male. Senior medical staff 52.5%, non-clinical managers 31.8%, and clinical leaders 24.9%. | Low response rate | Low |
| House et al. (2018), USA | Before-after | Academic hospital | Data not provided | Medical Students | Faculty most frequently were the source of | Insufficient enrollment, inadequate sample size, | High |

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|---|---|---|---|---|---|---|---|
| | | | | | bullying followed by residents. Exact breakdown not specified | no blinding of outcome assessors, outcomes not clearly described, lack of statistical analysis, individual-level analysis or ITS design | |
| Kulaylat et al. (2017), USA | Survey | Academic hospital | Verbal abuse, specialty-choice discrimination, non-educational tasks, withholding/ denying learning opportunities, neglect and gender/racial insensitivity | Medical Students | Faculty (57%), residents, fellows (49%), and nurses (33%) | Inappropriate sampling, inadequate sample size, classification bias, and non-validated identification or measurement of bullying | High |
| Bernotaite et al. (2017), Lithuania | Survey | Academic hospitals | Data not provided | Family Consultants | 25.3% supervisor, 9.8% colleague, 2.9% subordinate | Inappropriate sampling, inadequate sample size, and coverage bias | Moderate |

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| Chrysafi et al. (2017), Greece | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Surgeons most frequently followed by internal medicine consultants, then radiologists/ laboratory consultants | Low response rate and coverage bias | Moderate |
| Kapoor et al. (2016), India | Survey | Academic hospital | Data not provided | Medical students | Data not provided | Inappropriate sampling and inadequate description of study population | Moderate |
| Chadaga et al. (2016), USA | Survey | Academic hospitals | NAQ‡ used | Residents and fellows | Consultants 29%, nurses 27%, patients 23%, peers 19% | Low response rate, inadequate sample size, and coverage bias | Moderate |
| Llewellyn et al. (2016), Australia | Survey | Academic hospitals | Data not provided | Residents | Senior medical staff: 58.3% in 2015, 60.6% in 2016. Non-medical staff 33.2% 2015, 33.9% 2016, Manager 5.2% in 2015, 1.2% in 2016, junior resident 3.3% | Low response rate, biased sampling, coverage and classification bias | High |

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| | | | | | in 2015, 4.3% in 2016 | | |
| Rouse et al. (2016), USA | Survey | Academic clinics | NAQ used | Family medicine consultants | Data not provided | Low response rate | Low |
| Shabazz et al. (2016), UK | Survey | Academic and non-academic hospitals | Belittle and undermine an individual's work; undermining an individual's integrity; persistent and unjustified criticism and monitoring of work; freezing out, ignoring or excluding and continual undervaluing of an individual's effort. | Gynecology consultants | 50.9% senior consultants, 22.3% junior consultants, 4.5% medical director | Low response rate, and classification bias | Moderate |
| Peres et al. (2016), Brazil | Survey | Academic hospital | Data not provided | Medical students | Data not provided | Low response rate, and classification bias | Moderate |

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| Ling et al. (2016), Australia | Survey | Academic hospitals | NAQ used | General surgery residents and consultants | For trainee victims: staff surgeon 48%, trainee surgeon 13%, admin 13%, nurses 11%, other consultant 6% For consultant victims; 31% staff surgeon, 28% admin, 13% other consultant, 11% nurses, other 10%, trainees 4% | Low response rate | Low |
| Kulaylat et al. (2016), USA | Before-after | Academic hospital | Data not provided | Medical Students | Faculty (57%), residents/fellows (49%), and nurses (33%) | Inadequate sample size, no blinding of outcome assessors | Moderate |
| Ahmadipour et al. (2016), Iran | Survey | Academic hospital | Being assigned tasks as punishment, being threatened with an unjustly bad score or failure | Medical students, interns and residents | Data not provided | Inadequate sample size | Low |

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| Jagsi et al. (2016), USA | Survey | Academic hospital | Data not provided | Consultants who won a career advancement award | Data not provided | Inadequate sampling frame and classification bias | Moderate |
| Crebbin et al. (2015), Australia and New Zealand | Survey | Academic hospitals | Data not provided | Residents, fellows and consultants | 50% surgical consultants, other medical consultants (24%) and nursing staff (26%) | Low response rate | Low |
| Cresswell et al. (2016), UK | Before-after | Academic hospital | Data not provided | Residents | Data not provided | Insufficient description of study objectives, inadequate enrollment and sample size, no blinding of outcome assessors, outcomes not clearly described, lack of statistical analysis or ITS design and high loss to follow-up | High |
| Loerbroks et al. (2015), Germany | Survey | Academic hospitals | Data not provided | Residents | Data not provided | - | Low |

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| Malinauskiene et al. (2014), Lithuania | Survey | Non-academic clinics | NAQ used | Family medicine consultants | Bullying from patients 11.8%, from colleagues by 8.4%, from superiors by 26.6%. | - | Low |
| Mavis et al. (2014), USA | Survey | Academic hospitals | Mistreatment either intentional or unintentional occurs when behavior shows disrespect for the dignity of others and unreasonably interferes with the learning process | Medical students | Clinical faculty in the hospital (31%) residents/ interns (28%), nurses (11%) | Low response rate, inadequate description of study population and statistical analysis | Moderate |
| Oser et al. (2014), USA | Survey | Academic hospital | Data not provided | Medical students | Residents > clerkship faculty > other attendings > other students > preceptors = nurses | - | Low |
| Oku et al. (2014), Nigeria | Survey | Academic hospital | Data not provided | Medical students | 23.7% other students, 21.7% consultants, 17.5% | - | Low |

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|---|---|---|---|---|---|---|---|
| | | | | | lecturers, 16.5% consultants, 16.5% nurses, 4.1% other staff | | |
| Gan et al. (2014), Canada | Survey | Academic hospital | Data not provided | Medical students | Consultants | Low response rate, inappropriate sampling, small sample size and classification bias | High |
| Fried et al. (2015), USA | Before-after | Academic hospital | Power mistreatment defined as "made to feel intimidated, dehumanized, or had a threat made about a recommendation, your grade, or your career | Medical students | Residents 49.7%, Clinical faculty 36.9%, preclinical faculty 7.9% | - | low |
| Al-Shafaee et al. (2013), Oman | Survey | Academic hospitals | Being coerced into carrying out personal services unrelated to the expected role of interns and instances | Residents | Internal medicine 60.3%, surgery 29%, pediatrics 15.5%. Specialists 51.7%, | Inappropriate sampling, inadequate sample size, inadequate description of study | High |

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| | | | in which interns were excluded from reasonable learning opportunities offered to others, or threatened with failure or poor evaluations for reasons unrelated to academic performance | | consultants 50%, residents 12.1%, nurses 24.1% | population and coverage bias | |
| Owoaje et al. (2012), Nigeria | Survey | Academic hospital | Data not provided | Medical Students | Consultants 69.1%, residents/ fellows 52.4%, other students 15.7%, nurses 7.8%, laboratory technicians 4.1% | Low response rate | Low |
| Askew et al. (2012), Australia | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Consultants 44%, Managers 27%, Patients 15%, Nurses/ midwives 4%, | Low response rate | Low |

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|---|---|---|---|---|---|---|---|
| | | | | | junior consultants 1% | | |
| Meloni et al. (2011), Australia | Before-after | Academic hospital | Data not provided | Hospital employees | Data not provided | Lack of blinding of outcome assessors, high loss to follow-up, lack of statistical analysis or ITS design, and unit of analysis not clearly described | High |
| Dikmetas et al. (2011), Turkey | Survey | Academic hospital | Data not provided | Residents | Surgeons > Internists | Low response rate | Moderate |
| Eriksen et al. (2011), Norway | Survey | Academic hospital | NAQ used | Hospital employees | Colleagues. Specific occupations not described | Low response rate, inappropriate sampling and inadequate statistical analysis | Moderate |
| Imran et al. (2010), Pakistan | Survey | Academic hospitals | Threats to professional status, threats to personal standing, isolation, | Residents | Consultants | Inappropriate sampling, classification and coverage bias | Moderate |

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|---|---|---|---|---|---|---|---|
| | | | overwork, and destabilization | | | | |
| Ogunsemi et al. (2010), Nigeria | Survey | Academic hospital | Data not provided | Residents | 58% administrative staff, 41.4% from the hospital chief executive, 40.4% from patient relatives, 32.7% nurses, 30% residents, 20% patients | Inadequate sample size | Low |
| Best et al. (2010), USA | Before-after | Academic hospital | Data not provided | Unspecified | Data not provided | Study objective not clearly described, insufficient enrollment, no blinding of outcome assessors, lack of statistical or individual-level analysis or ITS design | High |
| Nagata-Kobayashi et al. (2009), Japan | Survey | Academic hospitals | Assigned you tasks as punishment; threatened to fail you | Residents | Surgery (27.6%), internal medicine (21.4%), | Low response rate | Low |

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|---|---|---|---|---|---|---|---|
| | | | unfairly in residency; competed maliciously or unfairly with you; made negative remarks to you about becoming a consultant or pursuing a career in medicine | | emergency medicine (11.5%), anaesthesia (11.3%). Consultants 34.1%, patients 21.7%, nurses 17.2% | | |
| Scott et al. (2008), New Zealand | Survey | Academic hospital | A threat to professional status and personal standing, isolation, enforced overwork, destabilization | Residents | Consultants 30%, nurses 30%, patients 25%, radiologists 8%, residents/ fellows 7% | Low response rate, inadequate sample size and description of study population | Moderate |
| Gadit et al. (2007), Pakistan | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Senior colleagues | Inadequate sample size | Low |
| Shrier et al. (2007), USA | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Colleagues 24%, patients 19%, teachers 18%, supervisors 15%, | Inappropriate sampling, inadequate sample size, and coverage bias | Moderate |

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|---|---|---|---|---|---|---|---|
| Cheema et al. (2005), Ireland | Survey | Academic hospitals | Data not provided | Residents | Senior residents 51-70%, Nursing staff 47-59%, Administration 15-16%, Colleagues 12-13% | Low response rate | Low |
| Rautio et al. (2005), Finland | Survey | Academic hospital | Data not provided | Medical students | Lecturers 27.9%, Research/senior research fellows 27.7%, Professors 16.6%, Associate professors 13.6% | Low response rate, inappropriate sampling, inadequate sample size, and coverage bias | High |
| Carr et al. (2000), USA | Survey | Academic hospitals | Data not provided | Consultants | Superiors and colleagues | - | Low |
| Quine (1999), UK | Survey | Non-academic clinics | Data not provided | Consultants | 54% greater seniority, 34% same seniority, 12% less senior. 49% of bullies older than victim | - | Low |
| Wear et al. (2005), USA | Survey | Academic hospital | Data not provided | Medical students | General surgeons and obstetricians | Low response rate, inappropriate sampling, inadequate | High |

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| | | | | | | sample size, classification and lack of validated measurement tool | |

*Academic hospitals/clinics were defined as teaching hospitals/clinics with a university affiliation
†Interrupted time series
‡The NAQ is the negative acts questionnaire, a validated tool for assessing the prevalence of workplace bullying

**Table 2: Self-reported description of specific bullying behaviours**

| Behaviour | No. of studies/ Total studies* | Total cohort No. affected/ total participants who completed surveys on behaviours (%)* | Men No. affected/ total men who completed surveys on behaviours (%)† | Women No. affected/ Total women who completed surveys on behaviours (%)† |
|---|---|---|---|---|
| **Threats to professional status** | | | | |
| Persistent unjustified criticism | 10/19 | 2587/10404 (24.9) | 535/1690 (31.7) | 552/1402 (39.4) |
| Excessive monitoring of work | 6/19 | 1752/6079 (28.8) | 442/1525 (27.7) | 441/1298 (34.0) |
| Intimidatory use of discipline | 11/19 | 1156/17046 (6.8) | 323/1746 (18.5) | 237/1546 (15.3) |
| Spread of gossip/rumours | 5/19 | 892/3694 (24.2) | 88/596 (14.8) | 94/453 (20.8) |
| False allegations | 5/19 | 577/3694 (15.6) | 59/596 (9.9) | 54/453 (11.9) |
| Refusal of leave, training or promotion | 6/19 | 1174/6079 (19.3) | 215/1690 (12.7) | 197/1402 (14.1) |
| **Isolation** | | | | |
| Social/professional exclusion | 13/19 | 3895/13963 (27.9) | 301/1718 (17.5) | 925/2385 (38.8) |
| **Overwork** | | | | |
| Undue pressure to produce work | 7/19 | 2509/6562 (38.2) | 233/1525 (15.3) | 355/1570 (22.6) |
| Setting impossible deadlines | 6/19 | 1571/6079 (25.8) | 164/1525 (10.8) | 189/1298 (14.6) |
| **Destabilization** | | | | |
| Shifting goalposts | 1/19 | 54/417 (12.9) | Not reported | Not reported |
| Removal of areas of responsibility without consultation | 8/19 | 1397/6193 (22.6) | 160/1525 (10.5) | 171/1298 (13.2) |

| | | | | |
|---|---|---|---|---|
| Withholding information that affects performance | 7/19 | 1786/6137 (29.1) | 219/1553 (14.1) | 267/1328 (20.1) |
| Ordered to work below one's competence level | 9/19 | 2860/8017 (35.7) | 81/625 (13.0) | 99/483 (20.5) |

*Total number of studies that described types of bullying behaviours, including studies that did not stratify results by sex. As a result, the denominator for the number of participants in total is not the sum of the denominators for men and women. The denominator was calculated from the total number of individuals who completed surveys on specific bullying behaviours, while the numerator was calculated from the number of individuals who indicated they experienced the specified bullying behaviour. Not all survey studies offered respondents the same options to respond to, and as a result the denominators for each bullying behaviour differ.
†Of the studies that separated data by gender or solely included the results of one gender and included the specified bullying behaviour.

**Table 3. Self-reported impact of academic bullying**

| Effect of academic bullying | No. of studies/ Total studies* | Total cohort No. of affected participants/ total participants who completed surveys on the impact of bullying (%)* | Men No. of affected men/ total men who completed surveys on the impact of bullying (%)† | Women No. of affected women/ total women who completed surveys on the impact of bullying (%)† |
|---|---|---|---|---|
| **Psychologic** | | | | |
| Psychologic distress including depressive/PTSD symptoms | 9/20 | 839/2076 (40.4) | 103/161 (64.0) | 64/101 (63.4) |
| Reduced confidence in clinical skill | 4/20 | 296/1518 (19.5) | 68/212 (32.1) | 97/597 (16.2) |
| **Career** | | | | |
| Missed career opportunities | 12/20 | 1570/6637 (23.7) | 89/812 (11.0) | 310/1325 (23.4) |
| Considerations of quitting | 8/20 | 1023/2704 (37.8) | Not reported | Not reported |
| Termination of employment | 3/20 | 84/1046 (8.0) | 4/139 (2.9) | 4/150 (2.7) |
| Leave of absence | 2/20 | 50/748 (6.7) | Not reported | Not reported |
| Self-reported worsening of clinical performance | 5/20 | 528/1801 (29.3) | 42/161 (26.1) | 22/101 (21.8) |

*Total number of studies that described the impact of bullying, including studies that did not stratify results by sex. Not all participants were given the same options to select from.

†Of the studies that separated data by gender or solely included the results of one gender and included the impact of bullying.

**Table 4. Barriers to addressing academic bullying**

| Barrier | No. of studies/Total studies* | No. of participants/ total participants (%) |
|---|---|---|
| **Low reporting rates** | | |
| Lack of awareness of what constitutes bullying | 3/18 | 53/397 (13.4) |
| Lack of awareness of reporting process | 8/18 | 934/2931 (31.9) |
| Lack of perceived benefit | 4/18 | 214/538 (39.8) |
| Fear that bullying would worsen | 6/18 | 448/1168 (38.4) |
| Fear of career ramifications | 7/18 | 829/2199 (37.7) |
| Concerns regarding confidentiality | 3/18 | 48/397 (12.1) |
| **Institutional factors** | | |
| Hierarchical nature of medicine | 4/18 | Not reported |
| Recurring cycle of abuse | 3/18 | Not reported |
| Normalization of bullying | 5/18 | Not reported |
| Lack of enforcement | 5/18 | 391/1106 (35.4) |

*Total number of studies that described barriers of bullying behaviours

**Supplementary table S1: Pooled prevalence of specific bullying behaviours by level of training**

| Behaviour | No. of studies/ Total studies* | Medical Students No. of participants/ total participants (%)* | Residents and fellows No. of participants/ total participants (%)* | Consultants No. of participants/ total participants (%)* |
|---|---|---|---|---|
| **Threats to professional status** | | | | |
| Persistent unjustified criticism | 8/17 | 192/269 (71.4) | 1696/6444 (26.3) | 600/2881 (20.8) |
| Excessive monitoring of work | 4/17 | Not reported | 1020/2445 (41.7) | 564/2824 (20.0) |
| Intimidatory use of discipline | 11/17 | 565/13363 (4.2) | 541/2561 (21.1) | 38/1112 (3.4) |
| Spread of gossip/rumours | 3/17 | Not reported | Not reported | 755/2881 (26.2) |
| False allegations | 3/17 | Not reported | Not reported | 509/2881 (17.7) |
| **Isolation** | | | | |
| Social/professional exclusion | 12/17 | 156/776 (20.1) | 1684/6019 (28.0) | 1272/4445 (28.6) |
| Refusal of leave, training or promotion | 4/17 | Not reported | 286/2445 (11.7) | 727/2824 (25.7) |
| **Overwork** | | | | |
| Undue pressure to produce work | 7/17 | Not reported | 827/2928 (28.2) | 1326/2824 (47.0) |
| Setting impossible deadlines | 6/17 | Not reported | 351/2445 (14.4) | 965/2824 (34.2) |
| **Destabilization** | | | | |
| Shifting goalposts | 1/17 | Not reported | 54/654 (8.3) | Not reported |

| | | | | |
|---|---|---|---|---|
| Removal of areas of responsibility without consultation | 6/17 | 11/56 (19.6) | 267/2503 (10.7) | 784/2824 (27.8) |
| Withholding information that affects performance | 5/17 | Not reported | 415/2503 (16.6) | 1140/2824 (40.4) |
| Ordered to work below one's competence level | 6/17 | 182/269 (67.7) | 1202/3574 (33.6) | 975/2881 (33.8) |

*Total number of studies that described types of bullying behaviours that separated data by level of training

**Supplementary table S2: The pooled impact of academic bullying by level of training**

| Effect of academic bullying | No. of studies/ Total studies* | Medical Students No. of participants/ total participants (%)* | Residents and fellows No. of participants/ total participants (%)* | Consultants No. of participants/ total participants (%)* |
|---|---|---|---|---|
| **Psychiatric** | | | | |
| Psychiatric distress including depressive/PTSD symptoms | 8/19 | 422/579 (72.9) | 220/456 (48.2) | 178/996 (17.9) |
| Reduced confidence in clinical skill | 4/19 | 119/262 (45.4) | Not reported | 177/1259 (14.1) |
| **Career** | | | | |
| Missed career opportunities | 12/19 | 484/3020 (16.0) | 141/389 (36.2) | 948/3228 (29.4) |
| Considered quitting | 8/19 | 109/317 (34.4) | Not reported | 908/2375 (38.2) |
| Terminated employment | 3/19 | Not reported | 73/698 (10.5) | 11/348 (3.2) |
| Leave of absence | 2/19 | Not reported | Not reported | 50/748 (6.7) |
| Self-reported worsening of clinical performance | 4/19 | 202/579 (34.9) | 35/203 (17.2) | 51/563 (9.1) |

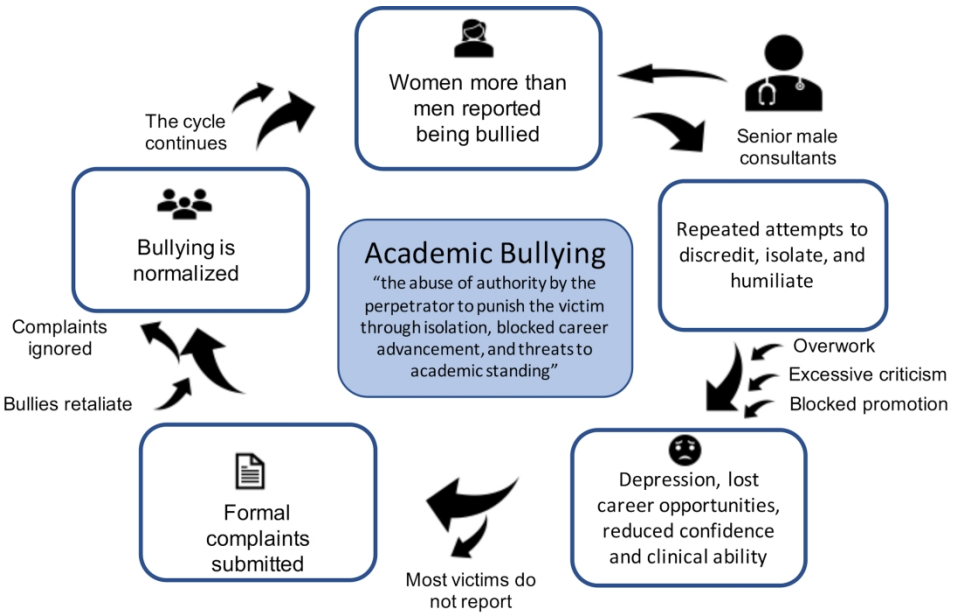
*Total number of studies that described the impact of academic bullying and separated data by level of training

**Supplementary table S3. Suggested policies, interventions and reported outcomes**

| Intervention | Outcome |
|---|---|
| **Zero-tolerance policy** | |
| (Meloni and Austin, 2011) | Increased employee engagement and workplace satisfaction<br>Increased trust among victims that reports would be appropriately managed (44% to 64%)<br>Victims felt safer reporting incidents of bullying (67% to 84%)<br>Improved awareness of where and whom to report to (67% to 84%) |
| (Fried et al., 2012) | Reduced power abuse (43% to 30%) but no change in overall mistreatment rates |
| **Bullying workshops** | |
| (Benmore et al., 2018) | Increased willingness to try to repair the harm caused by bullying and became more conscious of giving feedback |
| (Kulaylat et al., 2016) *, USA) | Data not provided |
| (Cresswell et al., 2016)* | Data not provided |
| (Oku et al., 2014)* | Data not provided |
| **Tracking and reporting mistreatment data** | |
| (House et al., 2018) | Decreased unprofessional or disrespectful behaviour by faculty as reported by students [4.8% (2015-16) to 1.7% (2016-17)] |
| (Gan and Snell, 2014) | No difference in mistreatment |
| (Mavis et al., 2014)* | Data not provided |
| **Staff education on formal reporting process** | |
| (Fried et al., 2012) | No change in reporting rate |
| (Al-Shafaee, 2013)* | Data not provided |
| (Imran et al., 2010)* | Data not provided |

| | |
|---|---|
| (Wear et al., 2005)* | Data not provided |
| (Scott et al., 2008)* | Data not provided |
| **Develop a committee to handle reporting** | |
| (Best et al., 2010) | Resolutions reached 96% of formal reports |
| (Gadit et al., 2007)* | Data not provided |
| (Kapoor et al., 2016)* | Data not provided |

*Suggested approach that had not been implemented




Central illustration: The definition, impact, victims, bullies, and contributing factors of academic bullying in medicine

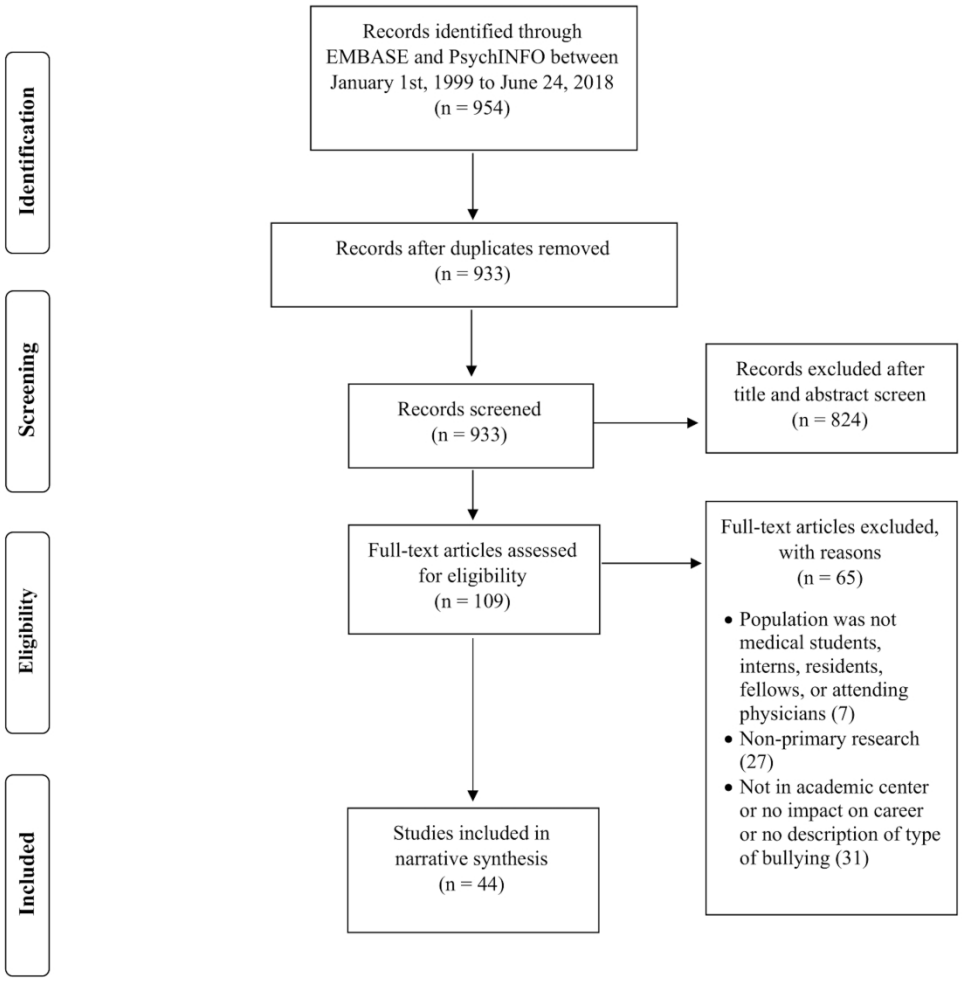
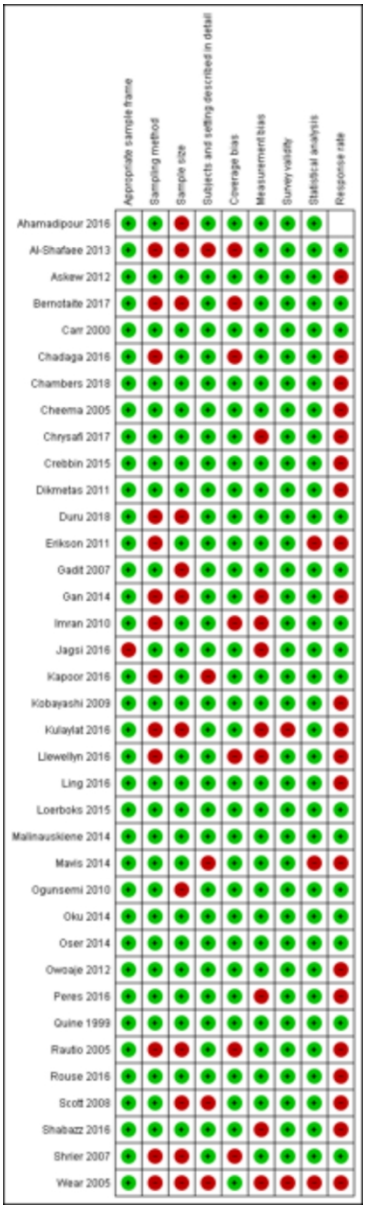



Figure 1: The flow diagram of included studies
We included 44 studies in this review. Reasons for exclusion are described at each stage of study selection.

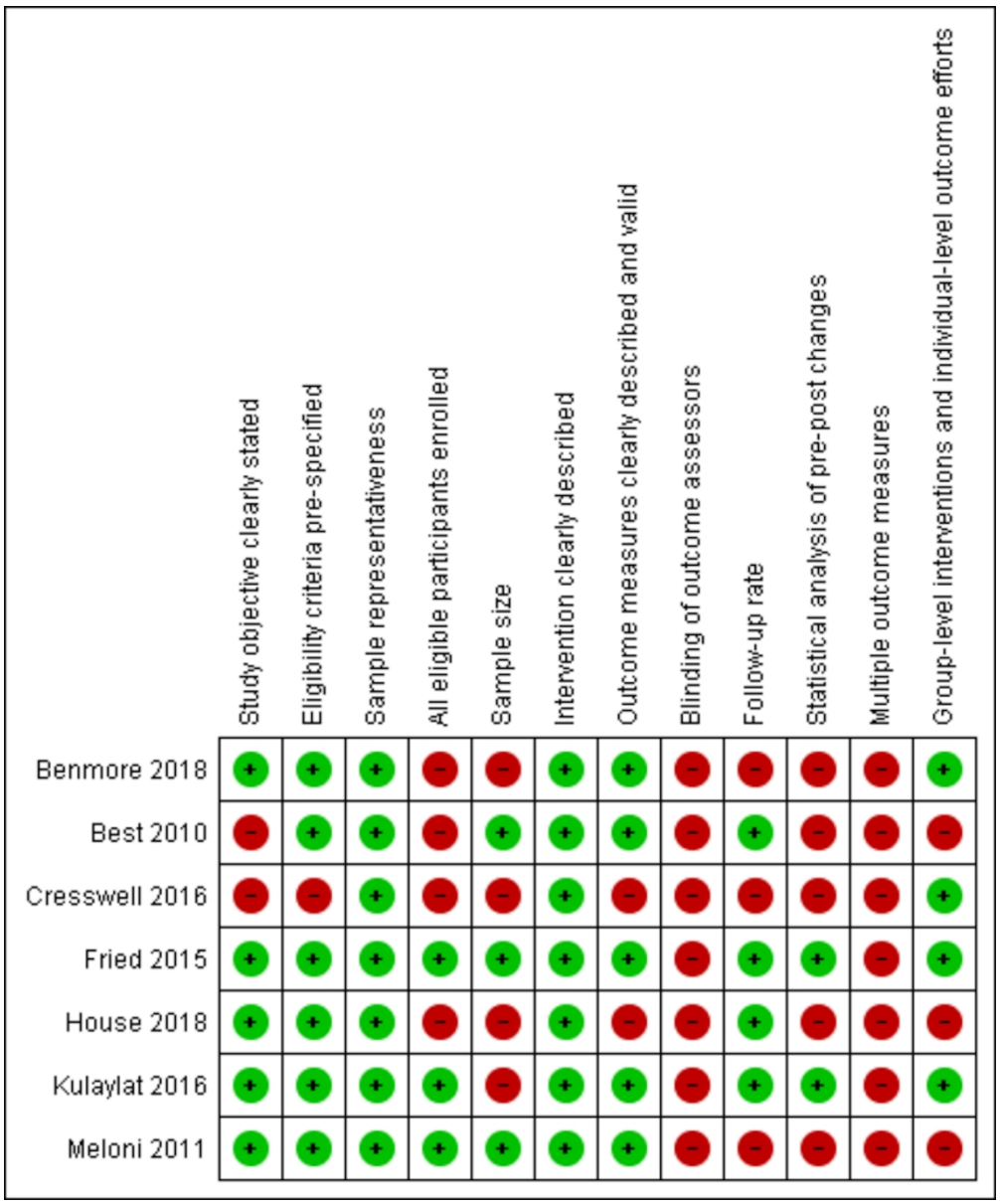
2195x2212mm (72 x 72 DPI)

**Supplementary figure S1:** Search strategy

1. Exp bullying
2. Exp medicine
3. Exp hospitals
4. (sabotage or mistreat* or discredit or humiliation or harassment or demean or bully* or belittle or intimidate or disrespect or coerce or ignore or undermine or exclude or libel or slander or criticism or overwork*).ti
5. (Workplace or career or professional or academic or promotion* or employment or job or profession or reputation or academia).mp
6. (medicine or residency* or "medical school" or "clinical training" or hospital or internship or fellow* or "junior doctor" or "house officer" or "clinical clerk" or "attending physician" or physician or doctor or clinician or hierarchical system or "clinician-scientist" or learner or faculty or “NHS”).ti,ab.
7. Exp aggression
8. 1 or 4 or 7
9. 5 and 8
10. 2 or 3 or 6
11. 9 and 10




Supplementary figure S2: The risk of bias of survey studies included in this review
Most studies in this review had at least a moderate risk of bias. Common sources of bias included inappropriate sampling techniques and low sample sizes




Supplementary figure S3: The risk of bias of before-after studies included in this review
Most studies in this review had at least a moderate risk of bias. Common sources of bias included lack of blinding or a control group and low sample sizes

# PRISMA 2009 Checklist

| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 2 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 4 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 4-5 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | N/A |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 5-6 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 5 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | 5 |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 5-6 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 6 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 6 |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 6 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | 7 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., $I^2$) for each meta-analysis. | 7 |

# PRISMA 2009 Checklist

| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | N/A |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | 6-7 |
| **RESULTS** | | | |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | 7 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | 7 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | 14-15 |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | 8-14 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | N/A |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | N/A |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | 9-12 |
| **DISCUSSION** | | | |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 15-18 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 18-19 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 19-20 |
| **FUNDING** | | | |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 20 |

*From:* Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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BMJ Open

# A systematic review of academic bullying in medical settings: behaviours, perpetrators, victims, and consequences



| | |
|---|---|
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| | |

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**A systematic review of academic bullying in medical settings: behaviours, perpetrators, victims, and consequences**

Averbuch T[a], Yousif E[b], Van Spall HGC[a, b, c]

**Corresponding author:** Harriette Gillian Christine Van Spall. Harriette.vanspall@phri.ca. 237 Barton Street East, Hamilton, ON L8L 2X2, Canada. Telephone: 905-521-2100 Ext: 40601 Fax: 905-538-8932

[a]Department of Medicine, McMaster University, Hamilton, Ontario; [b]Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, Ontario; [c]Population Health Research Institute, Hamilton, Ontario

**Word count: 4213**

## ABSTRACT

**Purpose:** To characterize the dynamics and consequences of bullying in academic medical settings**.**

**Design:** Systematic review.

**Data sources:** We searched EMBASE and PsycINFO for articles published between January 1, 1999 and June 24, 2018.

**Study selection:** We included studies conducted in academic medical settings in which victims were either consultants or trainees, and described bullying behaviours; the perpetrators or victims; the impact, and/or interventions. Study characteristics, quality, and data were assessed independently by 2 reviewers.

**Results:** We included 44 studies representing 36,262 consultants and trainees. We defined academic bullying as the abuse of authority in an academic setting through punishing behaviours that include overwork, destabilization, and isolation. Of 25,639 individuals (in 19 studies) who responded about bullying patterns, the most common (38.2% of respondents) was overwork. Of 9,181 individuals (20 studies) who reported the impact, the most common was psychologic distress (40.4%). Among bullies identified by 11,006 individuals (16 studies), consultants (55.1%) were most common. Of 6,923 victims who reported gender (17 studies), the majority were women (52.3%). Among 6,930 victims (in 15 studies) who described their response, 32.8% filed a report and most (52.3%) did not perceive a positive outcome. Studies that tested the effect of interventions to mitigate bullying had high risk of bias.

**Conclusions**: Academic bullying commonly involves overwork, and is perceived as having a negative impact on well-being. Perpetrators were commonly male consultants and victims were commonly women. Only a minority of victims filed a report. Methodologically robust trials of anti-bullying interventions are needed.

**Limitations:** Most studies (27/44) had at least a moderate risk of bias. All interventions were uncontrolled before-after studies.

**Keywords:** Medical Education & Training, General Medicine, Health Services Administration & Management



**Strengths and limitations**

- This review is comprehensive, including 44 studies with 36,262 consultants and trainees, across several countries and including all levels of training.
- We explicitly defined inclusion criteria, and used established tools to assess the risk of bias of included studies
- The included studies varied in their definitions of bullying, sampling bias was noted among the surveys, and intervention studies were sub-optimally designed

## Background

Bullying behaviours have been described as repeated attempts to discredit, destabilize, or instill fear in an intended target[1]. Bullying can take many forms from overt abuse to subtle acts that erode the confidence, reputation, and progress of the victim[2]. Bullying is common in medicine, likely impacting mental health, professional interactions, and career advancement[3–6]. It may also impact a physician's ability to care for patients[7]. Surveys from the National Health Service (NHS) in the United Kingdom showed that 55% of staff experienced at least one type of bullying; 31% were doctors in training[8]. Bullying is closely related to harassment and discrimination, in which mistreatment is based on personal characteristics or a protected class such as sex or race[9]. Within academic settings, victims may experience all three and the distinction may be less clear. Unlike harassment and discrimination, which have specific legal definitions, bullying is an amorphous term whose victims are often left without legal recourse.

The hierarchical structure of academic medicine – in which there are power imbalances, subjective criteria for recruitment and career advancement, and siloed departments with few checks in place for toxic behaviours – may offer an operational environment in which bullying may be more widespread than in non-academic medical settings. Academic bullying is a seldom-used term within the literature, but is intended to describe the forms of bullying that may exist in academic settings. The prevalence of academic bullying in medical settings is unknown likely due to a lack of definition of bullying behaviours, a fear of reporting, and insufficient research. There is not much known about the characteristics of perpetrators and victims, and about the impact of bullying on academic

productivity, career growth, and patient care. Furthermore, institutional barriers and facilitators of bullying behavior have not been reported, and the effectiveness of interventions in addressing academic bullying have not been evaluated.

The purpose of this systematic review is to define and classify patterns of academic bullying in medical settings; assess the characteristics of perpetrators and victims; describe the impact of bullying on victims; review institutional barriers and facilitators of bullying; and identify possible solutions.

## Methods

### Data sources and searches

This study follows PRISMA reporting guidelines. Two reviewers (T.A, Y.E.) searched two online databases (EMBASE and PsycINFO) for English-language articles published between January 1, 1999, to June 24, 2018 and relevant to academic bullying in medicine. An outline of the search is provided in Figure 1. A combination of medical subject heading (MeSH), title, and abstract text terms encompassing “Medicine”; “Bullying“ and “Academia” were used for the full search. The terms of the search are included in Supplementary figure S1. Two authors (T.A, Y.E.) independently screened articles for inclusion. Differences were resolved by discussion, and if necessary, by a third author (H.V.).

**Study selection**

We included studies conducted in academic medical settings in which victims were either consultants or trainees. We defined academic medical settings as hospitals or clinics that were either university-affiliated or involved trainees. In the case of pre-clinical medical students, academic medical settings included the university where medical instruction took place. Studies were included if they described: the method and impact of bullying; the characteristics of perpetrators and victims; or interventions used to address the bullying. Studies that included trainees or consultants in both academic and non-academic settings were included. We excluded editorials, opinion pieces, reviews, conference abstracts, theses, dissertations, and grey literature. For the purposes of study selection, academic bullying was defined as mistreatment in academic institutions with the intention or effect of disrupting the academic or career progress of the victim.

**Data extraction and quality assessment**

Two reviewers (T.A, Y.E.) independently extracted data on: study design, setting (academic or non-academic), definition, description and impact of academic bullying, characteristics of perpetrators and victims, barriers and facilitators of bullying, and interventions and their outcomes. Two reviewers independently assessed studies for risk of bias. We assessed before-after studies using the National Heart, Lung, and Blood Institute quality assessment tool[10] and assessed prevalence surveys using the Joanna Briggs Institute critical appraisal tool[11]. We classified survey studies as low risk of bias if at least 8 of 9 criteria were met, medium risk of

bias if 7 of 9 were met, and high risk of bias if less than 7 were met. We classified before-after studies as low risk of bias if at least 11 of 12 criteria were met, medium risk of bias if at least 9 of 12 were met, and high risk of bias if less than 9 were met.

**Data synthesis and analysis**

We pooled the results of surveys on the basis of similarity of survey themes to facilitate a descriptive analysis. For survey studies on the prevalence or impact of bullying, we solely pooled the results of studies that asked respondents about specific bullying behaviours or impacts, respectively. We then separated results by sex and level of training. Group selection was by consensus between authors. We presented our results as numbers and percentages. We calculated the denominators from the total number of individuals who completed surveys on types of bullying behaviours, the impact of bullying, characteristics of bullies and victims, or barriers to addressing academic bullying. The numerators were calculated from the number of individuals who experienced a specific behaviour or impact, were bullied by a perpetrator at a specified level of training, or endorsed a specific reason for not making a formal report. We also reported the number of studies that described each specific bullying behaviour or impact, demographic characteristics of victims and perpetrators, barriers and facilitators of academic bullying, and specific reasons for not making a formal report. We could not perform a meta-analysis due to the conceptual heterogeneity between studies.

**Patient and public involvement**

Patients or the public were not involved in the design, conduct, reporting, or dissemination plans of our research.

## Results

### Screening results

We identified 933 unique articles, 44 of which met inclusion criteria. Reasons for exclusion are described in Figure 1.

### Characteristics of included studies

Studies were most frequently set in the USA (reported in 13 studies)[3,12–22] and the UK (reported in 5 studies)[8,23–26] and were set in academic hospitals (reported in 36 studies)[1,3–5,12–16,18–20,22–45] or in both teaching and non-teaching sites (reported in 8 studies)[8,17,21,46–49]. Sixteen studies included medical students[3–5,12,14–16,18,20,30,32,35,39–42], 12 included residents or fellows[1,13,25,26,31–34,36,37,43,44] and 17 included consultants[6,8,17,19,21–24,28,29,33,38,45–49] (Table 1).

### Definition of academic bullying

Four papers provided definitions for academic bullying[30,32,37,40]. Common themes included behaviours where the perpetrator abuses authority to punish the victim through isolation, blocked career advancement, and threats to academic standing. We defined academic bullying as the abuse of authority by a perpetrator who targets the victim in an academic setting through punishing behaviours that include overwork, destabilization, and isolation. Multiple studies used the complete or partial Negative Acts Questionnaire (NAQ), a standardized list of bullying behaviours (reported in 22 studies)[1,3,4,6,12–15,17,27,29–32,34–36,39,42,43,47,49].

**Patterns of academic bullying behaviours**

There were 25,639 consultant and trainee respondents to surveys of bullying behaviours (reported in 19 studies), but not all were offered the same options to select from (Table 2). Bullying behaviours were grouped into destabilization (reported in 13 studies), threats to professional status (reported in 15 studies), overwork (reported in 7 studies), and isolation (reported in 13 studies). Undue pressure to produce work was commonly reported (38.2% of respondents affected, reported in 7 studies)[13,17,26,27,29,31,49]. Of the 13 studies that described destabilization, common methods included being ordered to work below one's competency level (35.7%, reported in 9 studies)[17,26,29–31,33,35,38,49] and withholding information that affects performance (29.1%; reported in 7 studies)[13,17,27,29–31,49]. Of the 15 studies that described threats to professional status, common methods were excessive monitoring (28.8%; reported in 6 studies)[13,17,27,29,31,49] and criticism (24.9%; reported in 10 studies)[13,17,26,27,29,31,33,35,38,49]. Of the 13 studies that described isolation, the most common method was social and professional exclusion (26.9%; reported in 13 studies)[4,13,15,17,21,27,29–31,33,35,46,49].

There were 3,564 consultant and trainee respondents to surveys that separated the prevalence of bullying behaviours by sex (reported in 6 studies). A greater proportion of men experienced the intimidatory use of discipline procedures (18.5%, reported in 5 studies)[13,17,30,35,39] while a greater proportion of women experienced all other bullying behaviours (reported in 6 studies)[13,17,21,30,35,39] (Table 2). There were 24,876 respondents to surveys that analyzed results by level of training (reported in 17 studies) (Supplementary table S1). A greater proportion of consultants experienced refusal of applications for leave, training, or promotion (25.7%, reported in 2 studies)[17,29] and removal of areas of responsibility (27.8%, reported in 2 studies)[17,29] than residents (11.7%, reported in 2 studies;

10.7%, reported in 3 studies, respectively)[13,27,36] or medical students (not reported; 19.6%, reported in 1 study, respectively)[15]. Compared to medical students (4.2%, reported in 5 studies)[12,14,15,35,39] and consultants (3.4%, reported in 2 studies)[17,38], a greater proportion of residents experienced the intimidatory use of discipline procedures (21.1%, reported in 4 studies)[13,27,30,36]. A greater proportion of medical students experienced persistent criticism (71.4%, reported in 1 study)[35] than residents (26.3%, reported in 4 studies)[13,26,27,33] and consultants (20.8%, reported in 3 studies)[17,29,38].

**Characteristics of bullies**

Twenty-two studies representing 11,006 consultants and trainees described the characteristics of bullies, although not all were offered the same options to select from. Common perpetrators included consultants (55.9%, reported in 22 studies)[1,3,4,6,8,13,14,18,21,24,26,27,29–31,33,35,37,42,44,47,48], residents (21.6%, reported in 14 studies)[1,3,6,8,14,18,26,27,30,31,37,42,44], and nurses (14.3%, reported in 14 studies)[1,3,4,13,14,18,26,27,30,31,37,42,44,47]. Of the 4,277 individuals who identified the gender of their bullies, most reported primarily male (67.2%, reported in 5 studies)[8,17,24,29,33], followed by primarily female (26.1%, reported in 5 studies)[8,17,24,29,33], and both (6.7%, reported in 3 studies)[8,24,29]. Among 5,444 medical students, perpetrators were commonly consultants (45.2%, reported in 6 studies)[3,4,14,18,35,42], residents (37.6%, reported in 4 studies)[3,14,18,42], nurses (12.8%, reported in 5 studies)[3,4,14,18,42], and other medical students (4.4%, reported in 3 studies)[3,4,35]. Among 2,980 residents, perpetrators were commonly consultants (51.0%, reported in 8 studies)[1,13,26,27,30,31,37,44], nurses (29.2%, reported in 8 studies)[1,13,26,27,30,31,37,44], and other residents (16.4%, reported in 8

studies)[1,13,26,27,30,31,37,44]. Of the 1,500 consultants, perpetrators were their peers (39.2%, reported in 7 studies)[6,8,21,29,31,47,48], senior consultants (23.7%, reported in 5 studies)[6,8,21,24,47], and administration (17.7%, reported in 4 studies)[24,29,31,48].

Six studies representing 1,258 interns and medical students described the prevalence of academic bullying according to the specialty rotation of the learner. Academic bullying was common in surgery (34.9% of respondents, reported in 5 studies)[1,12,30,33,37,42], obstetrics and gynecology (25.5%, reported in 2 studies)[12,42] and internal medicine (21.4%, reported in 5 studies)[1,12,30,33,37,42].

**Characteristics of victims**

Twenty-five studies described the characteristics of victims, and 19 included the proportion of those who experienced bullying. Of the 6,689 women and 9,162 men who responded to surveys that analyzed results by sex, women were more likely to report being bullied than men (54.1% of all women compared to 36.1% of all men, reported in 17 studies)[3,4,13,17,19,22,29–37,39,44]. There were 8,454 consultant and trainee respondents to surveys that separated the results by demographic characteristics other than sex, but not all characteristics were captured by each study. A greater proportion of international graduates / non-citizens experienced bullying than citizens (55.2% compared to 50.6%, reported in 3 studies)[13,26,33], and a greater proportion of overweight participants (BMI >25) experienced bullying than those with a BMI ≤25 (17.8% compared to 11.8%, reported in 1 study)[34]. The relationship between age and bullying varied based on the cutoff used and the survey sample in each study. Among consultants, a greater proportion of those with full professorship experienced bullying than assistant professors (68.0% compared to 51.9%, reported in 1 study)[22].

**Impact of academic bullying**

There were 9,181 consultant and trainee respondents to surveys on the psychological (reported in 12 studies) and career impact (reported in 16 studies) of academic bullying (Table 3), although not all were offered the same options to select from. Respondents commonly reported psychiatric distress (40.4%; reported in 9 studies)[6,24,29,35,37,38,41,44,47], considerations of quitting (37.8%; reported in 5 studies)[24,29,33,46,48], and reduced clinical ability (29.3%; reported in 5 studies)[26,29,35,37,41]. No studies quantified the effect on patient safety. Five studies representing 2,688 individuals described the impact of bullying separated by sex (Table 3). A greater proportion of women experienced loss of career opportunities (23.4%, reported in 5 studies)[17,19,21,22,35] while a greater proportion of men experienced decreased confidence (32.1%, reported in 2 studies)[22,35] and clinical ability (26.1%, reported in 1)[35].

There were 8,545 consultant and trainee respondents to surveys that separated results by level of training (Supplementary table S2). A greater proportion of medical students experienced psychiatric distress (72.9%, reported in 2 studies)[35,41] and decreased clinical performance (34.9%, reported in 2 studies)[35,41] than residents (48.2%, reported in 2 studies and 17.2%, reported in 1 study, respectively)[37,44] and consultants (17.9%, reported in 4 studies and 9.1%, reported in 1 study, respectively)[24,29,38,47]. A greater proportion of residents endorsed loss of career opportunities (36.2%, reported in 2 studies)[33,36] compared to medical students (16.0%, reported in 3 studies)[12,14,35] and consultants (23.7%, reported in 7 studies)[17,19,21,22,29,38,46].

**Barriers and facilitators of academic bullying**

Eighteen studies pertained to barriers to victims making a formal report (reported in 15 studies) and institutional facilitators (reported in 14 studies) of academic bullying (Table 4). There were 6,930 consultant and trainee respondents to surveys on their actions taken in response to bullying and reasons for not making a formal report, although not all were given the same options to select from. Victims commonly did not make a formal report[1,3,4,14,17,24,27,29,31–33,37,42,44,48]; only 32.8% made a formal report. Deterrents to reporting included concern regarding career implications (37.7%, reported in 12 studies)[1,4,14,16,29,30,32,33,37,44,46,48], not knowing who to report to (31.9%, reported in 9 studies)[1,4,29,30,32,37,44,46,48], and poor recognition of bullying (13.4%, reported in 7 studies)[5,14,16,18,23,30,37]. Of the 15 studies, 6 studies representing 1139 individuals reported the outcomes of reporting[1,17,24,29,31,33] although only a small range of outcomes were offered among options. Submitting a formal report often had no perceived effect on bullying (35.6%, reported in 5 studies);[17,24,29,31,33] a similar proportion of victims endorsed worsening (16.7%, reported in 2)[17,31] and improvement (13.7%, reported in 5 studies)[1,17,24,31,33] in bullying following reporting.

In the 11 studies that described institutional facilitators of bullying, common facilitators were lack of enforcement (reported in 8 studies)[1,17,24,27,29,31,32,37], the hierarchical structure of medicine (reported in 4 studies)[27,37–39], normalization of bullying (reported in 4 studies)[3,14,29,44] and lack of a formal reporting process (reported in 2 studies)[4,36]. Individual-level data was not pooled as institutional facilitators of bullying were most commonly elicited via free-response portions of surveys with varying completion rates.

**Suggested strategies, interventions, and outcomes**

Thirty-two studies suggested strategies to address academic bullying. These strategies included promoting anti-bullying policies (reported in 13 studies)[2,8,41,46,10,11,17,19,26,28,32,39], education to prevent academic bullying (reported in 13 studies)[2,3,46,48,4,12,13,20,24,25,28,31], establishing an anti-bullying oversight committee (reported in 5 studies)[2,15,17,35], institutional support for victims (reported in 2 studies)[10,41], and internal reviews where hospitals develop targeted solutions for their environment (reported in 2 studies)[15,46] (Supplementary table S3).

Of the 32 studies, 7 implemented organization-level interventions which included workshops with vignettes to improve recognition of bullying (reported in 3 studies)[18,23,25]; a gender and power abuse committee that established reporting mechanisms and held mandatory workshops on mistreatment (reported in 1)[3]; a gender equity office to handle reporting (reported in 1)[20]; zero-tolerance policies (reported in 1)[45]; and institutional-level tracking of mistreatment to provide targeted staff education (reported in 1)[15]. All 7 studies had an uncontrolled before-after design, and as such, did not establish causality. In the studies of vignettes, common bullying behaviours were demonstrated to improve recognition of both subtle and overt acts of bullying. Of the 3 studies that involved bullying recognition workshops, all reported an associated improvement in bullying recognition. In a study that developed a gender equity office, reporting was handled through an intermediary; decisions were binding with consequences for retaliation including termination of employment[20] and 96% of all formal reports were resolved. In a study where a Gender and Power Abuse committee was formed, there was an associated reduction in academic abuse[3]. In a study assessing the impact of a professionalism retreat about mistreatment

for consultants, there was no reduction in medical student mistreatment[12]. In a study assessing the implementation of zero-tolerance policies, there was an associated improvement in awareness of bullying reporting processes[45].

**Assessment of bias**

Seventeen studies had a low risk of bias[4,8,12,17,22,26,29,31–38,47,48], 15 had a medium risk of bias[1,3,13,14,18,19,21,24,27,28,40,41,43,46,49], and 12 had a high risk of bias[5,6,15,16,20,23,25,30,39,42,44,45]. Among the 37 survey studies, 13 sampled participants inappropriately[5,6,13,16,21,27,28,30,39,40,42,44,49], 12 had inadequate sample sizes or did not justify their sample size[1,5,6,16,21,28,30,32,36,38,39,42], 5 did not sufficiently describe the participants[1,14,16,30,40], 7 had coverage bias[6,13,21,27,30,39,44], 3 did not have an appropriate statistical analysis[14,16,49], and 2 had a low response rate[1,5,13,14,16,17,24,26,29,31,33,35,37,39,41–44,46,48,49] (Supplementary figure S2). Among the 7 before-after trials, 1 did not have pre-specified inclusion criteria[25], 4 had low sample sizes or did not justify their sample size[15,18,23,25], 2 did not have clearly defined, pre-specified, consistently measured outcomes[15,25], 7 did not blind pariticipants[3,15,18,20,23,25,45], 3 did not account for loss to follow-up in their analysis[23,25,45], and 5 lacked statistical tests to assess for significant pre- to post-intervention changes[15,20,23,25,45] (Supplementary figure S3).

**Discussion**

In this systematic review, we established a definition for academic bullying, identified common patterns of bullying, and reported the impact on victims. We defined academic bullying as the abuse of authority by a perpetrator who targets the victim in an

academic setting through punishing behaviours that include overwork, destabilization, and isolation. Victims reported that academic bullying often resulted in stalled career advancement and thoughts of leaving the position. A majority of academic bullies were senior men, and a majority of victims were women. Barriers to reporting academic bullying included fear of reprisal, perceived hopelessness, and institutional non-enforcement of anti-bullying policies. Strategies to overcome academic bullying, such as anti-bullying committees and workplace reassignment were associated with an improvement in the prevalence of bullying and resolution of formal reports (Central illustration).

Several factors contribute to the prevalence of bullying within academia[50,51]. The hierarchical structure lends itself to power imbalances and prevents victims from speaking out, especially when the aggressor is tenured[52]. The relative isolation of departments within universities allows poor behaviour to go unchecked. Furthermore, the closed networks within departments lend themselves to mobbing behaviour and causes victims to fear being blacklisted for speaking out[53].

A lack of clarity around the definition can limit awareness and reporting[32]. The Graduation Questionnaire administered to all American medical students found that in years where respondents were asked if they had been bullied, the estimated prevalence was lower than when they were asked about specific bullying behaviours[14]. Surveys on bullying should include a list of defining behaviours to increase clarity and accuracy in responses[54]. Even in institutions with established reporting systems, respondents were

often unaware of how to file a report[29]. We found that victims of academic bullying rarely filed reports, primarily due to fear of retaliation. Reporting was not consistently effective and was equally likely to worsen bullying.

We found that consultants were the most common sources of bullying at all levels of training, although residents often bullied medical students. No studies assessed the relative contribution of fellows and senior residents to resident bullying. Among studies that analyzed bullying among consultants by seniority, senior consultants were a more commonly reported source of bullying[6,8,21,24,47]. Women and ethnic minorities reported higher rates of bullying among demographic groups surveyed, although racial factors were infrequently assessed in the surveys included in this study. While some argue that the increasing proportion of women trainees[55,56] may change dynamics in healthcare settings, the leaky academic pipeline in which women remain underrepresented in several academic specialties and in positions of leadership make them vulnerable to the power dynamics of academic medicine[57].

Our review illustrates the self-reported harms of academic bullying. Victims experienced depressive symptoms, self-perceived loss of clinical ability, and termination of employment. Academic bullying has been linked to depression[34], substance abuse[58], and hospitalization for coronary artery or cerebrovascular disease[59]. Bullying costs the National Health Service (NHS) of the United Kingdom £325 million annually due to reduced performance and increased staff turnover[60]. Disruptive behavior, linked to bullying in the perioperative setting has been linked to 27% of patient deaths, 67% of adverse events, and 71% of medical errors[7]. Reasons for consultant error include intimidation leading to a fear of communicating sources of harm and slow response times[61] .

Interventions reported as effective were simple, non-resource intensive, and organization-level, such as anti-bullying workshops and committees. Anti-bullying committees involving staff and learners can research bullying within their institution and address the most common disruptive behaviours through targeted interventions[49]. An organization-level, rather than individual-level approach may address the root causes of academic bullying as well as the organizational culture that facilitates ongoing bullying. We found that anti-bullying committees typically included three elements: (1) a multidisciplinary team that includes clinicians and other front-line staff; (2) development of anti-bullying policies and a reporting process; and (3) an education campaign to promote awareness of policies. Owing to their multifaceted nature, it is challenging to evaluate the relative contributions of their components. Furthermore, without well-designed trials, the effect of anti-bullying committees is unknown.

The need for a confidential reporting process was raised in the studies included in this review, but few described how confidentiality could be maintained when the report has to describe details of the bullying that may be only privy to the perpetrator and victim. The reporting process could take the form of the Office of Gender Equity at the University of California, where the accuser and the accused do not meet face to face; the discipline process is through an intermediary[20]. A unique, non-punitive approach is the restorative justice approach used at Dalhousie University where victims, offenders, and administrators work collaboratively to address sexual harassment and re-integrate offenders[62]. Reporting may have been ineffective in this review due to the impunity offered to prominent consultants. Senior personnel, particularly those who are well-known and successful in grant funding, are often

considered “untouchable”, beyond reproach by their institutions[63]. Behaviour is often learned and modeling positive behaviours may break the cycle of bullying in medicine[64]. One approach would be making professionalism a requirement for promotion and career advancement, as in the Department of Medicine at the University of Toronto in Canada[65].

**Strengths and limitations**

The strengths of this review include its broad scope; capturing several aspects of academic bullying, and its size (n = 44 studies, 36,262 consultants and trainees). The cohort included was diverse, comprising several specialties and countries. We explicitly defined eligibility criteria and extracted data in duplicate. We used established tools to assess the risk of bias.

There are several limitations that should be acknowledged. There is no validated definition of bullying, and the included studies varied in their description of bullying. Most studies used questionnaires that were not previously validated. The survey instruments across studies differed from each other, and their results had to be pooled according to themes to be synthesized. We could not account for differences in institutional culture and hospital systems in the responses of survey participants. Data on bully/victim demographics were underrepresented. Selection bias was a significant concern:13 studies used convenience sampling, and 2 included voluntary focus groups for victims of bullying to sign up for. Overall, the response rate was 59.2%, with a range of 12% to 100%. Surrogate outcomes were used such as awareness of bullying, and the reporting of outcomes was inconsistent. As such, the effect of anti-bullying interventions must be interpreted cautiously.

**Future directions**

Significant gaps exist in the quality of the academic bullying literature, particularly with inconsistent definitions and limitations in study methodology. Our definition may be used to provide the breadth and granularity required to sufficiently capture cases of academic bullying in medicine. Studies on the impact of academic bullying would benefit from standardized, validated survey instruments. Although randomization and blinding are not always possible to test the effect of interventions, a control group should be included in anti-bullying intervention studies.

**Conclusions:**

Academic bullying refers to specific behaviours that disrupt the learning or career of the intended target and commonly consists of exclusion and overwork. The consequences include significant psychiatric distress and loss of career opportunities. Bullies tend to be male senior consultants, whereas victims tend to be females. The fear of reprisal and non-enforcement of anti-bullying policies are the greatest barriers to addressing academic bullying. Results of bullying interventions must be interpreted with caution due to their methodological quality and reliance on surrogate measures. There is a need for well-designed trials with transparent reporting of relevant outcomes and accounting for temporal trends.

**Author contributions**

TA contributed to study design, informed the search strategy, extracted and synthesized study data, and drafted and edited the manuscript. YE informed the search strategy, extracted and synthesized study data, and edited the manuscript. HGCV conceived the study idea, informed the search strategy, analyzed the data, drafted and edited the manuscript, and supervised the conduct of the study. HGCV affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

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**Competing interests**

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**Ethical approval**

Not required.

## Data sharing

All data relevant to the study are included in the article.

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**Table 1. Summary of studies investigating bullying in academic medicine**

| Author (year), Country | Study design | Setting | Definition of academic bullying | Target | Perpetrator | Source of bias | Risk of Bias |
|---|---|---|---|---|---|---|---|
| Benmore et al. (2018), England | Before-after | Academic hospital* | Data not provided | Residents | Senior consultants | Insufficient enrollment, inadequate sample size, no blinding of outcome assessors, high loss to follow-up, lack of statistical analysis or ITS† design | High |
| Duru et al. (2018), Turkey | Survey | Academic hospital | Data not provided | Consultants, researchers, administrators, nurses | Specific occupations of bullies not specified | Inappropriate sampling and inadequate sample size | Moderate |
| Chambers et al. (2018), New Zealand | Survey | Academic and non-academic hospitals | Data not provided | Specialist consultants | Primarily male. Senior medical staff 52.5%, non-clinical managers 31.8%, and clinical leaders 24.9%. | Low response rate | Low |

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|---|---|---|---|---|---|---|---|
| House et al. (2018), USA | Before-after | Academic hospital | Data not provided | Medical Students | Faculty most frequently were the source of bullying followed by residents. Exact breakdown not specified | Insufficient enrollment, inadequate sample size, no blinding of outcome assessors, outcomes not clearly described, lack of statistical analysis, individual-level analysis or ITS design | High |
| Kulaylat et al. (2017), USA | Survey | Academic hospital | Verbal abuse, specialty-choice discrimination, non-educational tasks, withholding/ denying learning opportunities, neglect and gender/racial insensitivity | Medical Students | Faculty (57%), residents, fellows (49%), and nurses (33%) | Inappropriate sampling, inadequate sample size, classification bias, and non-validated identification or measurement of bullying | High |
| Bernotaite et al. (2017), Lithuania | Survey | Academic hospitals | Data not provided | Family Consultants | 25.3% supervisor, 9.8% colleague, | Inappropriate sampling, inadequate sample size, | Moderate |

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|---|---|---|---|---|---|---|---|
| | | | | | 2.9% subordinate | and coverage bias | |
| Chrysafi et al. (2017), Greece | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Surgeons most frequently followed by internal medicine consultants, then radiologists/ laboratory consultants | Low response rate and coverage bias | Moderate |
| Kapoor et al. (2016), India | Survey | Academic hospital | Data not provided | Medical students | Data not provided | Inappropriate sampling and inadequate description of study population | Moderate |
| Chadaga et al. (2016), USA | Survey | Academic hospitals | NAQ‡ used | Residents and fellows | Consultants 29%, nurses 27%, patients 23%, peers 19% | Low response rate, inadequate sample size, and coverage bias | Moderate |
| Llewellyn et al. (2016), Australia | Survey | Academic hospitals | Data not provided | Residents | Senior medical staff: 58.3% in 2015, 60.6% in 2016. Non-medical staff 33.2% 2015, 33.9% 2016, Manager 5.2% | Low response rate, biased sampling, coverage and classification bias | High |

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|---|---|---|---|---|---|---|---|
| | | | | | in 2015, 1.2% in 2016, junior resident 3.3% in 2015, 4.3% in 2016 | | |
| Rouse et al. (2016), USA | Survey | Academic clinics | NAQ used | Family medicine consultants | Data not provided | Low response rate | Low |
| Shabazz et al. (2016), UK | Survey | Academic and non-academic hospitals | Belittle and undermine an individual's work; undermining an individual's integrity; persistent and unjustified criticism and monitoring of work; freezing out, ignoring or excluding and continual undervaluing of an individual's effort. | Gynecology consultants | 50.9% senior consultants, 22.3% junior consultants, 4.5% medical director | Low response rate, and classification bias | Moderate |
| Peres et al. (2016), Brazil | Survey | Academic hospital | Data not provided | Medical students | Data not provided | Low response rate, and classification bias | Moderate |

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|---|---|---|---|---|---|---|---|
| Ling et al. (2016), Australia | Survey | Academic hospitals | NAQ used | General surgery residents and consultants | For trainee victims: staff surgeon 48%, trainee surgeon 13%, admin 13%, nurses 11%, other consultant 6% For consultant victims; 31% staff surgeon, 28% admin, 13% other consultant, 11% nurses, other 10%, trainees 4% | Low response rate | Low |
| Kulaylat et al. (2016), USA | Before-after | Academic hospital | Data not provided | Medical Students | Faculty (57%), residents/fellows (49%), and nurses (33%) | Inadequate sample size, no blinding of outcome assessors | Moderate |
| Ahmadipour et al. (2016), Iran | Survey | Academic hospital | Being assigned tasks as punishment, being threatened with an unjustly bad score or failure | Medical students, interns and residents | Data not provided | Inadequate sample size | Low |

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|---|---|---|---|---|---|---|---|
| Jagsi et al. (2016), USA | Survey | Academic hospital | Data not provided | Consultants who won a career advancement award | Data not provided | Inadequate sampling frame and classification bias | Moderate |
| Crebbin et al. (2015), Australia and New Zealand | Survey | Academic hospitals | Data not provided | Residents, fellows and consultants | 50% surgical consultants, other medical consultants (24%) and nursing staff (26%) | Low response rate | Low |
| Cresswell et al. (2016), UK | Before-after | Academic hospital | Data not provided | Residents | Data not provided | Insufficient description of study purpose, inadequate enrollment and sample size, no blinding of outcome assessors, outcomes not clearly described, lack of statistical analysis or ITS design and high loss to follow-up | High |
| Loerbroks et al. (2015), Germany | Survey | Academic hospitals | Data not provided | Residents | Data not provided | - | Low |

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|---|---|---|---|---|---|---|---|
| Malinauskiene et al. (2014), Lithuania | Survey | Non-academic clinics | NAQ used | Family medicine consultants | Bullying from patients 11.8%, from colleagues by 8.4%, from superiors by 26.6%. | - | Low |
| Mavis et al. (2014), USA | Survey | Academic hospitals | Mistreatment either intentional or unintentional occurs when behavior shows disrespect for the dignity of others and unreasonably interferes with the learning process | Medical students | Clinical faculty in the hospital (31%) residents/ interns (28%), nurses (11%) | Low response rate, inadequate description of study population and statistical analysis | Moderate |
| Oser et al. (2014), USA | Survey | Academic hospital | Data not provided | Medical students | Residents > clerkship faculty > other attendings > other students > preceptors = nurses | - | Low |
| Oku et al. (2014), Nigeria | Survey | Academic hospital | Data not provided | Medical students | 23.7% other students, 21.7% consultants, 17.5% | - | Low |

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| | | | | | lecturers, 16.5% consultants, 16.5% nurses, 4.1% other staff | | |
| Gan et al. (2014), Canada | Survey | Academic hospital | Data not provided | Medical students | Consultants | Low response rate, inappropriate sampling, small sample size and classification bias | High |
| Fried et al. (2015), USA | Before-after | Academic hospital | Power mistreatment defined as "made to feel intimidated, dehumanized, or had a threat made about a recommendation, your grade, or your career | Medical students | Residents 49.7%, Clinical faculty 36.9%, preclinical faculty 7.9% | - | low |
| Al-Shafaee et al. (2013), Oman | Survey | Academic hospitals | Being coerced into carrying out personal services unrelated to the expected role of interns and instances | Residents | Internal medicine 60.3%, surgery 29%, pediatrics 15.5%. Specialists 51.7%, | Inappropriate sampling, inadequate sample size, inadequate description of study | High |

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|---|---|---|---|---|---|---|---|
| | | | in which interns were excluded from reasonable learning opportunities offered to others, or threatened with failure or poor evaluations for reasons unrelated to academic performance | | consultants 50%, residents 12.1%, nurses 24.1% | population and coverage bias | |
| Owoaje et al. (2012), Nigeria | Survey | Academic hospital | Data not provided | Medical Students | Consultants 69.1%, residents/ fellows 52.4%, other students 15.7%, nurses 7.8%, laboratory technicians 4.1% | Low response rate | Low |
| Askew et al. (2012), Australia | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Consultants 44%, Managers 27%, Patients 15%, Nurses/ midwives 4%, | Low response rate | Low |

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|---|---|---|---|---|---|---|---|
| | | | | | junior consultants 1% | | |
| Meloni et al. (2011), Australia | Before-after | Academic hospital | Data not provided | Hospital employees | Data not provided | Lack of blinding of outcome assessors, high loss to follow-up, lack of statistical analysis or ITS design, and unit of analysis not clearly described | High |
| Dikmetas et al. (2011), Turkey | Survey | Academic hospital | Data not provided | Residents | Surgeons > Internists | Low response rate | Moderate |
| Eriksen et al. (2011), Norway | Survey | Academic hospital | NAQ used | Hospital employees | Colleagues. Specific occupations not described | Low response rate, inappropriate sampling and inadequate statistical analysis | Moderate |
| Imran et al. (2010), Pakistan | Survey | Academic hospitals | Threats to professional status, threats to personal standing, isolation, | Residents | Consultants | Inappropriate sampling, classification and coverage bias | Moderate |

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|---|---|---|---|---|---|---|---|
| | | | overwork, and destabilization | | | | |
| Ogunsemi et al. (2010), Nigeria | Survey | Academic hospital | Data not provided | Residents | 58% administrative staff, 41.4% from the hospital chief executive, 40.4% from patient relatives, 32.7% nurses, 30% residents, 20% patients | Inadequate sample size | Low |
| Best et al. (2010), USA | Before-after | Academic hospital | Data not provided | Unspecified | Data not provided | Study purpose not clearly described, insufficient enrollment, no blinding of outcome assessors, lack of statistical or individual-level analysis or ITS design | High |
| Nagata-Kobayashi et al. (2009), Japan | Survey | Academic hospitals | Assigned you tasks as punishment; threatened to fail you unfairly in | Residents | Surgery (27.6%), internal medicine (21.4%), emergency | Low response rate | Low |

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|---|---|---|---|---|---|---|---|
| | | | residency; competed maliciously or unfairly with you; made negative remarks to you about becoming a consultant or pursuing a career in medicine | | medicine (11.5%), anaesthesia (11.3%). Consultants 34.1%, patients 21.7%, nurses 17.2% | | |
| Scott et al. (2008), New Zealand | Survey | Academic hospital | A threat to professional status and personal standing, isolation, enforced overwork, destabilization | Residents | Consultants 30%, nurses 30%, patients 25%, radiologists 8%, residents/ fellows 7% | Low response rate, inadequate sample size and description of study population | Moderate |
| Gadit et al. (2007), Pakistan | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Senior colleagues | Inadequate sample size | Low |
| Shrier et al. (2007), USA | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Colleagues 24%, patients 19%, teachers 18%, supervisors 15%, | Inappropriate sampling, inadequate sample size, and coverage bias | Moderate |

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|---|---|---|---|---|---|---|---|
| Cheema et al. (2005), Ireland | Survey | Academic hospitals | Data not provided | Residents | Senior residents 51-70%, Nursing staff 47-59%, Administration 15-16%, Colleagues 12-13% | Low response rate | Low |
| Rautio et al. (2005), Finland | Survey | Academic hospital | Data not provided | Medical students | Lecturers 27.9%, Research/senior research fellows 27.7%, Professors 16.6%, Associate professors 13.6% | Low response rate, inappropriate sampling, inadequate sample size, and coverage bias | High |
| Carr et al. (2000), USA | Survey | Academic hospitals | Data not provided | Consultants | Superiors and colleagues | - | Low |
| Quine (1999), UK | Survey | Non-academic clinics | Data not provided | Consultants | 54% greater seniority, 34% same seniority, 12% less senior. 49% of bullies older than victim | - | Low |
| Wear et al. (2005), USA | Survey | Academic hospital | Data not provided | Medical students | General surgeons and obstetricians | Low response rate, inappropriate sampling, inadequate | High |

sample size, classification and lack of validated measurement tool

*Academic hospitals/clinics were defined as teaching hospitals/clinics with a university affiliation
†Interrupted time series
‡The NAQ is the negative acts questionnaire, a validated tool for assessing the prevalence of workplace bullying

**Table 2: Self-reported description of specific bullying behaviours**

| Behaviour | No. of studies/ Total studies* | Total cohort No. affected/ total participants who completed surveys on behaviours (%)* | Men No. affected/ total men who completed surveys on behaviours (%)† | Women No. affected/ Total women who completed surveys on behaviours (%)† |
|---|---|---|---|---|
| **Threats to professional status** | | | | |
| Persistent unjustified criticism | 10/19 | 2587/10404 (24.9) | 535/1690 (31.7) | 552/1402 (39.4) |
| Excessive monitoring of work | 6/19 | 1752/6079 (28.8) | 442/1525 (27.7) | 441/1298 (34.0) |
| Intimidatory use of discipline | 11/19 | 1156/17046 (6.8) | 323/1746 (18.5) | 237/1546 (15.3) |
| Spread of gossip/rumours | 5/19 | 892/3694 (24.2) | 88/596 (14.8) | 94/453 (20.8) |
| False allegations | 5/19 | 577/3694 (15.6) | 59/596 (9.9) | 54/453 (11.9) |
| Refusal of leave, training or promotion | 6/19 | 1174/6079 (19.3) | 215/1690 (12.7) | 197/1402 (14.1) |
| **Isolation** | | | | |
| Social/professional exclusion | 13/19 | 3895/13963 (27.9) | 301/1718 (17.5) | 925/2385 (38.8) |
| **Overwork** | | | | |
| Undue pressure to produce work | 7/19 | 2509/6562 (38.2) | 233/1525 (15.3) | 355/1570 (22.6) |
| Setting impossible deadlines | 6/19 | 1571/6079 (25.8) | 164/1525 (10.8) | 189/1298 (14.6) |
| **Destabilization** | | | | |
| Shifting goalposts | 1/19 | 54/417 (12.9) | Not reported | Not reported |
| Removal of areas of responsibility without consultation | 8/19 | 1397/6193 (22.6) | 160/1525 (10.5) | 171/1298 (13.2) |

| | | | | |
|---|---|---|---|---|
| Withholding information that affects performance | 7/19 | 1786/6137 (29.1) | 219/1553 (14.1) | 267/1328 (20.1) |
| Ordered to work below one's competence level | 9/19 | 2860/8017 (35.7) | 81/625 (13.0) | 99/483 (20.5) |

*Total number of studies that described types of bullying behaviours, including studies that did not stratify results by sex. As a result, the denominator for the number of participants in total is not the sum of the denominators for men and women. The denominator was calculated from the total number of individuals who completed surveys on specific bullying behaviours, while the numerator was calculated from the number of individuals who indicated they experienced the specified bullying behaviour. Not all survey studies offered respondents the same options to respond to, and as a result the denominators for each bullying behaviour differ.
†Of the studies that separated data by gender or solely included the results of one gender and included the specified bullying behaviour.

**Table 3. Self-reported impact of academic bullying**

| Effect of academic bullying | No. of studies/ Total studies* | Total cohort No. of affected participants/ total participants who completed surveys on the impact of bullying (%)* | Men No. of affected men/ total men who completed surveys on the impact of bullying (%)† | Women No. of affected women/ total women who completed surveys on the impact of bullying (%)† |
|---|---|---|---|---|
| **Psychologic** | | | | |
| Psychologic distress including depressive/PTSD symptoms | 9/20 | 839/2076 (40.4) | 103/161 (64.0) | 64/101 (63.4) |
| Reduced confidence in clinical skill | 4/20 | 296/1518 (19.5) | 68/212 (32.1) | 97/597 (16.2) |
| **Career** | | | | |
| Missed career opportunities | 12/20 | 1570/6637 (23.7) | 89/812 (11.0) | 310/1325 (23.4) |
| Considerations of quitting | 8/20 | 1023/2704 (37.8) | Not reported | Not reported |
| Termination of employment | 3/20 | 84/1046 (8.0) | 4/139 (2.9) | 4/150 (2.7) |
| Leave of absence | 2/20 | 50/748 (6.7) | Not reported | Not reported |
| Self-reported worsening of clinical performance | 5/20 | 528/1801 (29.3) | 42/161 (26.1) | 22/101 (21.8) |

*Total number of studies that described the impact of bullying, including studies that did not stratify results by sex. Not all participants were given the same options to select from.

†Of the studies that separated data by gender or solely included the results of one gender and included the impact of bullying.

**Table 4. Barriers to addressing academic bullying**

| Barrier | No. of studies/Total studies* | No. of participants/ total participants (%) |
|---|---|---|
| **Low reporting rates** | | |
| Lack of awareness of what constitutes bullying | 3/18 | 53/397 (13.4) |
| Lack of awareness of reporting process | 8/18 | 934/2931 (31.9) |
| Lack of perceived benefit | 4/18 | 214/538 (39.8) |
| Fear that bullying would worsen | 6/18 | 448/1168 (38.4) |
| Fear of career ramifications | 7/18 | 829/2199 (37.7) |
| Concerns regarding confidentiality | 3/18 | 48/397 (12.1) |
| **Institutional factors** | | |
| Hierarchical nature of medicine | 4/18 | Not reported |
| Recurring cycle of abuse | 3/18 | Not reported |
| Normalization of bullying | 5/18 | Not reported |
| Lack of enforcement | 5/18 | 391/1106 (35.4) |

*Total number of studies that described barriers of bullying behaviours

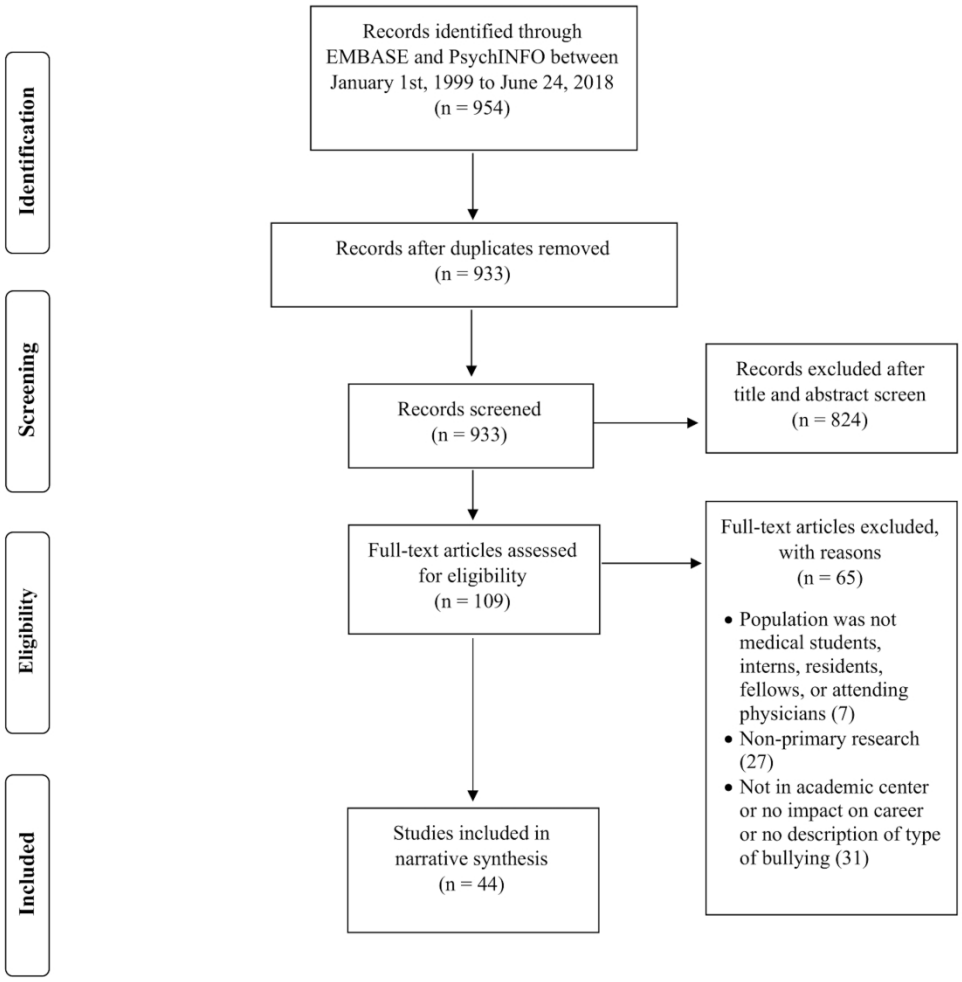


Figure 1: The flow diagram of included studies
We included 44 studies in this review. Reasons for exclusion are described at each stage of study selection.

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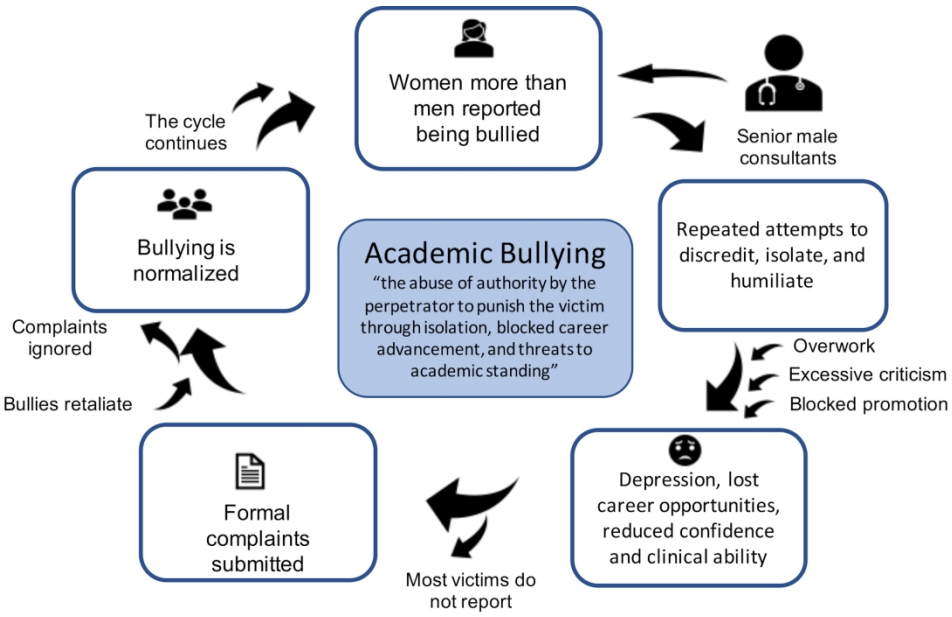



Central illustration: The definition, manifestations, impact, victims, and perpetrators of academic bullying

Academic bullying is defined as an abuse of authority through punishing behaviours that include overwork, destabilization, and isolation. Victims are commonly men, while perpetrators are commonly male consultants. Individual and institutional factors contribute to the ongoing cycle of bullying.

423x260mm (300 x 300 DPI)

**Supplementary table S1: Pooled prevalence of specific bullying behaviours by level of training**

| Behaviour | No. of studies/ Total studies* | Medical Students No. of participants/ total participants (%)* | Residents and fellows No. of participants/ total participants (%)* | Consultants No. of participants/ total participants (%)* |
|---|---|---|---|---|
| **Threats to professional status** | | | | |
| Persistent unjustified criticism | 8/17 | 192/269 (71.4) | 1696/6444 (26.3) | 600/2881 (20.8) |
| Excessive monitoring of work | 4/17 | Not reported | 1020/2445 (41.7) | 564/2824 (20.0) |
| Intimidatory use of discipline | 11/17 | 565/13363 (4.2) | 541/2561 (21.1) | 38/1112 (3.4) |
| Spread of gossip/rumours | 3/17 | Not reported | Not reported | 755/2881 (26.2) |
| False allegations | 3/17 | Not reported | Not reported | 509/2881 (17.7) |
| **Isolation** | | | | |
| Social/professional exclusion | 12/17 | 156/776 (20.1) | 1684/6019 (28.0) | 1272/4445 (28.6) |
| Refusal of leave, training or promotion | 4/17 | Not reported | 286/2445 (11.7) | 727/2824 (25.7) |
| **Overwork** | | | | |
| Undue pressure to produce work | 7/17 | Not reported | 827/2928 (28.2) | 1326/2824 (47.0) |
| Setting impossible deadlines | 6/17 | Not reported | 351/2445 (14.4) | 965/2824 (34.2) |
| **Destabilization** | | | | |
| Shifting goalposts | 1/17 | Not reported | 54/654 (8.3) | Not reported |
| Removal of areas of responsibility without consultation | 6/17 | 11/56 (19.6) | 267/2503 (10.7) | 784/2824 (27.8) |

| | | | | |
|---|---|---|---|---|
| Withholding information that affects performance | 5/17 | Not reported | 415/2503 (16.6) | 1140/2824 (40.4) |
| Ordered to work below one's competence level | 6/17 | 182/269 (67.7) | 1202/3574 (33.6) | 975/2881 (33.8) |

*Total number of studies that described types of bullying behaviours that separated data by level of training

**Supplementary table S2: The pooled impact of academic bullying by level of training**

| Effect of academic bullying | No. of studies/ Total studies* | Medical Students No. of participants/ total participants (%)* | Residents and fellows No. of participants/ total participants (%)* | Consultants No. of participants/ total participants (%)* |
|---|---|---|---|---|
| **Psychiatric** | | | | |
| Psychiatric distress including depressive/PTSD symptoms | 8/19 | 422/579 (72.9) | 220/456 (48.2) | 178/996 (17.9) |
| Reduced confidence in clinical skill | 4/19 | 119/262 (45.4) | Not reported | 177/1259 (14.1) |
| **Career** | | | | |
| Missed career opportunities | 12/19 | 484/3020 (16.0) | 141/389 (36.2) | 948/3228 (29.4) |
| Considered quitting | 8/19 | 109/317 (34.4) | Not reported | 908/2375 (38.2) |
| Terminated employment | 3/19 | Not reported | 73/698 (10.5) | 11/348 (3.2) |
| Leave of absence | 2/19 | Not reported | Not reported | 50/748 (6.7) |
| Self-reported worsening of clinical performance | 4/19 | 202/579 (34.9) | 35/203 (17.2) | 51/563 (9.1) |

*Total number of studies that described the impact of academic bullying and separated data by level of training

**Supplementary table S3. Suggested policies, interventions and reported outcomes**

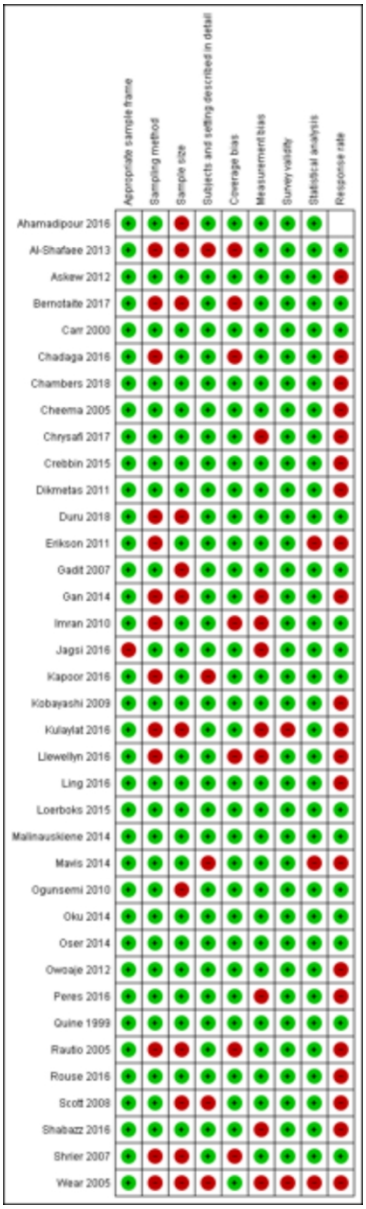
| Intervention | Outcome |
|---|---|
| **Zero-tolerance policy** | |
| (Meloni and Austin, 2011) | Increased employee engagement and workplace satisfaction<br>Increased trust among victims that reports would be appropriately managed (44% to 64%)<br>Victims felt safer reporting incidents of bullying (67% to 84%)<br>Improved awareness of where and whom to report to (67% to 84%) |
| (Fried et al., 2012) | Reduced power abuse (43% to 30%) but no change in overall mistreatment rates |
| **Bullying workshops** | |
| (Benmore et al., 2018) | Increased willingness to try to repair the harm caused by bullying and became more conscious of giving feedback |
| (Kulaylat et al., 2016) *, USA) | Data not provided |
| (Cresswell et al., 2016)* | Data not provided |
| (Oku et al., 2014)* | Data not provided |
| **Tracking and reporting mistreatment data** | |
| (House et al., 2018) | Decreased unprofessional or disrespectful behaviour by faculty as reported by students [4.8% (2015-16) to 1.7% (2016-17)] |
| (Gan and Snell, 2014) | No difference in mistreatment |
| (Mavis et al., 2014)* | Data not provided |
| **Staff education on formal reporting process** | |
| (Fried et al., 2012) | No change in reporting rate |
| (Al-Shafaee, 2013)* | Data not provided |
| (Imran et al., 2010)* | Data not provided |
| (Wear et al., 2005)* | Data not provided |
| (Scott et al., 2008)* | Data not provided |

| | |
|---|---|
| **Develop a committee to handle reporting** | |
| (Best et al., 2010) | Resolutions reached 96% of formal reports |
| (Gadit et al., 2007)* | Data not provided |
| (Kapoor et al., 2016)* | Data not provided |

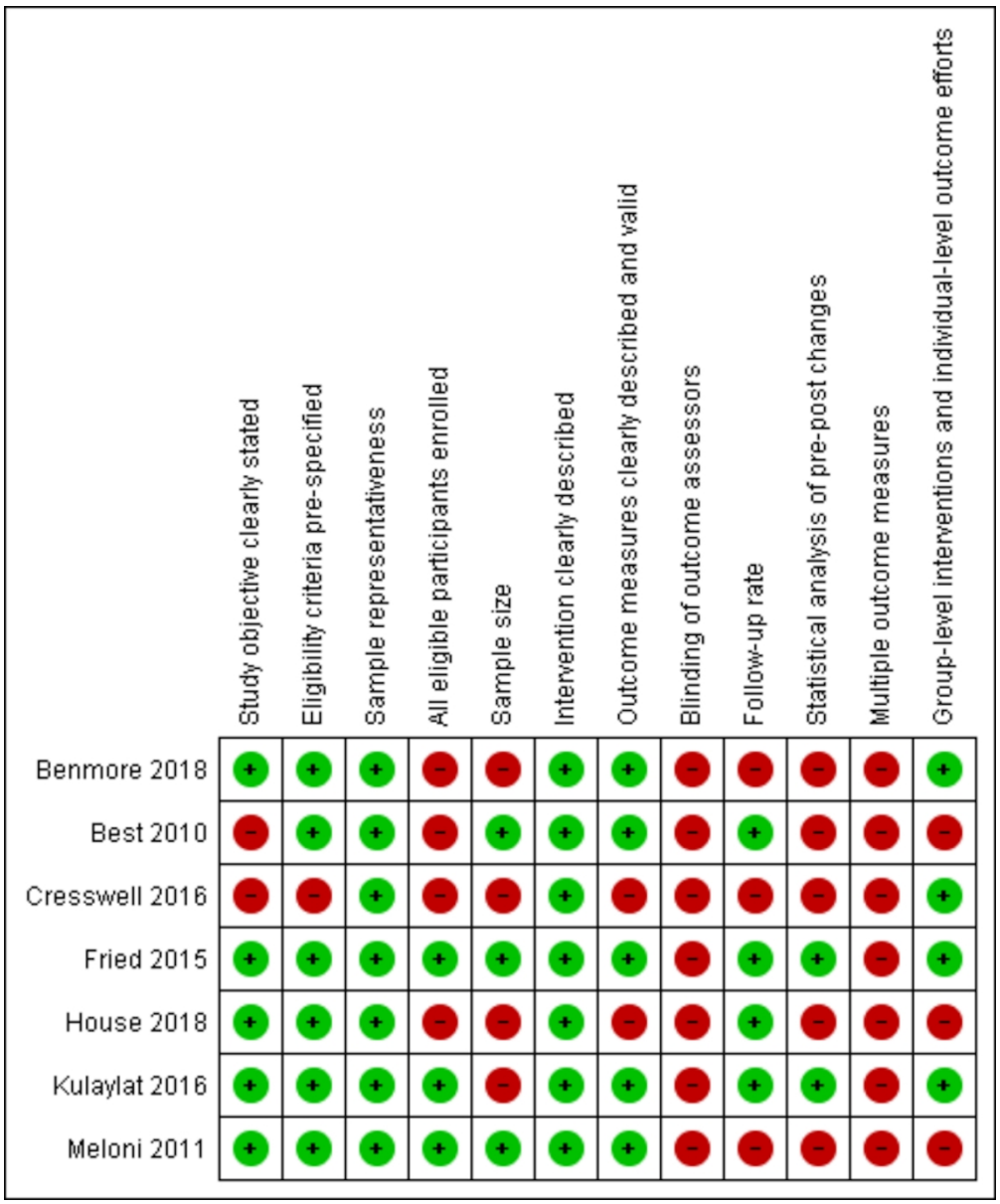
*Suggested approach that had not been implemented

**Supplementary figure S1:** Search strategy

1. Exp bullying
2. Exp medicine
3. Exp hospitals
4. (sabotage or mistreat* or discredit or humiliation or harassment or demean or bully* or belittle or intimidate or disrespect or coerce or ignore or undermine or exclude or libel or slander or criticism or overwork*).ti
5. (Workplace or career or professional or academic or promotion* or employment or job or profession or reputation or academia).mp
6. (medicine or residency* or "medical school" or "clinical training" or hospital or internship or fellow* or "junior doctor" or "house officer" or "clinical clerk" or "attending physician" or physician or doctor or clinician or hierarchical system or "clinician-scientist" or learner or faculty or “NHS”).ti,ab.
7. Exp aggression
8. 1 or 4 or 7
9. 5 and 8
10. 2 or 3 or 6
11. 9 and 10




Supplementary figure S2: The risk of bias of survey studies included in this review
Most studies in this review had at least a moderate risk of bias. Common sources of bias included inappropriate sampling techniques and low sample sizes




Supplementary figure S3: The risk of bias of before-after studies included in this review
Most studies in this review had at least a moderate risk of bias. Common sources of bias included lack of blinding or a control group and low sample sizes

# PRISMA 2009 Checklist

| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 2 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 4 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 4-5 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | N/A |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 5-6 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 5 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | 5 |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 6 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 6 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 6 |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 6-7 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | 7 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., $I^2$) for each meta-analysis. | 7 |

# PRISMA 2009 Checklist



| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | N/A |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | 6-7 |
| **RESULTS** | | | |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | 8 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | 8 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | 15 |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | 8-14 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | N/A |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | N/A |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | 9-12 |
| **DISCUSSION** | | | |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 15-19 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 19 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 20 |
| **FUNDING** | | | |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 21 |

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# A systematic review of academic bullying in medical settings: behaviours, perpetrators, victims, and consequences



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**A systematic review of academic bullying in medical settings: behaviours, perpetrators, victims, and consequences**

Averbuch T[a], Yousif E[b], Van Spall HGC[, b, c]

**Corresponding author:** Harriette Gillian Christine Van Spall. Harriette.vanspall@phri.ca. 237 Barton Street East, Hamilton, ON L8L 2X2, Canada. Telephone: 905-521-2100 Ext: 40601 Fax: 905-538-8932

[a]Department of Medicine, McMaster University, Hamilton, Ontario; [b]Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, Ontario; [c]Population Health Research Institute, Hamilton, Ontario

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## ABSTRACT

**Purpose:** To characterize the dynamics and consequences of bullying in academic medical settings, describe individual and institutional factors that promote academic bullying, and potential interventions.

**Design:** Systematic review.

**Data sources:** We searched EMBASE and PsycINFO for articles published between January 1, 1999 and February 7, 2021.

**Study selection:** We included studies conducted in academic medical settings in which victims were either consultants or trainees, and described bullying behaviours; the perpetrators or victims; the impact, barriers to addressing academic bullying, and/or interventions. Study characteristics, quality, and data were assessed independently by 2 reviewers.

**Results:** We included 68 studies representing 82,349 consultants and trainees. We defined academic bullying as the abuse of authority in an academic setting to impede the education or career of the victim through punishing behaviours that include overwork, destabilization, and isolation. Of 35,779 individuals (in 28 studies) who responded about bullying patterns, the most common (38.2% of respondents) was overwork. Of 24,894 individuals (33 studies) who reported the impact, the most common was psychologic distress (39.1%). Among bullies identified by 15,868 individuals (31 studies), consultants (53.6%) were most common. Of 15,246 victims who reported gender (27 studies), the majority were women (56.2%). Among 9,410 victims (in 25 studies) who described their response, 28.9% filed a report and most (57.5%) did not perceive a positive outcome. Studies that tested the effect of interventions to mitigate bullying had a high risk of bias.

**Conclusions**: Academic bullying commonly involves overwork, and is perceived as having a negative impact on well-being. Perpetrators were commonly male consultants and victims were commonly women. Only a minority of victims filed a report. Methodologically robust trials of anti-bullying interventions are needed.

**Limitations:** Most studies (40/68) had at least a moderate risk of bias. All interventions were uncontrolled before-after studies.

**Keywords:** Medical Education & Training, General Medicine, Health Services Administration & Management

**Strengths and limitations**

- This review is comprehensive, including 68 studies with 82,349 consultants and trainees, across several countries and including all levels of training.
- We explicitly defined inclusion criteria, and used established tools to assess the risk of bias of included studies
- The included studies varied in their definitions of bullying, sampling bias was noted among the surveys, and intervention studies were sub-optimally designed

## Background

Bullying behaviours have been described as repeated attempts to discredit, destabilize, or instill fear in an intended target[1]. Bullying can take many forms from overt abuse to subtle acts that erode the confidence, reputation, and progress of the victim[2]. Bullying is common in medicine, likely impacting mental health, professional interactions, and career advancement[3–6]. It may also impact a physician's ability to care for patients[7]. Surveys from the National Health Service (NHS) in the United Kingdom showed that 55% of staff experienced at least one type of bullying; 31% were doctors in training[8]. Bullying is closely related to harassment and discrimination, in which mistreatment is based on personal characteristics or a protected class such as sex or race[9]. Within academic settings, victims may experience all three and the distinction may be less clear. Unlike harassment and discrimination, which have specific legal definitions, bullying is an amorphous term whose victims are often left without legal recourse.

The hierarchical structure of academic medicine – in which there are power imbalances, subjective criteria for recruitment and career advancement, and siloed departments with few checks in place for toxic behaviours – may offer an operational environment in which bullying may be more widespread than in non-academic medical settings. Academic bullying is a seldom-used term within the literature, but is intended to describe the forms of bullying that may exist in academic settings. Academic bullying can be defined as mistreatment in academic institutions with the intention or effect of disrupting the academic or career progress of the victim[10]. The prevalence of academic bullying in medical settings is unknown likely due to a lack of definition of bullying behaviours, a fear of reporting, and insufficient research. There is not much known about the characteristics of perpetrators and victims, and about the

impact of bullying on academic productivity, career growth, and patient care. Furthermore, institutional barriers and facilitators of bullying behavior have not been reported, and the effectiveness of interventions in addressing academic bullying have not been evaluated.

The purpose of this systematic review is to define and classify patterns of academic bullying in medical settings; assess the characteristics of perpetrators and victims; describe the impact of bullying on victims; review institutional barriers and facilitators of bullying; and identify possible solutions.

## Methods

### Data sources and searches

This study follows PRISMA reporting guidelines. Two reviewers (T.A, Y.E.) searched two online databases (EMBASE and PsycINFO) for English-language articles published between January 1, 1999, to February 7, 2021 and relevant to academic bullying in medicine. An outline of the search is provided in Figure 1. A combination of medical subject heading (MeSH), title, and abstract text terms encompassing “Medicine”; “Bullying” and “Academia” were used for the full search. The terms of the search are included in Supplementary figure S1. Two authors (T.A, Y.E.) independently screened articles for inclusion. Differences were resolved by discussion, and if necessary, by a third author (H.V.).

**Study selection**

We included studies conducted in academic medical settings in which victims were either consultants or trainees. We defined academic medical settings as hospitals or clinics that were either university-affiliated or involved trainees. In the case of pre-clinical medical students, academic medical settings included the university where medical instruction took place. Studies were included if they described: the method and impact of bullying; the characteristics of perpetrators and victims; or interventions used to address the bullying. Studies that included trainees or consultants in both academic and non-academic settings were included. We excluded editorials, opinion pieces, reviews, conference abstracts, theses, dissertations, and grey literature.

**Data extraction and quality assessment**

Two reviewers (T.A, Y.E.) independently extracted data on: study design, setting (academic or non-academic), definition, description and impact of academic bullying, characteristics of perpetrators and victims, barriers and facilitators of bullying, and interventions and their outcomes. Two reviewers independently assessed studies for risk of bias. We assessed before-after studies using the National Heart, Lung, and Blood Institute quality assessment tool[11] and assessed prevalence surveys using the Joanna Briggs Institute critical appraisal tool[12]. We classified survey studies as low risk of bias if at least 8 of 9 criteria were met, medium risk of bias if 7 of 9 were met, and high risk of bias if less than 7 were met. We classified before-after studies as low risk of bias if at least 11 of 12 criteria were met, medium risk of bias if at least 9 of 12 were met, and high risk of bias if less than 9 were met.

## Data synthesis and analysis

We developed a definition for academic bullying through narrative synthesis of the definitions provided by studies included in this systematic review. We pooled the results of surveys on the basis of similarity of survey themes to facilitate a descriptive analysis. For survey studies on the prevalence or impact of bullying, we solely pooled the results of studies that asked respondents about specific bullying behaviours or impacts, respectively. We then separated results by sex and level of training. Group selection was by consensus between authors. We presented our results as numbers and percentages. We calculated the denominators from the total number of individuals who completed surveys on types of bullying behaviours, the impact of bullying, characteristics of bullies and victims, or barriers to addressing academic bullying. The numerators were calculated from the number of individuals who experienced a specific behaviour or impact, were bullied by a perpetrator at a specified level of training, or endorsed a specific reason for not making a formal report. We also reported the number of studies that described each specific bullying behaviour or impact, demographic characteristics of victims and perpetrators, barriers and facilitators of academic bullying, and specific reasons for not making a formal report. We could not perform a meta-analysis due to the conceptual heterogeneity between studies.

## Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting, or dissemination plans of our research.

## Results

## Screening results

We identified 1342 unique articles, 68 of which met inclusion criteria. Reasons for exclusion are described in Figure 1.

## Characteristics of included studies

Studies were most frequently set in the USA (reported in 31 studies)[3,13–41] and the UK (reported in 5 studies)[8,42–45] and were set in academic hospitals (reported in 54 studies)[1,3–6,13–15,17,19–21,23,24,26,27,29,30,32–35,37–39,41–65] or in both teaching and non-teaching sites (reported in 14 studies)[8,16,25,28,36,40,66–73]. Twenty-five studies included medical students[3–5,13,15,21,22,24,26,33–35,37,39,48,50,52,57–60,63,64,74,75], 27 included residents or fellows[1,14,16–18,20,22,23,25,27–32,44,45,49–51,55,56,61,62,65,69,72] and 25 included consultants[6,8,16,19,20,25,28,36,38,40–43,46,47,53,66–73,75] (Table 1).

## Definition of academic bullying

Six papers provided definitions for academic bullying[33,48,50,56,58,63]. Common themes included behaviours where the perpetrator abuses authority to punish the victim through isolation, blocked career advancement, and threats to academic standing. We defined academic bullying as the abuse of authority by a perpetrator who targets the victim in an academic setting through punishing behaviours that include overwork, destabilization, and isolation in order to impede the education or career of the target. Multiple studies used the complete or partial Negative Acts Questionnaire (NAQ), a standardized list of bullying behaviours (reported in 24 studies)[1,3,4,6,13–15,24,29,31,36,47–52,54,55,57,60,61,67,73].

**Patterns of academic bullying behaviours**

There were 35,779 consultant and trainee respondents to surveys of bullying behaviours (reported in 28 studies), but not all were offered the same options to select from (Table 2). Bullying behaviours were grouped into destabilization (reported in 15 studies), threats to professional status (reported in 23 studies), overwork (reported in 7 studies), and isolation (reported in 17 studies). Undue pressure to produce work was commonly reported (38.2% of respondents affected, reported in 7 studies)[14,36,45,47,49,54,67]. Of the 15 studies that described destabilization, common methods included being ordered to work below one's competency level (36.1%, reported in 10 studies)[31,36,45,47–49,52,67,71,72] and withholding information that affects performance (30.7%; reported in 9 studies)[14,29,31,36,47–49,54,67]. Of the 23 studies that described threats to professional status, common methods were excessive monitoring (28.8%; reported in 6 studies)[14,36,47,49,54,67] and criticism (26.9%; reported in 12 studies)[14,21,29,36,45,47,49,52,54,67,71,72]. Of the 17 studies that described isolation, the most common method was social and professional exclusion (29.1%; reported in 17 studies)[4,14,21,24,29,31,36,40,47–49,52,54,63,67,70,72].

There were 6,179 consultant and trainee respondents to surveys that separated the prevalence of bullying behaviours by sex (reported in 11 studies). A greater proportion of women experienced all bullying behaviours (reported in 11 studies)[14,16,19,22,36,40,48,52,57,63,65] (Table 2). There were 34,175 respondents to surveys that analyzed results by level of training (reported in 24 studies) (Supplementary table S1). A greater proportion of consultants experienced refusal of applications for leave, training, or promotion (26.3%, reported in 3 studies)[19,36,47] and removal of areas of responsibility (27.8%, reported in 2 studies)[36,47] than residents

(11.0%, reported in 3 studies; 10.7%, reported in 3 studies, respectively)[14,22,54,55] or medical students (13.4%; 19.6%, reported in 1 study)[22,24]. Compared to medical students (4.6%, reported in 6 studies)[13,15,22,24,52,57] and consultants (3.4%, reported in 2 studies)[36,71], a greater proportion of residents experienced the intimidatory use of discipline procedures (17.8%, reported in 6 studies)[14,22,48,54,55,65]. A greater proportion of medical students experienced persistent criticism (66.4%, reported in 2 studies)[21,52] than residents (28.3%, reported in 5 studies)[14,29,45,54,72] and consultants (20.8%, reported in 3 studies)[36,47,71].

**Characteristics of bullies**

Thirty-one unique studies representing 15,868 consultants and trainees described the characteristics of bullies, although not all were offered the same options to select from. Common perpetrators included consultants (53.6%, reported in 30 studies)[1,3,4,6,8,14,15,17,18,20,22,27,28,33,37,40,43,45,47–49,52,54,56,60,62,63,66,72,73], residents (22.0%, reported in 22 studies)[1,3,6,8,15,17,18,20,22,25,27,28,33,37,45,48,49,54,56,60,62], and nurses (14.9%, reported in 21 studies)[1,3,4,14,15,17,20,22,25,27,28,33,37,45,48,49,54,56,60,62,73]. Of the 4,277 individuals who identified the gender of their bullies, most reported primarily male (67.2%, reported in 5 studies)[8,36,43,47,72], followed by primarily female (26.1%, reported in 5 studies)[8,36,43,47,72], and both (6.7%, reported in 3 studies)[8,43,47]. Among 6,084 medical students, perpetrators were commonly consultants (43.1%, reported in 8 studies)[3,4,15,22,33,37,52,60], residents (35.7%, reported in 6 studies)[3,15,22,33,37,60], nurses (12.4%, reported in 7 studies)[3,4,15,22,33,37,60], and other medical students (8.8%, reported in 5 studies)[3,4,22,52,63]. Among 6,289 residents, perpetrators were commonly consultants (52.2%, reported in 12 studies)[1,14,17,18,22,27,45,48,49,54,56,62], nurses (24.3%, reported in 11 studies)[1,14,17,22,27,45,48,49,54,56,62], and other residents (20.6%, reported in

12 studies)[1,14,17,18,22,27,45,48,49,54,56,62]. Of the 1,500 consultants, perpetrators were their peers (39.2%, reported in 7 studies)[6,8,40,47,49,66,73], senior consultants (23.7%, reported in 5 studies)[6,8,40,43,73], and administration (17.7%, reported in 4 studies)[43,47,49,66].

Six unique studies representing 1,698 interns and medical students described the prevalence of academic bullying according to the specialty rotation of the learner. Academic bullying was common in surgery (32.9% of respondents, reported in 6 studies)[1,13,34,48,56,60,72], obstetrics and gynecology (25.5%, reported in 2 studies)[13,60] and internal medicine (21.4%, reported in 5 studies)[1,13,48,56,60,72].

**Characteristics of victims**

Forty-one unique studies described the characteristics of victims, and 29 included the proportion of those who experienced bullying. Of the 15,704 women and 19,495 men who responded to surveys that analyzed results by sex, women were more likely to report being bullied than men (54.6% of all women compared to 34.2% of all men, reported in 27 studies)[3,4,14,16,17,19,20,27,28,36,38,41,47–52,55–57,62,63,65,69,72,75]. There were 10,730 consultant and trainee respondents to surveys that separated the results by demographic characteristics other than sex, but not all characteristics were captured by each study. A greater proportion of international graduates / non-citizens experienced bullying than citizens (48.0% compared to 43.3%, reported in 4 studies)[14,17,45,72], and a greater proportion of overweight participants (BMI > 25) experienced bullying than those with a BMI ≤ 25 (17.8% compared to 11.8%, reported in 1 study)[51]. The relationship between age and bullying varied based on the cut-off used and the survey sample in each study. Among

consultants, a greater proportion of those with full professorship experienced bullying than assistant professors (68.0% compared to 51.9%, reported in 1 study)[41].

**Impact of academic bullying**

There were 24,894 consultant and trainee respondents to surveys on the psychological (reported in 20 studies) and career impact (reported in 25 studies) of academic bullying (Table 3), although not all were offered the same options to select from. Respondents commonly reported psychiatric distress (39.2%; reported in 14 studies)[6,17,18,27,29,30,43,47,52,56,59,62,71,73], considerations of quitting (35.9%; reported in 7 studies)[25,31,43,47,66,70,72], and reduced clinical ability (34.6%; reported in 8 studies)[25,30,31,45,47,52,56,59]. Respondents agreed that academic bullying negatively affected patient safety (68.0%; reported in 2 studies)[18,31]. Nine studies representing 13,418 individuals described the impact of bullying separated by sex (Table 3). A greater proportion of women experienced loss of career opportunities (43.6%, reported in 8 studies)[16,19,36,38,40,41,52,65] while a greater proportion of men experienced decreased confidence (32.1%, reported in 2 studies)[41,52] and clinical ability (26.1%, reported in 1)[52].

There were 16,523 consultant and trainee respondents to surveys that separated results by level of training (Supplementary table S2). A greater proportion of medical students experienced psychiatric distress (72.9%; reported in 2 studies)[52,59] than residents (40.8%; reported in 6 studies)[17,18,29,30,56,62] and consultants (17.9%; reported in 4 studies)[43,47,71,73]. A greater proportion of residents

endorsed loss of career opportunities (35.0%; reported in 3 studies)[55,65,72] compared to medical students (16.0%; reported in 3 studies)[13,15,52] and consultants (30.6%; reported in 8 studies)[19,36,38,40,41,47,70,71].

**Barriers and facilitators of academic bullying**

Thirty-five unique studies pertained to barriers to victims making a formal report (reported in 26 studies) and institutional facilitators (reported in 25 studies) of academic bullying (Table 4). There were 9,239 consultant and trainee respondents to surveys on their actions taken in response to bullying and reasons for not making a formal report, although not all were given the same options to select from. Victims commonly did not make a formal report[1,3,4,15,36,43,47,49,50,54,56,60,62,66,72]; only 28.9% made a formal report. Deterrents to reporting included concern regarding career implications (41.1%; reported in 15 studies)[1,4,15,25,28,35,47,48,50,56,62,65,66,70,72], not knowing who to report to (26.5%; reported in 15 studies)[1,4,16,22,25,33,47,48,50,56,62,65,66,70,75], and poor recognition of bullying (11.4%; reported in 5 studies)[5,15,25,33,35,37,42,48,56]. Of the 26 studies, 7 studies representing 1139 individuals reported the outcomes of reporting[1,36,43,47,49,65,72] although only a small range of outcomes were offered among options. Submitting a formal report often had no perceived effect on bullying (35.6%; reported in 5 studies);[36,43,47,49,72] a greater proportion of victims endorsed worsening (21.9%; reported in 3)[36,49,65] than improvement (13.7%; reported in 5 studies)[1,36,43,49,72] in bullying following reporting.

In the 25 unique studies that described institutional facilitators of bullying, common facilitators were lack of enforcement (reported in 13 studies)[1,16,20,25,28,36,43,47,49,50,54,56,65], the hierarchical structure of medicine (reported in 7 studies)[26,54,56,57,63,64,71], and

normalization of bullying (reported in 10 studies)[3,15,19,23,26,31,34,47,62,65]. Individual-level data was not pooled as institutional facilitators of bullying were most commonly elicited via free-response portions of surveys with varying completion rates.

**Suggested strategies, interventions, and outcomes**

Forty-nine unique studies suggested strategies to address academic bullying. These strategies included promoting anti-bullying policies (reported in 13 studies)[3,14–16,35,45,53,54,56,58,59,66,71], education to prevent academic bullying (reported in 20 studies)[1,3,4,14,15,20,25,26,31,33,35,45,48,54,59,63–65,71,72], establishing an anti-bullying oversight committee (reported in 10 studies)[21,22,26,28,30,34,39,58,69,71], institutional support for victims (reported in 5 studies)[35,46,58,62,72], and internal reviews where hospitals develop targeted solutions for their environment (reported in 5 studies)[15,22,24,60,63] (Supplementary table S3).

Of the 49 unique studies, 10 implemented organization-level interventions which included workshops with vignettes to improve recognition of bullying (reported in 4 studies)[23,37,42,44]; a gender and power abuse committee that established reporting mechanisms and held mandatory workshops on mistreatment (reported in 1)[3]; a gender equity office to handle reporting (reported in 1)[39]; a professionalism-focused approach that included profressionalism in employee contracts and performance reviews and a professionalism office to handle student complaints (reported in 1)[26]; zero-tolerance policies (reported in 1)[53]; and institutional-level tracking of mistreatment to provide targeted staff education (reported in 2)[21,24]. All 10 studies had an uncontrolled before-after design, and as such, did not establish causality. In the studies of vignettes, common bullying behaviours were demonstrated to improve

recognition of both subtle and overt acts of bullying. Of the 4 studies that involved bullying recognition workshops, three reported an associated improvement in bullying recognition[37,42,44]. In a study that developed a gender equity office, reporting was handled through an intermediary; decisions were binding with consequences for retaliation including termination of employment[39] and 96% of all formal reports were resolved. In a study where a Gender and Power Abuse committee was formed, there was an associated reduction in academic abuse[3]. Similarly, in a study that used a multifaceted approach of developing a professionalism committee, and including professionalism in contracts and performance reviews, there was a 35.9% decrease in reporting of mistreatment, and improved awareness of the reporting process[26]. In a study where a clerkship committee monitored unprofessionalism, there was an associated reduction in narrative comments regarding unprofessionalism on end of rotation surveys[21]. In a study assessing the impact of a professionalism retreat about mistreatment for consultants, there was no reduction in medical student mistreatment[13]. In a study assessing the implementation of zero-tolerance policies, there was an associated improvement in awareness of bullying reporting processes[53].

**Assessment of bias**

Twenty-eight studies had a low risk of bias[3,4,8,13,16–19,22,27,29,30,36,41,45,47,49–52,55,56,63,66,71–73,75], 21 had a moderate risk of bias[1,6,14,15,21,25,28,34,37,38,40,43,46,54,58,59,61,67–70], and 19 had a high risk of bias[20,23,24,26,31–33,35,37,39,42,44,48,53,57,60,62,64,65]. Among the 58 survey studies, 14 sampled participants inappropriately[5,6,14,19,33,35,40,46,48,54,57,58,60,62,67], 19 had inadequate sample sizes or did not justify their sample size[1,5,6,14,18,25,31,35,40,46,48,50,55,57,60,64,68,69,71], 7 did not sufficiently describe the participants[1,15,29,31,35,48,58], 9 had coverage

bias[6,14,40,48,54,57,62,64,65], 8 did not have an appropriate statistical analysis[15,20,28,34,35,64,67,68], and 30 had a low response rate[1,5,34–36,43,45,47,49,52,56,57,14,59–62,65–67,69,70,72,15,16,20,22,28,31,32] (Supplementary figure S2). Among the 10 before-after trials, 1 did not have pre-specified inclusion criteria[44], 5 had low sample sizes or did not justify their sample size[23,24,37,42,44], 3 did not have clearly defined, pre-specified, consistently measured outcomes[21,24,44], 9 did not blind pariticipants[3,23,24,26,37,39,42,44,53], 5 did not account for loss to follow-up in their analysis[23,26,42,44,53], and 6 lacked statistical tests to assess for significant pre- to post-intervention changes[24,26,39,42,44,53] (Supplementary figure S3).

## Discussion

In this systematic review, we established a definition for academic bullying, identified common patterns of bullying, and reported the impact on victims. We defined academic bullying as the abuse of authority by a perpetrator who targets the victim in order to impede their education or career through punishing behaviours that include overwork, destabilization, and isolation in an academic setting. Victims reported that academic bullying often resulted in stalled career advancement and thoughts of leaving the position. A majority of academic bullies were senior men, and a majority of victims were women. Barriers to reporting academic bullying included fear of reprisal, perceived hopelessness, and institutional non-enforcement of anti-bullying policies. Strategies to overcome academic bullying, such as anti-bullying committees and adding professionalism as a requirement for career advancement, were associated with an improvement in the prevalence of bullying and resolution of formal reports (Central illustration).

Several factors contribute to the prevalence of bullying within academia. The hierarchical structure lends itself to power imbalances and prevents victims from speaking out, especially when the aggressor is tenured[76]. The relative isolation of departments within universities allows poor behaviour to go unchecked. Furthermore, the closed networks within departments lend themselves to mobbing behaviour and causes victims to fear being blacklisted for speaking out[77].

A lack of clarity around the definition can limit awareness and reporting[50]. The Graduation Questionnaire administered to all American medical students found that in years where respondents were asked if they had been bullied, the estimated prevalence was lower than when they were asked about specific bullying behaviours[15]. Surveys on bullying should include a list of defining behaviours to increase clarity and accuracy in responses[78]. Even in institutions with established reporting systems, respondents were often unaware of how to file a report[47]. We found that victims of academic bullying rarely filed reports, primarily due to fear of retaliation. Reporting was not consistently effective and was more likely to worsen bullying.

We found that consultants were the most common sources of bullying at all levels of training, although residents often bullied medical students. No studies assessed the relative contribution of fellows and senior residents to resident bullying. Among studies that analyzed bullying among consultants by seniority, senior consultants were a commonly reported source of bullying[6,8,40,43,73]. Women and ethnic minorities reported higher rates of bullying among demographic groups surveyed, although racial factors were infrequently assessed in the surveys included in this study. While some argue that the increasing proportion of women trainees[79,80] may change

dynamics in healthcare settings, the leaky academic pipeline in which women remain underrepresented in several academic specialties and in positions of leadership make them vulnerable to the power dynamics of academic medicine[81].

Our review illustrates the self-reported harms of academic bullying. Victims experienced depressive symptoms, self-perceived loss of clinical ability, and termination of employment. Academic bullying has been linked to depression[51], substance abuse[82], and hospitalization for coronary artery or cerebrovascular disease[83]. Bullying costs the National Health Service (NHS) of the United Kingdom £325 million annually due to reduced performance and increased staff turnover[84]. Disruptive behavior, linked to bullying in the perioperative setting has been linked to 27% of patient deaths, 67% of adverse events, and 71% of medical errors[7]. Reasons for consultant error include intimidation leading to a fear of communicating sources of harm and slow response times[85]. We found that academic bullying negatively impacted patient safety. In a study of emergency medicine residents, 90% reported examples in which disruptive behaviour affected patient care, and 51% were less likely to call an abusive consultant[18].

Interventions reported as effective were simple, non-resource intensive, and organization-level, such as anti-bullying workshops and committees. Anti-bullying committees involving staff and learners can research bullying within their institution and address the most common disruptive behaviours through targeted interventions[67]. An organization-level, rather than individual-level approach may address the root causes of academic bullying as well as the organizational culture that facilitates ongoing bullying. We found that anti-bullying committees typically included three elements: (1) a multidisciplinary team that includes clinicians and other

front-line staff; (2) development of anti-bullying policies and a reporting process; and (3) an education campaign to promote awareness of policies. Owing to their multifaceted nature, it is challenging to evaluate the relative contributions of their components. Furthermore, without well-designed trials, the effect of anti-bullying committees is unknown.

The need for a confidential reporting process was raised in the studies included in this review, but few described how confidentiality could be maintained when the report has to describe details of the bullying that may be only privy to the perpetrator and victim. The reporting process could take the form of the Office of Gender Equity at the University of California, where the accuser and the accused do not meet face to face; the discipline process is through an intermediary[39]. A unique, non-punitive approach is the restorative justice approach used at Dalhousie University where victims, offenders, and administrators work collaboratively to address sexual harassment and re-integrate offenders[86]. Reporting may have been ineffective in this review due to the impunity offered to prominent consultants. Senior personnel, particularly those who are well-known and successful in grant funding, are often considered "untouchable", beyond reproach by their institutions[87]. Behaviour is often learned and modeling positive behaviours may break the cycle of bullying in medicine[88]. One approach would be making professionalism a requirement for promotion and career advancement, as in the Department of Medicine at the University of Toronto in Canada[89] or the University of Colorado School of Medicine[26].

**Strengths and limitations**

The strengths of this review include its broad scope; capturing several aspects of academic bullying, and its size (n = 68 studies, 82,349 consultants and trainees). The cohort included was diverse, comprising several specialties and countries. We explicitly defined eligibility criteria and extracted data in duplicate. We used established tools to assess the risk of bias.

There are several limitations that should be acknowledged. There is no validated definition of bullying, and the included studies varied in their description of bullying. Most studies used questionnaires that were not previously validated. The survey instruments across studies differed from each other, and their results had to be pooled according to themes to be synthesized. We could not account for differences in institutional culture and hospital systems in the responses of survey participants. Data on bully/victim demographics were underrepresented. Selection bias was a significant concern:14 studies used convenience sampling, and 2 included voluntary focus groups for victims of bullying to sign up for. Overall, the response rate was 59.2%, with a range of 12% to 100%. Surrogate outcomes were used such as awareness of bullying, and the reporting of outcomes was inconsistent. As such, the effect of anti-bullying interventions must be interpreted cautiously.

**Future directions**

Significant gaps exist in the quality of the academic bullying literature, particularly with inconsistent definitions and limitations in study methodology. Our definition may be used to provide the breadth and granularity required to sufficiently capture cases of academic bullying in medicine. Studies on the impact of academic bullying would benefit from standardized, validated survey

instruments. Although randomization and blinding are not always possible to test the effect of interventions, a control group should be included in anti-bullying intervention studies.

**Conclusions:**

Academic bullying refers to specific behaviours that disrupt the learning or career of the intended target and commonly consists of exclusion and overwork. The consequences include significant psychiatric distress and loss of career opportunities. Bullies tend to be male senior consultants, whereas victims tend to be females. The fear of reprisal and non-enforcement of anti-bullying policies are the greatest barriers to addressing academic bullying. Results of bullying interventions must be interpreted with caution due to their methodological quality and reliance on surrogate measures. There is a need for well-designed trials with transparent reporting of relevant outcomes and accounting for temporal trends.

**Author contributions**

TA contributed to study design, informed the search strategy, extracted and synthesized study data, and drafted and edited the manuscript. YE informed the search strategy, extracted and synthesized study data, and edited the manuscript. HGCV conceived the study idea, informed the search strategy, analyzed the data, drafted and edited the manuscript, and supervised the conduct of the study. HGCV affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

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**Competing interests**

All authors have reported that they have no relationships relevant to the contents of this paper to disclose.

**Ethical approval**

Not required.

**Data sharing**

All data relevant to the study are included in the article.

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**Table 1. Summary of studies investigating bullying in academic medicine**

| Author (year), Country | Study design | Setting | Definition of academic bullying | Target | Perpetrator | Source of bias | Risk of Bias |
|---|---|---|---|---|---|---|---|
| Huber et al. (2020), USA | Survey | Academic and non-academic hospitals | Data not provided | Residents | Consultant (83%) and resident (63%) | Inadequate sample size | Low |
| Hammoud et al. (2020), USA | Survey | Academic hospitals | Study based graduation questionnaire | Residents and medical students | For resident victims: consultant (58.7%), resident (27.9%), nurses (26.4%), other employees (10.2%), and administration (5.4%). For medical student victims: consultant (66.4%), resident (50.9%), nurses (22.4%), other employees (13.8%), administration (5.2%), and students (12.0%) | Low response rate | Low |
| Samora et al. (2020), USA | Survey | Academic hospitals | A behavior that a reasonable person would expect might | Residents, fellows, and consultants | Multiple* | Inappropriate statistical analysis, and | Moderate |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | victimize, humiliate, undermine, or threaten a person to whom the behavior is directed | | | low response rate | |
| Brown et al. (2020), Canada | Survey | Academic hospitals | Gender-based discrimination included belittling remarks, inappropriate comments and jokes, denial of opportunities, and behaviors that are perceived as hostile or humiliating | Residents | Nurses, consultants, and residents | Inadequate sample size, analysis not conducted in full coverage of the sample, inappropriate identification of bullying, and low response rate | High |
| Zhang et al. (2020), USA | Survey | Academic and non-academic hospitals | NAQ‡ used | Residents | Consultants, co-residents, nurses, and administrators | Study subjects not described in details | Low |
| Lind et al. (2020), USA | Before-After | Academic | Public belittlement or humiliation; physical harm; denied opportunities for training or rewards, or receiving lower evaluations or grades, based | Medical students | Data not provided | Unblinded outcome assessors, small sample size, high loss to follow-up, and analysis of change score not applied | High |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | solely on gender; and being subjected to racially or ethnically offensive remarks | | | | |
| Colenbrander et al. (2020), Australia | Survey | Academic hospitals | Data not provided | Medical students | Data not provided | Inadequate sample size, analysis plan, data analysis coverage, and unreliable measurement of bullying | High |
| Iqbal et al. (2020), Pakistan | Survey | Academic and non-academic hospitals | NAQ‡ used | Consultants | Data not provided | Inadequate sample size and statistical analysis | Moderate |
| Elghazally et al. (2020), Egypt | Survey | Academic | Behaviour that is intended to cause physical or psychological damage due to the imbalance of power, strength or status between the aggressor and the victim | Medical students | Professors (30.1%), students (51.2%), and staff (18.7%) | None | Low |
| Raj et al. (2020), USA | Survey | Academic | Harassment defined as unwanted sexual advances, subtle bribery to | Consultants | Data not provided | None | Low |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | engage in sexual behavior, threats to engage in sexual behavior, or coercive advances | | | | |
| Kemper et al. (2020), USA | Survey | Academic and non-academic hospitals | Data not provided | Residents | Faculty (43%), clinical staff (60%), resident (28%), medical student (3%), and admin (9%) | None | Low |
| Stasenko et al. (2020), USA | Survey | Academic and non-academic hospitals | Harassment is defined as an unwelcome sexual advances or other forms of physical and verbal aggression that is sexual in nature | Consultants and fellows | Data not provided | Low response rate | Low |
| Afkhamzadeh et al. (2019), Iran | Survey | Academic hospitals | Physical or verbal violence, or bullying | Medical students and consultants | Data not provided | None | Low |
| Wolfman et al. (2019), USA | Survey | Academic and non-academic hospitals | Repeated negative actions and practices that are carried out as a deliberate act or unconsciously. These behaviors cause humiliation, | Residents | Data not provided | Inappropriate sampling frame, and identification of bullying condition, low response rate | High |

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|---|---|---|---|---|---|---|---|
| | | | offense and distress to the target | | | | |
| Chowdhury et al. (2019), USA | Survey | Academic and non-academic hospitals | NAQ‡ used | Residents | Data not provided | Inadequate sample size, description of subjects and setting, and low response rate | High |
| Ayyala et al. (2019), USA | Survey | Academic and non-academic hospitals | Harassment that occurs repeatedly (> once) by an individual in a position of greater power | Residents | Data not provided | Inappropriate methods of bullying identification | Low |
| Hu et al. (2019), USA | Survey | Academic and non-academic hospitals | Discrimination and harassment on the basis of gender, race, or pregnancy or childcare | Residents | Consultants (52.4%), admin (1.1%), co-residents (20.2%), and nurses (7.9%) | None | Low |
| Brown et al. (2019), International | Survey | Academic and non-academic hospitals | Data not provided | Residents or fellow and consultant | Data not provided | Inappropriate methods of bullying identification and low response rate | Moderate |
| Zurayk et al. (2019), USA | Survey | Academic and non-academic clinics | Study-based sexual experience questionnaire | Consultants and residents | Residents (60%), lecturers (33%), professors (44%), nurses (10%), and hospital staff (29%) | Inadequate sample size, inappropriate sample frame | Moderate |

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|---|---|---|---|---|---|---|---|
| Castillo-Angeles et al. (2019), USA | Before-after | Academic hospital | Study-based abuse sensitivity questionnaire | Residents | Data not provided | Small sample size, inadequate blinding of outcome assessors, and loss to follow-up | High |
| Kappy et al. (2019), USA | Before-after | Academic hospital | Harassment; discrimination; humiliation; physical punishment; and the use of grading and other forms of assessment in a punitive manner. | Medical students | Consultant, co-resident, and nurse | Intervention and outcomes not well defined | Moderate |
| D'Agostino et al. (2019), USA | Survey | Academic and non-academic hospitals | Abuse or harassment particularly of a sexual type | Residents, fellows, and attending | Consultants (64.5%), co-resident (38.7%), ancillary staff (25.8%) | Inappropriate methods of bullying identification, Inadequate statistical analysis plan, and low response rate | High |
| Chung et al. (2018), USA | Survey | Academic | Feeling of intimidation, dehumanization, or threat to grade, or career advancement | Medical students | Attending physician (68.4%), resident (26.3%), and nurse (10.5%) | Inappropriate sample methods, Non-validated method of bullying identification | High |

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| Kemp et al. (2018), USA | Survey | Academic hospital | Disrespect for the dignity of others that interferes with the learning process | Residents, consultants, and fellows | Data not provided | Inadequate statistical analysis plan, and low response rate | Moderate |
| Benmore et al. (2018), England | Before-after | Academic hospital* | Data not provided | Residents | Senior consultants | Insufficient enrollment, inadequate sample size, no blinding of outcome assessors, high loss to follow-up, lack of statistical analysis or ITS† design | High |
| Duru et al. (2018), Turkey | Survey | Academic hospital | Data not provided | Consultants, researchers, administrators, nurses | Specific occupations of bullies not specified | Inappropriate sampling and inadequate sample size | Moderate |
| Chambers et al. (2018), New Zealand | Survey | Academic and non-academic hospitals | Data not provided | Specialist Consultants | Primarily male. Senior medical staff (52.5%), non-clinical managers (31.8%), and clinical leaders (24.9%) | Low response rate | Low |
| House et al. (2018), USA | Before-after | Academic hospital | Data not provided | Medical Students | Faculty most frequently were the source of bullying followed by residents. Exact | Insufficient enrollment, inadequate sample size, no blinding of outcome | High |

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| | | | | | breakdown not specified | assessors, outcomes not clearly described, lack of statistical analysis, individual-level analysis or ITS design | |
| Kulaylat et al. (2017), USA | Survey | Academic hospital | Verbal abuse, specialty-choice discrimination, non-educational tasks, withholding/ denying learning opportunities, neglect and gender/racial insensitivity | Medical Students | Faculty (57%), residents, fellows (49%), and nurses (33%) | Inappropriate sampling, inadequate sample size, classification bias, and non-validated identification or measurement of bullying | High |
| Bernotaite et al. (2017), Lithuania | Survey | Academic hospitals | Data not provided | Family Consultants | Supervisor (25.3%), colleague (9.8%), subordinate (2.9%) | Inappropriate sampling, inadequate sample size, and coverage bias | Moderate |
| Chrysafi et al. (2017), Greece | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Surgeons most frequently followed by internal medicine consultants, then radiologists/ | Low response rate and coverage bias | Moderate |

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| | | | | | laboratory consultants | | |
| Kapoor et al. (2016), India | Survey | Academic hospital | Data not provided | Medical students | Data not provided | Inappropriate sampling and inadequate description of study population | Moderate |
| Chadaga et al. (2016), USA | Survey | Academic hospitals | NAQ‡ used | Residents and fellows | Consultants (29%), nurses (27%), patients (23%), peers (19%) | Low response rate, inadequate sample size, and coverage bias | Moderate |
| Llewellyn et al. (2016), Australia | Survey | Academic hospitals | Data not provided | Residents | Senior medical staff: (58.3%) in 2015, (60.6%) in 2016. Non-medical staff (33.2%) 2015, (33.9%) 2016, Manager (5.2%) in 2015, (1.2%) in 2016, junior resident (3.3%) in 2015, (4.3%) in 2016 | Low response rate, biased sampling, coverage and classification bias | High |
| Rouse et al. (2016), USA | Survey | Academic clinics | NAQ used | Family medicine consultants | Data not provided | Low response rate | Low |
| Shabazz et al. (2016), UK | Survey | Academic and non-academic hospitals | Belittle and undermine an individual's work; | Gynecology consultants | Senior consultants (50.9%), junior consultants | Low response rate, and classification bias | Moderate |

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| | | | undermining an individual's integrity; persistent and unjustified criticism and monitoring of work; freezing out, ignoring or excluding and continual undervaluing of an individual's effort. | | (22.3%), medical director (4.5%) | | |
| Peres et al. (2016), Brazil | Survey | Academic hospital | Data not provided | Medical students | Data not provided | Low response rate, and classification bias | Moderate |
| Ling et al. (2016), Australia | Survey | Academic hospitals | NAQ used | General surgery residents and consultants | For trainee victims: staff surgeon (48%), trainee surgeon (13%), admin (13%), nurses (11%), other consultant (6%) For consultant victims; (31%) staff surgeon, (28%) admin, (13%) other consultant, (11%) nurses, other (10%), trainees (4%) | Low response rate | Low |

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|---|---|---|---|---|---|---|---|
| Kulaylat et al. (2016), USA | Before-after | Academic hospital | Data not provided | Medical Students | Faculty (57%), residents/fellows (49%), and nurses (33%) | Inadequate sample size, no blinding of outcome assessors | Moderate |
| Ahmadipour et al. (2016), Iran | Survey | Academic hospital | Being assigned tasks as punishment, being threatened with an unjustly bad score or failure | Medical students, interns and residents | Data not provided | Inadequate sample size | Low |
| Jagsi et al. (2016), USA | Survey | Academic hospital | Data not provided | Consultants who won a career advancement award | Data not provided | Inadequate sampling frame and classification bias | Moderate |
| Crebbin et al. (2015), Australia and New Zealand | Survey | Academic hospitals | Data not provided | Residents, fellows and consultants | Surgical consultants (50%), other medical consultants (24%) and nursing staff (26%) | Low response rate | Low |
| Cresswell et al. (2016), UK | Before-after | Academic hospital | Data not provided | Residents | Data not provided | Insufficient description of study purpose, inadequate enrollment and sample size, no blinding of outcome assessors, outcomes not clearly | High |

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| | | | | | | described, lack of statistical analysis or ITS design and high loss to follow-up | |
| Loerbroks et al. (2015), Germany | Survey | Academic hospitals | Data not provided | Residents | Data not provided | None | Low |
| Malinauskiene et al. (2014), Lithuania | Survey | Non-academic clinics | NAQ used | Family medicine consultants | Bullying from patients (11.8%), from colleagues by (8.4%), from superiors by (26.6%) | None | Low |
| Mavis et al. (2014), USA | Survey | Academic hospitals | Mistreatment either intentional or unintentional occurs when behavior shows disrespect for the dignity of others and unreasonably interferes with the learning process | Medical students | Clinical faculty in the hospital (31%) residents/ interns (28%), nurses (11%) | Low response rate, inadequate description of study population and statistical analysis | Moderate |
| Oser et al. (2014), USA | Survey | Academic hospital | Data not provided | Medical students | Residents > clerkship faculty > other attendings > other students > | None | Low |

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| | | | | | preceptors = nurses | | |
| Oku et al. (2014), Nigeria | Survey | Academic hospital | Data not provided | Medical students | Medical students (23.7%), consultants (21.7%), lecturers (17.5%), consultants (16.5%), nurses (16.5%), other staff (4.1%) | None | Low |
| Gan et al. (2014), Canada | Survey | Academic hospital | Data not provided | Medical students | Consultants | Low response rate, inappropriate sampling, small sample size and classification bias | High |
| Fried et al. (2015), USA | Before-after | Academic hospital | Power mistreatment defined as "made to feel intimidated, dehumanized, or had a threat made about a recommendation, your grade, or your career | Medical students | Residents (49.7%), clinical faculty (36.9%), preclinical faculty (7.9%) | None | Low |

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| Al-Shafaee et al. (2013), Oman | Survey | Academic hospitals | Being coerced into carrying out personal services unrelated to the expected role of interns and instances in which interns were excluded from reasonable learning opportunities offered to others, or threatened with failure or poor evaluations for reasons unrelated to academic performance | Residents | Internal medicine (60.3%), surgery (29%), pediatrics (15.5%). specialists (51.7%), consultants (50%), residents (12.1%), nurses (24.1%) | Inappropriate sampling, inadequate sample size, inadequate description of study population and coverage bias | High |
| Owoaje et al. (2012), Nigeria | Survey | Academic hospital | Data not provided | Medical Students | Consultants (69.1%), residents/ fellows (52.4%), other students (15.7%), nurses (7.8%), laboratory technicians (4.1%) | Low response rate | Low |

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|---|---|---|---|---|---|---|---|
| Askew et al. (2012), Australia | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Consultants (44%), managers (27%), patients (15%), nurses/ midwives (4%), junior consultants (1%) | Low response rate | Low |
| Meloni et al. (2011), Australia | Before-after | Academic hospital | Data not provided | Hospital employees | Data not provided | Lack of blinding of outcome assessors, high loss to follow-up, lack of statistical analysis or ITS design, and unit of analysis not clearly described | High |
| Dikmetas et al. (2011), Turkey | Survey | Academic hospital | Data not provided | Residents | Surgeons > Internists | Low response rate | Moderate |
| Eriksen et al. (2011), Norway | Survey | Academic hospital | NAQ used | Hospital employees | Colleagues. Specific occupations not described | Low response rate, inappropriate sampling and inadequate statistical analysis | Moderate |
| Imran et al. (2010), Pakistan | Survey | Academic hospitals | Threats to professional status, threats to personal | Residents | Consultants | Inappropriate sampling, classification | Moderate |

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| | | | standing, isolation, overwork, and destabilization | | | and coverage bias | |
| Ogunsemi et al. (2010), Nigeria | Survey | Academic hospital | Data not provided | Residents | Administrative staff (58%), from the hospital chief executive( 41.4%), from patient relatives (40.4%), nurses (32.7%), residents (30%), patients (20%) | Inadequate sample size | Low |
| Best et al. (2010), USA | Before-after | Academic hospital | Data not provided | Unspecified | Data not provided | Study purpose not clearly described, insufficient enrollment, no blinding of outcome assessors, lack of statistical or individual-level analysis or ITS design | High |
| Nagata-Kobayashi et al. (2009), Japan | Survey | Academic hospitals | Assigned you tasks as punishment; threatened to fail you unfairly in residency; competed maliciously or unfairly with | Residents | Surgery (27.6%), internal medicine (21.4%), emergency medicine (11.5%), anaesthesia | Low response rate | Low |

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| | | | you; made negative remarks to you about becoming a consultant or pursuing a career in medicine | | (11.3%). Consultants 34.1%, patients 21.7%, nurses 17.2% | | |
| Scott et al. (2008), New Zealand | Survey | Academic hospital | A threat to professional status and personal standing, isolation, enforced overwork, destabilization | Residents | Consultants (30%), nurses (30%), patients (25%), radiologists (8%), residents/ fellows (7%) | Low response rate, inadequate sample size and description of study population | Moderate |
| Gadit et al. (2007), Pakistan | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Senior colleagues | Inadequate sample size | Low |
| Shrier et al. (2007), USA | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Colleagues (24%), patients (19%), teachers (18%), supervisors (15%), | Inappropriate sampling, inadequate sample size, and coverage bias | Moderate |
| Cheema et al. (2005), Ireland | Survey | Academic hospitals | Data not provided | Residents | Senior residents (51-70%), nursing staff 47-59%, administration (15%-16%), colleagues (12%-13%) | Low response rate | Low |

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|---|---|---|---|---|---|---|---|
| Rautio et al. (2005), Finland | Survey | Academic hospital | Data not provided | Medical students | Lecturers (27.9%), research/senior research fellows (27.7%), professors (16.6%), associate professors (13.6%) | Low response rate, inappropriate sampling, inadequate sample size, and coverage bias | High |
| Wear et al. (2005), USA | Survey | Academic hospital | Data not provided | Medical students | General surgeons and obstetricians | Low response rate, inappropriate sampling, inadequate sample size, classification and lack of validated measurement tool | High |
| Carr et al. (2000), USA | Survey | Academic hospitals | Data not provided | Consultants | Superiors and colleagues | None | Low |
| Quine (1999), UK | Survey | Non-academic clinics | Data not provided | Consultants | 54% greater seniority, 34% same seniority, 12% less senior. 49% of bullies older than victim | None | Low |

*Regarding sexual harassment: the most common sources were attending surgeons (69% overall, 71% female, 18% male); trainee (46% overall, 47% female, 9% male); attending nonsurgical (22%, 22% female, 18% male); other allied health professionals (16%, 15% female, 36% male); nursing (14%, 12% female, 73% male); admins staff (4%, 2% female, 36% male). Re: harassing behaviors: the most common sources were attending orthopaedic surgeon (76% overall, 75% female, 86% male); trainee (30%,32%female, 14% male); attending physician; nonsurgical (e.g., anesthesiologist, internist) (20%, 21% female, 11% male, nursing staff (18%,18% female, 20% male); administration staff (13%, 12% female, 17% male); and other allied health professional (9%, 10% female, 9% male)

**Academic hospitals/clinics were defined as teaching hospitals/clinics with a university affiliation
†Interrupted time series
‡The NAQ is the negative acts questionnaire, a validated tool for assessing the prevalence of workplace bullying

**Table 2: Self-reported description of specific bullying behaviours**

| Behaviour | No. of studies/ Total studies* | Total cohort No. affected/ total participants who completed surveys on behaviours (%)* | Men No. affected/ total men who completed surveys on behaviours (%)† | Women No. affected/ Total women who completed surveys on behaviours (%)† |
|---|---|---|---|---|
| **Threats to professional status** | | | | |
| Persistent unjustified criticism | 12/28 | 4495/16700 (26.9) | 535/1690 (31.7) | 552/1402 (39.4) |
| Excessive monitoring of work | 6/28 | 1752/6079 (28.8) | 442/1525 (27.7) | 441/1298 (34.0) |
| Intimidatory use of discipline | 15/28 | 1531/19471 (7.9) | 366/2381 (15.4) | 363/2209 (16.4) |
| Spread of gossip/rumours | 7/28 | 2977/10060 (29.6) | 88/596 (14.8) | 94/453 (20.8) |
| False allegations | 6/28 | 613/3796 (16.1) | 59/596 (9.9) | 54/453 (11.9) |
| Refusal of leave, training or promotion | 9/28 | 1604/8551 (18.8) | 296/2594 (11.4) | 458/2340 (19.6) |
| **Isolation** | | | | |
| Social/professional exclusion | 17/28 | 6160/21099 (29.1) | 420/2027 (20.7) | 1064/2814 (37.8) |
| **Overwork** | | | | |
| Undue pressure to produce work | 7/28 | 2509/6562 (38.2) | 233/1525 (15.3) | 355/1570 (22.6) |
| Setting impossible deadlines | 6/28 | 1571/6079 (25.8) | 164/1525 (10.8) | 189/1298 (14.6) |
| **Destabilization** | | | | |
| Shifting goalposts | 1/28 | 54/417 (12.9) | Not reported | Not reported |
| Removal of areas of responsibility without consultation | 8/28 | 1397/6193 (22.6) | 160/1525 (10.5) | 171/1298 (13.2) |

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|---|---|---|---|---|
| Withholding information that affects performance | 9/28 | 3836/12503 (30.7) | 219/1553 (14.1) | 267/1328 (20.1) |
| Ordered to work below one's competence level | 10/28 | 2934/8119 (36.1) | 81/625 (13.0) | 99/483 (20.5) |

*Total number of studies that described types of bullying behaviours, including studies that did not stratify results by sex. As a result, the denominator for the number of participants in total is not the sum of the denominators for men and women. The denominator was calculated from the total number of individuals who completed surveys on specific bullying behaviours, while the numerator was calculated from the number of individuals who indicated they experienced the specified bullying behaviour. Not all survey studies offered respondents the same options to respond to, and as a result the denominators for each bullying behaviour differ.
†Of the studies that separated data by gender or solely included the results of one gender and included the specified bullying behaviour.

**Table 3. Self-reported impact of academic bullying**

| Effect of academic bullying | No. of studies/ Total studies* | Total cohort No. of affected participants/ total participants who completed surveys on the impact of bullying (%)* | Men No. of affected men/ total men who completed surveys on the impact of bullying (%)† | Women No. of affected women/ total women who completed surveys on the impact of bullying (%)† |
|---|---|---|---|---|
| **Psychologic** | | | | |
| Psychologic distress including depressive/PTSD symptoms | 14/33 | 5597/14285 (39.1) | 1750/5172 (33.8) | 1636/3529 (46.4) |
| Reduced confidence in clinical skill | 8/33 | 564/2112 (26.7) | 68/212 (32.1) | 97/597 (16.2) |
| **Career** | | | | |
| Missed career opportunities | 17/33 | 2823/9442 (29.9) | 357/1898 (18.8) | 1104/2530 (43.6) |
| Considerations of quitting | 7/33 | 1034/2880 (35.9) | Not reported | Not reported |
| Termination of employment | 5/33 | 228/4419 (5.2) | 4/139 (2.9) | 4/150 (2.7) |
| Leave of absence | 2/33 | 50/748 (6.7) | Not reported | Not reported |
| Self-reported worsening of clinical performance | 8/33 | 1673/4841 (34.6) | 42/161 (26.1) | 22/101 (21.8) |

*Total number of studies that described the impact of bullying, including studies that did not stratify results by sex. Not all participants were given the same options to select from.
†Of the studies that separated data by gender or solely included the results of one gender and included the impact of bullying.

**Table 4. Barriers to addressing academic bullying**

| Barrier | No. of studies/Total studies* | No. of participants/ total participants (%) |
|---|---|---|
| **Low reporting rates** | | |
| Lack of awareness of what constitutes bullying | 5/35 | 73/642 (11.4) |
| Lack of awareness of reporting process | 15/35 | 1115/4215 (26.5) |
| Lack of perceived benefit | 9/35 | 667/1621 (41.1) |
| Fear that bullying would worsen | 13/35 | 969/2696 (35.9) |
| Fear of career ramifications | 15/35 | 1094/2664 (41.1) |
| Concerns regarding confidentiality | 4/35 | 56/445 (12.6) |
| **Institutional factors** | | |
| Hierarchical nature of medicine | 7/35 | Not reported |
| Recurring cycle of abuse | 3/35 | Not reported |
| Normalization of bullying | 10/35 | Not reported |
| Lack of enforcement | 13/35 | 586/1400 (41.9) |

*Total number of studies that described barriers of bullying behaviours

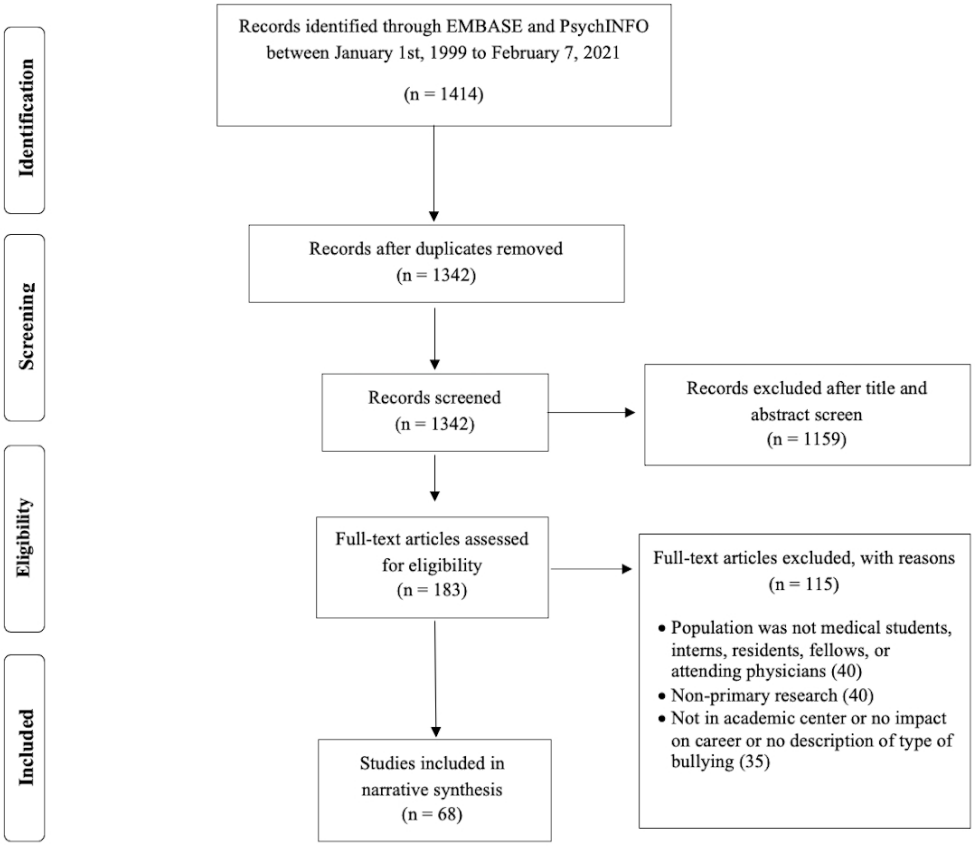
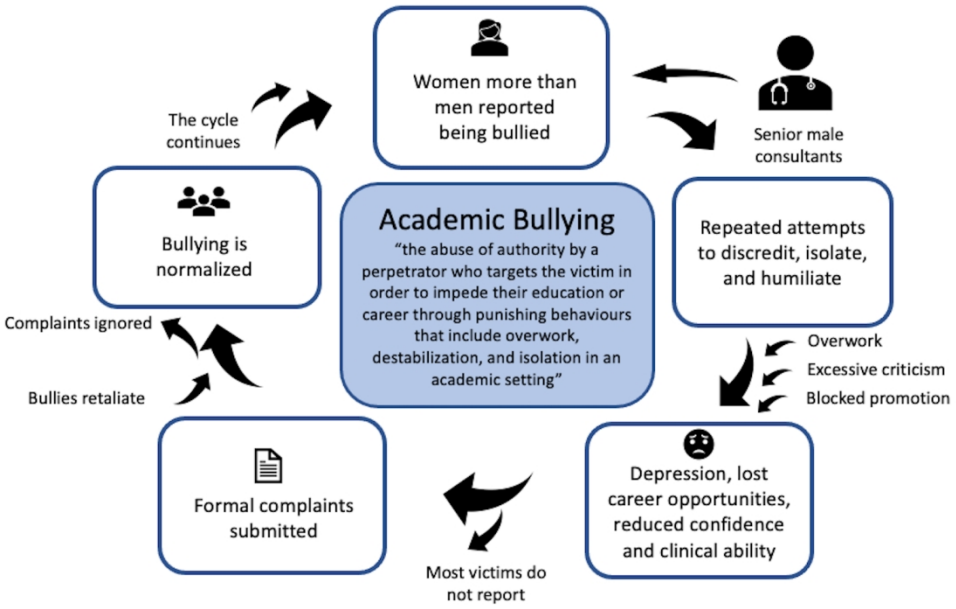



Figure 1: PRIMSA diagram of included studies

We identified 68 articles relevant to academic bullying. We describe the reasons for exclusion at each stage of screening

93x90mm (300 x 300 DPI)




Central illustration: The definition, manifestations, impact, victims, and perpetrators of academic bullying

Academic bullying is defined as an abuse of authority through punishing behaviours that include overwork, destabilization, and isolation. Victims are commonly men, while perpetrators are commonly male consultants. Individual and institutional factors contribute to the ongoing cycle of bullying.

136x88mm (300 x 300 DPI)

**Supplementary table S1: Pooled prevalence of specific bullying behaviours by level of training**

| Behaviour | No. of studies/ Total studies* | Medical Students No. of participants/ total participants (%) * | Residents and fellows No. of participants/ total participants (%)* | Consultants No. of participants/ total participants (%)* |
|---|---|---|---|---|
| **Threats to professional status** | | | | |
| Persistent unjustified criticism | 10/24 | 200/301 (66.4) | 3596/12708 (28.3) | 600/2881 (20.8) |
| Excessive monitoring of work | 4/24 | Not reported | 1020/2445 (41.7) | 564/2824 (20.0) |
| Intimidatory use of discipline | 14/24 | 641/13914 (4.6) | 640/3594 (17.8) | 38/1112 (3.4) |
| Spread of gossip/rumours | 5/24 | Not reported | 2085/6366 (32.8) | 755/2881 (26.2) |
| False allegations | 4/24 | Not reported | 36/102 (35.3) | 509/2881 (17.7) |
| Refusal of leave, training or promotion | 8/24 | 74/551 (13.4) | 379/3441 (11.0) | 894/3403 (26.3) |
| **Isolation** | | | | |
| Social/professional exclusion | 16/24 | 418/1546 (27.0) | 3687/12385 (29.8) | 1272/4445 (28.6) |
| **Overwork** | | | | |
| Undue pressure to produce work | 7/24 | Not reported | 827/2928 (28.2) | 1326/2824 (47.0) |
| Setting impossible deadlines | 6/24 | Not reported | 351/2445 (14.4) | 965/2824 (34.2) |
| **Destabilization** | | | | |
| Shifting goalposts | 1/24 | Not reported | 54/654 (8.3) | Not reported |
| Removal of areas of responsibility without consultation | 6/24 | 11/56 (19.6) | 267/2503 (10.7) | 784/2824 (27.8) |

| | | | | |
|---|---|---|---|---|
| Withholding information that affects performance | 7/24 | Not reported | 2465/8869 (27.8) | 1140/2824 (40.4) |
| Ordered to work below one's competence level | 7/24 | 182/269 (67.7) | 1276/3676 (34.7) | 975/2881 (33.8) |

*Total number of studies that described types of bullying behaviours that separated data by level of training

**Supplementary table S2: The pooled impact of academic bullying by level of training**

| Effect of academic bullying | No. of studies/ Total studies* | Medical Students No. of participants/ total participants (%) * | Residents and fellows No. of participants/ total participants (%) * | Consultants No. of participants/ total participants (%) * |
|---|---|---|---|---|
| **Psychiatric** | | | | |
| Psychiatric distress including depressive/PTSD symptoms | 12/28 | 422/579 (72.9) | 2142/5256 (40.8) | 178/996 (17.9) |
| Reduced confidence in clinical skill | 4/28 | 119/262 (45.4) | Not reported | 177/1259 (14.1) |
| **Career** | | | | |
| Missed career opportunities | 14/28 | 484/3020 (16.0) | 149/426 (35.0) | 1789/5854 (30.6) |
| Considered quitting | 9/28 | 109/317 (34.4) | 5/100 (5.0) | 908/2375 (38.2) |
| Terminated employment | 4/28 | Not reported | 135/3574 (3.8) | 11/348 (3.2) |
| Leave of absence | 2/28 | Not reported | Not reported | 50/748 (6.7) |
| Self-reported worsening of clinical performance | 6/28 | 202/579 (34.9) | 1168/3179 (36.7) | 51/563 (9.1) |

*Total number of studies that described the impact of academic bullying and separated data by level of training

**Supplementary table S3. Suggested policies, interventions and reported outcomes**

| Intervention | Outcome |
|---|---|
| **Zero-tolerance/Anti-bullying policy** | |
| (Cheema et al., 2005) * | Data not provided |
| (Wear et al., 2005) * | Data not provided |
| (Gadit et al., 2007) * | Data not provided |
| (Nagata-Kobayashi et al., 2009) * | Data not provided |
| (Imran et al., 2010) * | Data not provided |
| (Meloni and Austin, 2011) | Increased employee engagement and workplace satisfaction<br>Increased trust among victims that reports would be appropriately managed (44% to 64%)<br>Victims felt safer reporting incidents of bullying (67% to 84%)<br>Improved awareness of where and whom to report to (67% to 84%) |
| (Fried et al., 2012) | Reduced power abuse (43% to 30%) but no change in overall mistreatment rates |
| (Askew et al., 2012) * | Data not provided |
| (Mavis et al., 2014) * | Data not provided |
| (Chadaga et al., 2016) * | Data not provided |
| (Kapoor et al., 2016) * | Data not provided |
| (Peres et al., 2016) * | Data not provided |
| (Wolfman et al., 2019) * | Data not provided |
| **Bullying workshops** | |
| (Oku et al., 2014) * | Data not provided |
| (Kulaylat et al., 2016) * | Data not provided |

| | |
|---|---|
| (Cresswell et al., 2016) * | Data not provided |
| (Benmore et al., 2018) | Increased willingness to try to repair the harm caused by bullying and became more conscious of giving feedback |
| (Castillo-Angeles et al., 2019) | Bullying behaviour persisted |
| (Colenbrander et al., 2020) * | Data not provided |
| (Stasenko et al., 2020) * | Data not provided |
| **Tracking and reporting mistreatment data** | |
| (Gan and Snell, 2014) | No difference in mistreatment |
| (Mavis et al., 2014) * | Data not provided |
| (House et al., 2018) | Decreased unprofessional or disrespectful behaviour by faculty as reported by students [4.8% (2015-16) to 1.7% (2016-17)] |
| (Elghazally et al., 2020) * | Data not provided |
| (Hammoud et al., 2020) * | Data not provided |
| **Staff education on bullying and the reporting process** | |
| (Cheema et al., 2005) * | Data not provided |
| (Wear et al., 2005) * | Data not provided |
| (Gadit et al., 2007) * | Data not provided |
| (Scott et al., 2008) * | Data not provided |
| (Imran et al., 2010) * | Data not provided |
| (Fried et al., 2012) | No change in reporting rate |
| (Al-Shafaee, 2013) * | Data not provided |
| (Mavis et al., 2014) * | Data not provided |
| (Oku et al., 2014) * | Data not provided |

| | |
|---|---|
| (Crebbin et al., 2015) * | Data not provided |
| (Chadaga et al., 2016) * | Data not provided |
| (Peres et al., 2016) * | Data not provided |
| (Chung et al., 2018) * | Data not provided |
| (D'Agostino et al., 2019) * | Data not provided |
| (Chowdhury et al., 2019) * | Data not provided |
| (Zurayk et al. 2019) * | Data not provided |
| (Colenbrander et al., 2020) * | Data not provided |
| (Elghazally et al., 2020) * | Data not provided |
| (Lind et al. 2020) | Multiple effect** |
| (Brown et al., 2020) * | Data not provided |
| **Develop a committee to handle and support reporting** | |
| (Gadit et al., 2007) * | Data not provided |
| (Best et al., 2010) | Resolutions reached 96% of formal reports |
| (Kapoor et al., 2016) * | Data not provided |
| (Kemp et al., 2018) * | Data not provided |
| (Kappy et al., 2019) | Fewer comments on mistreatment |
| (Ayyala et al., 2019) * | Data not provided |
| (Brown et al., 2019) * | Data not provided |
| (Lind et al. 2020) | Multiple effects** |
| (Samora et al., 2020) * | Data not provided |
| (Hammoud et al., 2020) * | Data not provided |
| **Accessible and confidential reporting** | |

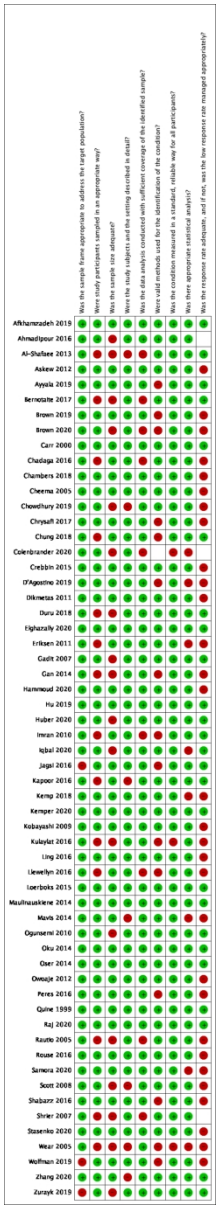
| | |
|---|---|
| (Imran et al., 2010) * | Data not provided |
| (Fried et al., 2012) | Reduced power abuse (43% to 30%) but no change in overall mistreatment rates |
| (Askew et al., 2012) * | Data not provided |
| (Al-Shafaee, 2013) * | Data not provided |
| (Crebbin et al., 2015) * | Data not provided |
| (Mavis et al., 2014) * | Data not provided |
| (Colenbrander et al., 2020) * | Data not provided |
| (Brown et al. 2019) * | Data not provided |
| (Samora et al., 2020) * | Data not provided |

*Suggested approach that had not been implemented

** In this study, a substantial decrease in mistreatment (from 62.9% to 40.3%), fear of reporting (from 42.2% to 37.1%), fear of reprisal (from 28.9% to 22.6%), and an increase in knowledge of reporting increased (from 88.8% to 94.2%) was observed.

**Supplementary figure S1:** Search strategy

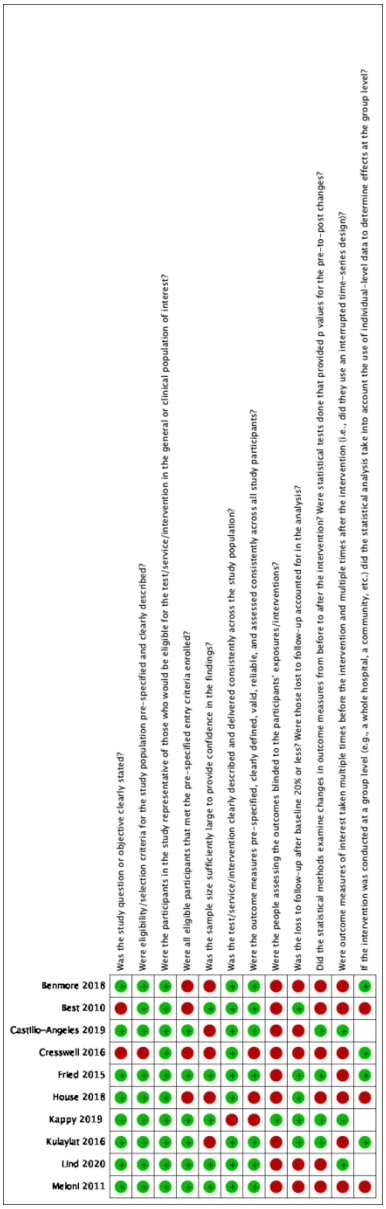
1. Exp bullying
2. Exp medicine
3. Exp hospitals
4. (sabotage or mistreat* or discredit or humiliation or harassment or demean or bully* or belittle or intimidate or disrespect or coerce or ignore or undermine or exclude or libel or slander or criticism or overwork*).ti
5. (Workplace or career or professional or academic or promotion* or employment or job or profession or reputation or academia).mp
6. (medicine or residency* or "medical school" or "clinical training" or hospital or internship or fellow* or "junior doctor" or "house officer" or "clinical clerk" or "attending physician" or physician or doctor or clinician or hierarchical system or "clinician-scientist" or learner or faculty or “NHS”).ti,ab.
7. Exp aggression
8. 1 or 4 or 7
9. 5 and 8
10. 2 or 3 or 6
11. 9 and 10




Supplementary figure S2: The risk of bias of survey studies included in this review

Most studies in this review had at least a moderate risk of bias. Common sources of bias included inappropriate sampling techniques and low sample sizes

88x501mm (300 x 300 DPI)




Supplementary figure S3: The risk of bias of before-after studies included in this review

Most studies in this review had at least a moderate risk of bias. Common sources of bias included lack of blinding or a control group and low sample sizes

88x279mm (300 x 300 DPI)

# PRISMA 2009 Checklist

| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 3 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 4 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 4 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | n/a |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 4,5 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 4 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | 4 |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 5 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 5 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | n/a |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 5 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | 5 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., $I^2$) for each meta-analysis. | n/a |

# PRISMA 2009 Checklist



| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | 5 |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | n/a |
| **RESULTS** | | | |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | 5 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | 5 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | 9,10 |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | 5 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | 6,7,8,9 |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | n/a |
| **DISCUSSION** | | | |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 10 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 12 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 13 |
| **FUNDING** | | | |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 13 |

*From:* Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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BMJ Open

# A systematic review of academic bullying in medical settings: dynamics and consequences



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**A systematic review of academic bullying in medical settings: dynamics and consequences**

Averbuch T[a], Yousif E[b], Van Spall HGC[, b, c]

**Corresponding author:** Harriette Gillian Christine Van Spall. Harriette.vanspall@phri.ca. 237 Barton Street East, Hamilton, ON L8L 2X2, Canada. Telephone: 905-521-2100 Ext: 40601 Fax: 905-538-8932

[a]Department of Medicine, McMaster University, Hamilton, Ontario; [b]Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, Ontario; [c]Population Health Research Institute, Hamilton, Ontario

**Word count: 4327**

## ABSTRACT

**Purpose:** To characterize the dynamics and consequences of bullying in academic medical settings, report factors that promote academic bullying, and describe potential interventions.

**Design:** Systematic review.

**Data sources:** We searched EMBASE and PsycINFO for articles published between January 1, 1999 and February 7, 2021.

**Study selection:** We included studies conducted in academic medical settings in which victims were consultants or trainees. Studies had to describe bullying behaviours; the perpetrators or victims; barriers or facilitators; impact; or interventions. Data were assessed independently by 2 reviewers.

**Results:** We included 68 studies representing 82,349 respondents. Studies described academic bullying as the abuse of authority that impeded the education or career of the victim through punishing behaviours that include overwork, destabilization, and isolation in academic settings. Among 35,779 individuals in 28 studies who responded about bullying patterns, the most commonly described (38.2% respondents) was overwork. Among 24,894 individuals in 33 studies who reported the impact, the most common was psychologic distress (39.1% respondents). Consultants were the most common bullies identified among 15,868 individuals in 31 studies (53.6% respondents). Women represented a majority (56.2%) of victims among 15,246 respondents in 27 studies. Only a minority (28.9%) of 9,410 victims in 25 studies reported the bullying, and most (57.5%) did not perceive a positive outcome. Facilitators of bullying included lack of enforcement of institutional policies (reported in 13 studies), hierarchies (7 studies), and normalization of bullying (10 studies). Studies testing the effectiveness of anti-bullying interventions had a high risk of bias.

**Conclusions**: Academic bullying commonly involved overwork, had a negative impact on well-being, and was not typically reported. Perpetrators were commonly male consultants and victims were commonly women. Methodologically robust trials of anti-bullying interventions are needed.

**Limitations:** Most studies (40/68) had at least a moderate risk of bias. All interventions were tested in uncontrolled before-after studies.

**Keywords:** Medical Education & Training, General Medicine, Health Services Administration & Management

**Strengths and limitations**

- This systematic review is comprehensive, including 68 studies with 82,349 consultants and trainees, across several countries and including all levels of training.
- We defined inclusion criteria a priori, and used established tools to assess the risk of bias of included studies
- The included studies varied in their definitions of bullying, sampling bias was noted among the surveys, and intervention studies were sub-optimally designed

## Background

Bullying behaviours have been described as repeated attempts to discredit, destabilize, or instill fear in an intended target[1]. Bullying can take many forms from overt abuse to subtle acts that erode the confidence, reputation, and progress of the victim[2]. Bullying is common in medicine, likely impacting mental health, professional interactions, and career advancement[3–6]. It may also impact a physician's ability to care for patients[7]. Surveys from the National Health Service (NHS) in the United Kingdom showed that 55% of staff experienced at least one type of bullying; 31% were doctors in training[8]. Bullying is closely related to harassment and discrimination, in which mistreatment is based on personal characteristics or a protected class such as sex or race[9]. Within academic settings, victims may experience all three and the distinction may be less clear. Unlike harassment and discrimination, which have specific legal definitions, bullying is an amorphous term whose victims are often left without legal recourse.

The hierarchical structure of academic medicine – in which there are power imbalances, subjective criteria for recruitment and career advancement, and siloed departments with few checks in place for toxic behaviours – may offer an operational environment in which bullying may be more widespread than in non-academic medical settings. Academic bullying is a seldom-used term within the literature, but is intended to describe the forms of bullying that may exist in academic settings. Academic bullying can be defined as mistreatment in academic institutions with the intention or effect of disrupting the academic or career progress of the victim[10]. The prevalence of academic bullying in medical settings is unknown likely due to a lack of definition of bullying behaviours, a fear of reporting, and insufficient research. There is not much known about the characteristics of perpetrators and victims, and about the

impact of bullying on academic productivity, career growth, and patient care. Furthermore, institutional barriers and facilitators of bullying behavior have not been reported, and the effectiveness of interventions in addressing academic bullying have not been evaluated.

The purpose of this systematic review is to define and classify patterns of academic bullying in medical settings; assess the characteristics of perpetrators and victims; describe the impact of bullying on victims; review institutional barriers and facilitators of bullying; and identify possible solutions.

## Methods

### Data sources and searches

This study follows PRISMA reporting guidelines. Two reviewers (T.A, Y.E.) searched two online databases (EMBASE and PsycINFO) for English-language articles published between January 1, 1999, to February 7, 2021 and relevant to academic bullying in medicine. An outline of the search is provided in Figure 1. A combination of medical subject heading (MeSH), title, and abstract text terms encompassing “Medicine”; “Bullying” and “Academia” were used for the full search. The terms of the search are included in Supplementary figure S1. Two authors (T.A, Y.E.) independently screened articles for inclusion. Differences were resolved by discussion, and if necessary, by a third author (H.V.).

**Study selection**

We included studies conducted in academic medical settings in which victims were either consultants or trainees. We defined academic medical settings as hospitals or clinics that were either university-affiliated or involved trainees. In the case of pre-clinical medical students, academic medical settings included the university where medical instruction took place. Studies were included if they described: the method and impact of bullying; the characteristics of perpetrators and victims; or interventions used to address the bullying. Studies that included trainees or consultants in both academic and non-academic settings were included. We excluded editorials, opinion pieces, reviews, conference abstracts, theses, dissertations, and grey literature.

**Data extraction and quality assessment**

Two reviewers (T.A, Y.E.) independently extracted data on: study design, setting (academic or non-academic), definition, description and impact of academic bullying, characteristics of perpetrators and victims, barriers and facilitators of bullying, and interventions and their outcomes. Two reviewers independently assessed studies for risk of bias. We assessed before-after studies using the National Heart, Lung, and Blood Institute quality assessment tool[11] and assessed prevalence surveys using the Joanna Briggs Institute critical appraisal tool[12]. We classified survey studies as low risk of bias if at least 8 of 9 criteria were met, medium risk of bias if 7 of 9 were met, and high risk of bias if less than 7 were met. We classified bias in before-after studies as low if at least 11 of 12 criteria were met, medium if at least 9 of 12 were met, and high if less than 9 were met.

## Data synthesis and analysis

We developed a definition for academic bullying through narrative synthesis of the definitions provided by studies included in this systematic review. We pooled the results of surveys on the basis of similarity of survey themes to facilitate a descriptive analysis. For survey studies on the prevalence or impact of bullying, we solely pooled the results of studies that asked respondents about specific bullying behaviours or impacts, respectively. We then separated results by sex and level of training. Group selection was by consensus between authors. We presented our results as numbers and percentages. We calculated the denominators from the total number of individuals who completed surveys on types of bullying behaviours, the impact of bullying, characteristics of bullies and victims, or barriers to addressing academic bullying. The numerators were calculated from the number of individuals who experienced a specific behaviour or impact, were bullied by a perpetrator at a specified level of training, or endorsed a specific reason for not making a formal report. We also reported the number of studies that described each specific bullying behaviour or impact, demographic characteristics of victims and perpetrators, barriers and facilitators of academic bullying, and specific reasons for not making a formal report. We could not perform a meta-analysis due to the conceptual heterogeneity between studies.

## Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting, or dissemination plans of our research.

## Results

### Screening results

We identified 1342 unique articles, 68 of which met inclusion criteria. Reasons for exclusion are described in Figure 1.

### Characteristics of included studies

Studies were most frequently set in the USA (reported in 31 studies)[3,13–41] and the UK (reported in 5 studies)[8,42–45] and were set in academic hospitals (reported in 54 studies)[1,3–6,13–15,17,19–21,23,24,26,27,29,30,32–35,37–39,41–65] or in both teaching and non-teaching sites (reported in 14 studies)[8,16,25,28,36,40,66–73]. Twenty-five studies included medical students[3–5,13,15,21,22,24,26,33–35,37,39,48,50,52,57–60,63,64,74,75], 27 included residents or fellows[1,14,16–18,20,22,23,25,27–32,44,45,49–51,55,56,61,62,65,69,72] and 25 included consultants[6,8,16,19,20,25,28,36,38,40–43,46,47,53,66–73,75] (Table 1).

### Definition of academic bullying

Six papers provided definitions for academic bullying[33,48,50,56,58,63]. Common themes included behaviours where the perpetrator abuses authority to punish the victim through isolation, blocked career advancement, and threats to academic standing. We defined academic bullying as the abuse of authority by a perpetrator who targets the victim in an academic setting through punishing behaviours that include overwork, destabilization, and isolation in order to impede the education or career of the target. Multiple

studies used the complete or partial Negative Acts Questionnaire (NAQ), a standardized list of bullying behaviours (reported in 24 studies)[1,3,4,6,13–15,24,29,31,36,47–52,54,55,57,60,61,67,73].

**Patterns of academic bullying behaviours**

There were 35,779 consultant and trainee respondents to surveys of bullying behaviours (reported in 28 studies), but not all were offered the same options to select from (Table 2). Bullying behaviours were grouped into destabilization (reported in 15 studies), threats to professional status (reported in 23 studies), overwork (reported in 7 studies), and isolation (reported in 17 studies). Undue pressure to produce work was commonly reported (38.2% of respondents affected, reported in 7 studies)[14,36,45,47,49,54,67]. Of the 15 studies that described destabilization, common methods included being ordered to work below one's competency level (36.1%, reported in 10 studies)[31,36,45,47–49,52,67,71,72] and withholding information that affects performance (30.7%; reported in 9 studies)[14,29,31,36,47–49,54,67]. Of the 23 studies that described threats to professional status, common methods were excessive monitoring (28.8%; reported in 6 studies)[14,36,47,49,54,67] and criticism (26.9%; reported in 12 studies)[14,21,29,36,45,47,49,52,54,67,71,72]. Of the 17 studies that described isolation, the most common method was social and professional exclusion (29.1%; reported in 17 studies)[4,14,21,24,29,31,36,40,47–49,52,54,63,67,70,72].

There were 6,179 consultant and trainee respondents to surveys that separated the prevalence of bullying behaviours by sex (reported in 11 studies). A greater proportion of women experienced all bullying behaviours (reported in 11

studies)[14,16,19,22,36,40,48,52,57,63,65] (Table 2). There were 34,175 respondents to surveys that analyzed results by level of training (reported in 24 studies) (Supplementary table S1). A greater proportion of consultants experienced refusal of applications for leave, training, or promotion (26.3%, reported in 3 studies)[19,36,47] and removal of areas of responsibility (27.8%, reported in 2 studies)[36,47] than residents (11.0%, reported in 3 studies; 10.7%, reported in 3 studies, respectively)[14,22,54,55] or medical students (13.4%; 19.6%, reported in 1 study)[22,24]. Compared to medical students (4.6%, reported in 6 studies)[13,15,22,24,52,57] and consultants (3.4%, reported in 2 studies)[36,71], a greater proportion of residents experienced the intimidatory use of discipline procedures (17.8%, reported in 6 studies)[14,22,48,54,55,65]. A greater proportion of medical students experienced persistent criticism (66.4%, reported in 2 studies)[21,52] than residents (28.3%, reported in 5 studies)[14,29,45,54,72] and consultants (20.8%, reported in 3 studies)[36,47,71].

**Characteristics of bullies**

Thirty-one unique studies representing 15,868 consultants and trainees described the characteristics of bullies, although not all were offered the same options to select from. Common perpetrators included consultants (53.6%, reported in 30 studies)[1,3,4,6,8,14,15,17,18,20,22,27,28,33,37,40,43,45,47–49,52,54,56,60,62,63,66,72,73], residents (22.0%, reported in 22 studies)[1,3,6,8,15,17,18,20,22,25,27,28,33,37,45,48,49,54,56,60,62], and nurses (14.9%, reported in 21 studies)[1,3,4,14,15,17,20,22,25,27,28,33,37,45,48,49,54,56,60,62,73]. Of the 4,277 individuals who identified the gender of their bullies, most reported primarily male (67.2%, reported in 5 studies)[8,36,43,47,72], followed by primarily female (26.1%, reported in 5 studies)[8,36,43,47,72], and both (6.7%, reported in 3 studies)[8,43,47]. Among 6,084 medical students, perpetrators were commonly consultants (43.1%, reported in 8 studies)[3,4,15,22,33,37,52,60], residents

(35.7%, reported in 6 studies)[3,15,22,33,37,60], nurses (12.4%, reported in 7 studies)[3,4,15,22,33,37,60], and other medical students (8.8%, reported in 5 studies)[3,4,22,52,63]. Among 6,289 residents, perpetrators were commonly consultants (52.2%, reported in 12 studies)[1,14,17,18,22,27,45,48,49,54,56,62], nurses (24.3%, reported in 11 studies)[1,14,17,22,27,45,48,49,54,56,62], and other residents (20.6%, reported in 12 studies)[1,14,17,18,22,27,45,48,49,54,56,62]. Of the 1,500 consultants, perpetrators were their peers (39.2%, reported in 7 studies)[6,8,40,47,49,66,73], senior consultants (23.7%, reported in 5 studies)[6,8,40,43,73], and administration (17.7%, reported in 4 studies)[43,47,49,66].

Six unique studies representing 1,698 interns and medical students described the prevalence of academic bullying according to the specialty rotation of the learner. Academic bullying was common in surgery (32.9% of respondents, reported in 6 studies)[1,13,34,48,56,60,72], obstetrics and gynecology (25.5%, reported in 2 studies)[13,60] and internal medicine (21.4%, reported in 5 studies)[1,13,48,56,60,72].

**Characteristics of victims**

Forty-one unique studies described the characteristics of victims, and 29 included the proportion of those who experienced bullying. Of the 15,704 women and 19,495 men who responded to surveys that analyzed results by sex, women were more likely to report being bullied than men (54.6% of all women compared to 34.2% of all men, reported in 27 studies)[3,4,14,16,17,19,20,27,28,36,38,41,47–52,55–57,62,63,65,69,72,75]. There were 10,730 consultant and trainee respondents to surveys that separated the results by demographic characteristics other than sex, but not all characteristics were captured by each study. A greater proportion of international graduates /

non-citizens experienced bullying than citizens (48.0% compared to 43.3%, reported in 4 studies)[14,17,45,72], and a greater proportion of overweight participants (BMI > 25) experienced bullying than those with a BMI ≤ 25 (17.8% compared to 11.8%, reported in 1 study)[51]. The relationship between age and bullying varied based on the cut-off used and the survey sample in each study. Among consultants, a greater proportion of those with full professorship experienced bullying than assistant professors (68.0% compared to 51.9%, reported in 1 study)[41].

**Impact of academic bullying**

There were 24,894 consultant and trainee respondents to surveys on the psychological (reported in 20 studies) and career impact (reported in 25 studies) of academic bullying (Table 3), although not all were offered the same options to select from. Respondents commonly reported psychiatric distress (39.2%; reported in 14 studies)[6,17,18,27,29,30,43,47,52,56,59,62,71,73], considerations of quitting (35.9%; reported in 7 studies)[25,31,43,47,66,70,72], and reduced clinical ability (34.6%; reported in 8 studies)[25,30,31,45,47,52,56,59]. Respondents agreed that academic bullying negatively affected patient safety (68.0%; reported in 2 studies)[18,31]. Nine studies representing 13,418 individuals described the impact of bullying separated by sex (Table 3). A greater proportion of women experienced loss of career opportunities (43.6%, reported in 8 studies)[16,19,36,38,40,41,52,65] while a greater proportion of men experienced decreased confidence (32.1%, reported in 2 studies)[41,52] and clinical ability (26.1%, reported in 1)[52].

There were 16,523 consultant and trainee respondents to surveys that separated results by level of training (Supplementary table S2). A greater proportion of medical students experienced psychiatric distress (72.9%; reported in 2 studies)[52,59] than residents (40.8%; reported in 6 studies)[17,18,29,30,56,62] and consultants (17.9%; reported in 4 studies)[43,47,71,73]. A greater proportion of residents endorsed loss of career opportunities (35.0%; reported in 3 studies)[55,65,72] compared to medical students (16.0%; reported in 3 studies)[13,15,52] and consultants (30.6%; reported in 8 studies)[19,36,38,40,41,47,70,71].

**Barriers and facilitators of academic bullying**

Thirty-five unique studies pertained to barriers to victims making a formal report (reported in 26 studies) and institutional facilitators (reported in 25 studies) of academic bullying (Table 4). There were 9,239 consultant and trainee respondents to surveys on their actions taken in response to bullying and reasons for not making a formal report, although not all were given the same options to select from. Victims commonly did not formally report the bullying[1,3,4,15,36,43,47,49,50,54,56,60,62,66,72]; only 28.9% of respondents made a formal report. Deterrents to reporting included concern regarding career implications (41.1%; reported in 15 studies)[1,4,15,25,28,35,47,48,50,56,62,65,66,70,72], not knowing who to report to (26.5%; reported in 15 studies)[1,4,16,22,25,33,47,48,50,56,62,65,66,70,75], and poor recognition of bullying (11.4%; reported in 5 studies)[5,15,25,33,35,37,42,48,56]. Of the 26 studies, 7 studies representing 1139 individuals reported the outcomes of reporting[1,36,43,47,49,65,72] although only a small range of outcomes were offered among options. Submitting a formal report often had no perceived effect on bullying (35.6%; reported in 5 studies);[36,43,47,49,72] a greater proportion of victims

endorsed worsening (21.9%; reported in 3)[36,49,65] than improvement (13.7%; reported in 5 studies)[1,36,43,49,72] in bullying following reporting.

In the 25 unique studies that described institutional facilitators of bullying, common facilitators were lack of enforcement (reported in 13 studies)[1,16,20,25,28,36,43,47,49,50,54,56,65], the hierarchical structure of medicine (reported in 7 studies)[26,54,56,57,63,64,71], and normalization of bullying (reported in 10 studies)[3,15,19,23,26,31,34,47,62,65]. Individual-level data was not pooled as institutional facilitators of bullying were most commonly elicited via free-response portions of surveys with varying completion rates.

**Suggested strategies, interventions, and outcomes**

Forty-nine unique studies suggested strategies to address academic bullying. These strategies included promoting anti-bullying policies (reported in 13 studies)[3,14–16,35,45,53,54,56,58,59,66,71], education to prevent academic bullying (reported in 20 studies)[1,3,4,14,15,20,25,26,31,33,35,45,48,54,59,63–65,71,72], establishing an anti-bullying oversight committee (reported in 10 studies)[21,22,26,28,30,34,39,58,69,71], institutional support for victims (reported in 5 studies)[35,46,58,62,72], and internal reviews where hospitals develop targeted solutions for their environment (reported in 5 studies)[15,22,24,60,63] (Supplementary table S3).

Of the 49 unique studies, 10 implemented organization-level interventions which included workshops with vignettes to improve recognition of bullying (reported in 4 studies)[23,37,42,44]; a gender and power abuse committee that established reporting

mechanisms and held mandatory workshops on mistreatment (reported in 1)[3]; a gender equity office to handle reporting (reported in 1)[39]; a professionalism-focused approach that included profressionalism in employee contracts and performance reviews and a professionalism office to handle student complaints (reported in 1)[26]; zero-tolerance policies (reported in 1)[53]; and institutional-level tracking of mistreatment to provide targeted staff education (reported in 2)[21,24]. All 10 studies had an uncontrolled before-after design, and as such, did not establish causality. In the studies of vignettes, common bullying behaviours were demonstrated to improve recognition of both subtle and overt acts of bullying. Of the 4 studies that involved bullying recognition workshops, three reported an associated improvement in bullying recognition[37,42,44]. In a study that developed a gender equity office, reporting was handled through an intermediary; decisions were binding with consequences for retaliation including termination of employment[39] and 96% of all formal reports were resolved. In a study where a Gender and Power Abuse committee was formed, there was an associated reduction in academic abuse[3]. Similarly, in a study that used a multifaceted approach of developing a professionalism committee, and including professionalism in contracts and performance reviews, there was a 35.9% decrease in reporting of mistreatment, and improved awareness of the reporting process[26]. In a study where a clerkship committee monitored unprofessionalism, there was an associated reduction in narrative comments regarding unprofessionalism on end of rotation surveys[21]. In a study assessing the impact of a professionalism retreat about mistreatment for consultants, there was no reduction in medical student mistreatment[13]. In a study assessing the implementation of zero-tolerance policies, there was an associated improvement in awareness of bullying reporting processes[53].

**Assessment of bias**

Twenty-eight studies had a low risk of bias[3,4,8,13,16–19,22,27,29,30,36,41,45,47,49–52,55,56,63,66,71–73,75], 21 had a moderate risk of bias[1,6,14,15,21,25,28,34,37,38,40,43,46,54,58,59,61,67–70], and 19 had a high risk of bias[20,23,24,26,31–33,35,37,39,42,44,48,53,57,60,62,64,65]. Among the 58 survey studies, 14 sampled participants inappropriately[5,6,14,19,33,35,40,46,48,54,57,58,60,62,67], 19 had inadequate sample sizes or did not justify their sample size[1,5,6,14,18,25,31,35,40,46,48,50,55,57,60,64,68,69,71], 7 did not sufficiently describe the participants[1,15,29,31,35,48,58], 9 had coverage bias[6,14,40,48,54,57,62,64,65], 8 did not have an appropriate statistical analysis[15,20,28,34,35,64,67,68], and 30 had a low response rate[1,5,14–16,20,22,28,31,32,34–36,43,45,47,49,52,56,57,59–62,65–67,69,70,72] (Supplementary figure S2). Among the 10 before-after trials, 1 did not have pre-specified inclusion criteria[44], 5 had low sample sizes or did not justify their sample size[23,24,37,42,44], 3 did not have clearly defined, pre-specified, consistently measured outcomes[21,24,44], 9 did not blind pariticipants[3,23,24,26,37,39,42,44,53], 5 did not account for loss to follow-up in their analysis[23,26,42,44,53], and 6 lacked statistical tests to assess for significant pre- to post-intervention changes[24,26,39,42,44,53] (Supplementary figure S3).

**Discussion**

In this systematic review, we established a definition for academic bullying, identified common patterns of bullying, and reported the impact on victims. We defined academic bullying as the abuse of authority by a perpetrator who targets the victim in order to impede their education or career through punishing behaviours that include overwork, destabilization, and isolation in an academic setting. Victims reported that academic bullying often resulted in stalled career advancement and thoughts of leaving the

position. A majority of academic bullies were senior men, and a majority of victims were women. Barriers to reporting academic bullying included fear of reprisal, perceived hopelessness, and institutional non-enforcement of anti-bullying policies. Strategies to overcome academic bullying, such as anti-bullying committees and adding professionalism as a requirement for career advancement, were associated with an improvement in the prevalence of bullying and resolution of formal reports (Figure 2). Our review differs from other systematic reviews of bullying in medicine in its scope and population studied. We included studies involving all medical and surgical disciplines, but limited our analysis to physicians and physician trainees. While prior reviews have focused on the prevalence of bullying[76] or anti-bullying interventions[77], our comprehensive review expanded the focus to also include characteristics of bullies andvictims, impact and outcomes of bullying, anti-bullying strategies, and facilitators of academic bullying.

Several factors contribute to the prevalence of bullying within academia. The hierarchical structure lends itself to power imbalances and prevents victims from speaking out, especially when the aggressor is tenured[78]. The relative isolation of departments within universities allows poor behaviour to go unchecked. Furthermore, the closed networks within departments lend themselves to mobbing behaviour and causes victims to fear being blacklisted for speaking out[79].

A lack of clarity around the definition can limit awareness and reporting[50]. The Graduation Questionnaire administered to all American medical students found that in years where respondents were asked if they had been bullied, the estimated prevalence was lower than when they were asked about specific bullying behaviours[15]. Surveys on bullying should include a list of defining

behaviours to increase clarity and accuracy in responses[80]. Even in institutions with established reporting systems, respondents were often unaware of how to file a report[47]. We found that victims of academic bullying rarely filed reports, primarily due to fear of retaliation. Reporting was not consistently effective and was more likely to worsen bullying.

We found that consultants were the most common perpetrators of bullying at all levels of training, although residents often bullied medical students. No studies assessed the relative contribution of fellows and senior residents to resident bullying. Among studies that analyzed bullying among consultants by seniority, senior consultants were a commonly reported source of bullying[6,8,40,43,73]. Women and ethnic minorities reported higher rates of bullying among demographic groups surveyed, although race and ethnicity were infrequently assessed in the surveys included in this study. While some argue that the increasing proportion of women trainees[81,82] may change dynamics in healthcare settings, the leaky academic pipeline in which women remain underrepresented in several academic specialties and in positions of leadership make them vulnerable to the power asymmetries in academic medicine[83].

Our review illustrates the self-reported harms of academic bullying. Victims experienced depressive symptoms, self-perceived loss of clinical ability, and termination of employment. Academic bullying has been linked to depression[51], substance abuse[84], and hospitalization for coronary artery or cerebrovascular disease[85]. Bullying costs the National Health Service (NHS) of the United Kingdom £325 million annually due to reduced performance and increased staff turnover[86]. Disruptive behavior, linked to bullying in

the perioperative setting has been linked to 27% of patient deaths, 67% of adverse events, and 71% of medical errors[7]. Reasons for consultant error include intimidation leading to a fear of communicating sources of harm and slow response times[87]. We found that academic bullying negatively impacted patient safety. In a study of emergency medicine residents, 90% reported examples in which disruptive behaviour affected patient care, and 51% were less likely to call an abusive consultant[18].

Interventions reported as effective were simple and organization-level, such as anti-bullying workshops and committees. Anti-bullying committees involving staff and learners can research bullying within their institution and address the most common disruptive behaviours through targeted interventions[67]. An organization-level, rather than individual-level approach may address the root causes of academic bullying as well as the organizational culture that facilitates ongoing bullying. We found that anti-bullying committees typically included three elements: (1) a multidisciplinary team that includes clinicians and other front-line staff; (2) development of anti-bullying policies and a reporting process; and (3) an education campaign to promote awareness of policies. Owing to their multifaceted nature, it is challenging to evaluate the relative contributions of their components. Without well-designed trials, the effects of anti-bullying interventions are unknown. All of the intervention studies used before-after designs, which did not account for confounding variables, co-interventions, and background changes in policy or practice; the majority were at high-risk of bias. Furthermore, among studies that implemented anti-bullying workshops, the majority interviewed participants immediately after the workshop without longitudinal follow-up to determine if benefits were sustained.

The need for a confidential reporting process was raised in the studies included in this review, but few described how confidentiality could be maintained when the report has to describe details of the bullying that may be only privy to the perpetrator and victim. The reporting process could take the form of the Office of Gender Equity at the University of California, where the accuser and the accused do not meet face to face; the discipline process is through an intermediary[39]. A unique, non-punitive approach is the restorative justice approach used at Dalhousie University where victims, offenders, and administrators work collaboratively to address sexual harassment and re-integrate offenders[88]. Reporting may have been ineffective in this review due to the impunity offered to prominent consultants. Senior personnel, particularly those who are well-known and successful in grant funding, are often considered "untouchable", beyond reproach by their institutions[89]. Behaviour is often learned and modeling positive behaviours may break the cycle of bullying in medicine[90]. One approach would be making professionalism a requirement for promotion and career advancement, as in the Department of Medicine at the University of Toronto in Canada[91] or the University of Colorado School of Medicine[26].

**Strengths and limitations**

The strengths of this review include its broad scope; capturing several aspects of academic bullying, and its size (n = 68 studies, 82,349 consultants and trainees). The cohort included was diverse, comprising several specialties and countries. We explicitly defined eligibility criteria and extracted data in duplicate. We used established tools to assess the risk of bias.

There are several limitations that should be acknowledged. There is no validated definition of academic bullying, and the included studies varied in their description of bullying. Most studies used questionnaires that were not previously validated. The survey instruments across studies differed from each other, and their results had to be pooled according to themes to be synthesized. We could not account for differences in institutional culture and hospital systems in the responses of survey participants. Estimates of the prevalence of bullying must be interpreted in light of the self-reported nature of bullying surveys. Data on bully/victim demographics were underrepresented. Selection bias was a significant concern: 14 studies used convenience sampling, and 2 included voluntary focus groups for victims of bullying to sign up for. Overall, the response rate was 59.2%, with a range of 12% to 100%. Surrogate outcomes were used such as awareness of bullying, and the reporting of outcomes was inconsistent. As such, the effect of anti-bullying interventions must be interpreted cautiously.

**Future directions**

Significant gaps exist in the quality of the academic bullying literature, particularly with inconsistent definitions and limitations in study methodology. Our definition may be used to provide the breadth and granularity required to sufficiently capture cases of academic bullying in medicine. Studies on the impact of academic bullying would benefit from standardized, validated survey instruments. Although randomization and blinding are not always possible to test the effect of interventions, a control group should be included in anti-bullying intervention studies.

**Conclusions:**

Academic bullying refers to specific behaviours that disrupt the learning or career of the intended target and commonly consists of exclusion and overwork. The consequences include significant psychiatric distress and loss of career opportunities. Bullies tend to be male senior consultants, whereas victims tend to be females. The fear of reprisal and non-enforcement of anti-bullying policies are the greatest barriers to addressing academic bullying. Results of bullying interventions must be interpreted with caution due to their methodological quality and reliance on surrogate measures. There is a need for well-designed trials with transparent reporting of relevant outcomes and accounting for temporal trends.

**Author contributions**

TA contributed to study design, informed the search strategy, extracted and synthesized study data, and drafted and edited the manuscript. YE informed the search strategy, extracted and synthesized study data, and edited the manuscript. HGCV conceived the study idea, informed the search strategy, analyzed the data, drafted and edited the manuscript, and supervised the conduct of the study. HGCV affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

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**Competing interests**

All authors have reported that they have no relationships relevant to the contents of this paper to disclose.

**Ethical approval**

Not required.

**Data sharing**

All data relevant to the study are included in the article.

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**Table 1. Summary of studies investigating bullying in academic medicine**

| Author (year), Country | Study design | Setting | Definition of academic bullying | Target | Perpetrator | Source of bias | Risk of Bias |
|---|---|---|---|---|---|---|---|
| Huber et al. (2020), USA | Survey | Academic and non-academic hospitals | Data not provided | Residents | Consultant (83%) and resident (63%) | Inadequate sample size | Low |
| Hammoud et al. (2020), USA | Survey | Academic hospitals | Study based graduation questionnaire | Residents and medical students | For resident victims: consultant (58.7%), resident (27.9%), nurses (26.4%), other employees (10.2%), and administration (5.4%). For medical student victims: consultant (66.4%), resident (50.9%), nurses (22.4%), other employees (13.8%), administration (5.2%), and students (12.0%) | Low response rate | Low |
| Samora et al. (2020), USA | Survey | Academic hospitals | A behavior that a reasonable person would expect might | Residents, fellows, and consultants | Multiple* | Inappropriate statistical analysis, and | Moderate |

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| | | | victimize, humiliate, undermine, or threaten a person to whom the behavior is directed | | | low response rate | |
| Brown et al. (2020), Canada | Survey | Academic hospitals | Gender-based discrimination included belittling remarks, inappropriate comments and jokes, denial of opportunities, and behaviors that are perceived as hostile or humiliating | Residents | Nurses, consultants, and residents | Inadequate sample size, analysis not conducted in full coverage of the sample, inappropriate identification of bullying, and low response rate | High |
| Zhang et al. (2020), USA | Survey | Academic and non-academic hospitals | NAQ‡ used | Residents | Consultants, co-residents, nurses, and administrators | Study subjects not described in details | Low |
| Lind et al. (2020), USA | Before-After | Academic | Public belittlement or humiliation; physical harm; denied opportunities for training or rewards, or receiving lower evaluations or grades, based | Medical students | Data not provided | Unblinded outcome assessors, small sample size, high loss to follow-up, and analysis of change score not applied | High |

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| | | | solely on gender; and being subjected to racially or ethnically offensive remarks | | | | |
| Colenbrander et al. (2020), Australia | Survey | Academic hospitals | Data not provided | Medical students | Data not provided | Inadequate sample size, analysis plan, data analysis coverage, and unreliable measurement of bullying | High |
| Iqbal et al. (2020), Pakistan | Survey | Academic and non-academic hospitals | NAQ‡ used | Consultants | Data not provided | Inadequate sample size and statistical analysis | Moderate |
| Elghazally et al. (2020), Egypt | Survey | Academic | Behaviour that is intended to cause physical or psychological damage due to the imbalance of power, strength or status between the aggressor and the victim | Medical students | Professors (30.1%), students (51.2%), and staff (18.7%) | None | Low |
| Raj et al. (2020), USA | Survey | Academic | Harassment defined as unwanted sexual advances, subtle bribery to | Consultants | Data not provided | None | Low |

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| | | | engage in sexual behavior, threats to engage in sexual behavior, or coercive advances | | | | |
| Kemper et al. (2020), USA | Survey | Academic and non-academic hospitals | Data not provided | Residents | Faculty (43%), clinical staff (60%), resident (28%), medical student (3%), and admin (9%) | None | Low |
| Stasenko et al. (2020), USA | Survey | Academic and non-academic hospitals | Harassment is defined as an unwelcome sexual advances or other forms of physical and verbal aggression that is sexual in nature | Consultants and fellows | Data not provided | Low response rate | Low |
| Afkhamzadeh et al. (2019), Iran | Survey | Academic hospitals | Physical or verbal violence, or bullying | Medical students and consultants | Data not provided | None | Low |
| Wolfman et al. (2019), USA | Survey | Academic and non-academic hospitals | Repeated negative actions and practices that are carried out as a deliberate act or unconsciously. These behaviors cause humiliation, | Residents | Data not provided | Inappropriate sampling frame, and identification of bullying condition, low response rate | High |

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| | | | offense and distress to the target | | | | |
| Chowdhury et al. (2019), USA | Survey | Academic and non-academic hospitals | NAQ‡ used | Residents | Data not provided | Inadequate sample size, description of subjects and setting, and low response rate | High |
| Ayyala et al. (2019), USA | Survey | Academic and non-academic hospitals | Harassment that occurs repeatedly (> once) by an individual in a position of greater power | Residents | Data not provided | Inappropriate methods of bullying identification | Low |
| Hu et al. (2019), USA | Survey | Academic and non-academic hospitals | Discrimination and harassment on the basis of gender, race, or pregnancy or childcare | Residents | Consultants (52.4%), admin (1.1%), co-residents (20.2%), and nurses (7.9%) | None | Low |
| Brown et al. (2019), International | Survey | Academic and non-academic hospitals | Data not provided | Residents or fellow and consultant | Data not provided | Inappropriate methods of bullying identification and low response rate | Moderate |
| Zurayk et al. (2019), USA | Survey | Academic and non-academic clinics | Study-based sexual experience questionnaire | Consultants and residents | Residents (60%), lecturers (33%), professors (44%), nurses (10%), and hospital staff (29%) | Inadequate sample size, inappropriate sample frame | Moderate |

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| Castillo-Angeles et al. (2019), USA | Before-after | Academic hospital | Study-based abuse sensitivity questionnaire | Residents | Data not provided | Small sample size, inadequate blinding of outcome assessors, and loss to follow-up | High |
| Kappy et al. (2019), USA | Before-after | Academic hospital | Harassment; discrimination; humiliation; physical punishment; and the use of grading and other forms of assessment in a punitive manner. | Medical students | Consultant, co-resident, and nurse | Intervention and outcomes not well defined | Moderate |
| D'Agostino et al. (2019), USA | Survey | Academic and non-academic hospitals | Abuse or harassment particularly of a sexual type | Residents, fellows, and attending | Consultants (64.5%), co-resident (38.7%), ancillary staff (25.8%) | Inappropriate methods of bullying identification, Inadequate statistical analysis plan, and low response rate | High |
| Chung et al. (2018), USA | Survey | Academic | Feeling of intimidation, dehumanization, or threat to grade, or career advancement | Medical students | Attending physician (68.4%), resident (26.3%), and nurse (10.5%) | Inappropriate sample methods, Non-validated method of bullying identification | High |

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| Kemp et al. (2018), USA | Survey | Academic hospital | Disrespect for the dignity of others that interferes with the learning process | Residents, consultants, and fellows | Data not provided | Inadequate statistical analysis plan, and low response rate | Moderate |
| Benmore et al. (2018), England | Before-after | Academic hospital* | Data not provided | Residents | Senior consultants | Insufficient enrollment, inadequate sample size, no blinding of outcome assessors, high loss to follow-up, lack of statistical analysis or ITS† design | High |
| Duru et al. (2018), Turkey | Survey | Academic hospital | Data not provided | Consultants, researchers, administrators, nurses | Specific occupations of bullies not specified | Inappropriate sampling and inadequate sample size | Moderate |
| Chambers et al. (2018), New Zealand | Survey | Academic and non-academic hospitals | Data not provided | Specialist Consultants | Primarily male. Senior medical staff (52.5%), non-clinical managers (31.8%), and clinical leaders (24.9%) | Low response rate | Low |
| House et al. (2018), USA | Before-after | Academic hospital | Data not provided | Medical Students | Faculty most frequently were the source of bullying followed by residents. Exact | Insufficient enrollment, inadequate sample size, no blinding of outcome | High |

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| | | | | | breakdown not specified | assessors, outcomes not clearly described, lack of statistical analysis, individual-level analysis or ITS design | |
| Kulaylat et al. (2017), USA | Survey | Academic hospital | Verbal abuse, specialty-choice discrimination, non-educational tasks, withholding/ denying learning opportunities, neglect and gender/racial insensitivity | Medical Students | Faculty (57%), residents, fellows (49%), and nurses (33%) | Inappropriate sampling, inadequate sample size, classification bias, and non-validated identification or measurement of bullying | High |
| Bernotaite et al. (2017), Lithuania | Survey | Academic hospitals | Data not provided | Family Consultants | Supervisor (25.3%), colleague (9.8%), subordinate (2.9%) | Inappropriate sampling, inadequate sample size, and coverage bias | Moderate |
| Chrysafi et al. (2017), Greece | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Surgeons most frequently followed by internal medicine consultants, then radiologists/ | Low response rate and coverage bias | Moderate |

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| | | | | | laboratory consultants | | |
| Kapoor et al. (2016), India | Survey | Academic hospital | Data not provided | Medical students | Data not provided | Inappropriate sampling and inadequate description of study population | Moderate |
| Chadaga et al. (2016), USA | Survey | Academic hospitals | NAQ‡ used | Residents and fellows | Consultants (29%), nurses (27%), patients (23%), peers (19%) | Low response rate, inadequate sample size, and coverage bias | Moderate |
| Llewellyn et al. (2016), Australia | Survey | Academic hospitals | Data not provided | Residents | Senior medical staff: (58.3%) in 2015, (60.6%) in 2016. Non-medical staff (33.2%) 2015, (33.9%) 2016, Manager (5.2%) in 2015, (1.2%) in 2016, junior resident (3.3%) in 2015, (4.3%) in 2016 | Low response rate, biased sampling, coverage and classification bias | High |
| Rouse et al. (2016), USA | Survey | Academic clinics | NAQ used | Family medicine consultants | Data not provided | Low response rate | Low |
| Shabazz et al. (2016), UK | Survey | Academic and non-academic hospitals | Belittle and undermine an individual's work; | Gynecology consultants | Senior consultants (50.9%), junior consultants | Low response rate, and classification bias | Moderate |

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| | | | undermining an individual's integrity; persistent and unjustified criticism and monitoring of work; freezing out, ignoring or excluding and continual undervaluing of an individual's effort. | | (22.3%), medical director (4.5%) | | |
| Peres et al. (2016), Brazil | Survey | Academic hospital | Data not provided | Medical students | Data not provided | Low response rate, and classification bias | Moderate |
| Ling et al. (2016), Australia | Survey | Academic hospitals | NAQ used | General surgery residents and consultants | For trainee victims: staff surgeon (48%), trainee surgeon (13%), admin (13%), nurses (11%), other consultant (6%) For consultant victims; (31%) staff surgeon, (28%) admin, (13%) other consultant, (11%) nurses, other (10%), trainees (4%) | Low response rate | Low |

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| Kulaylat et al. (2016), USA | Before-after | Academic hospital | Data not provided | Medical Students | Faculty (57%), residents/fellows (49%), and nurses (33%) | Inadequate sample size, no blinding of outcome assessors | Moderate |
| Ahmadipour et al. (2016), Iran | Survey | Academic hospital | Being assigned tasks as punishment, being threatened with an unjustly bad score or failure | Medical students, interns and residents | Data not provided | Inadequate sample size | Low |
| Jagsi et al. (2016), USA | Survey | Academic hospital | Data not provided | Consultants who won a career advancement award | Data not provided | Inadequate sampling frame and classification bias | Moderate |
| Crebbin et al. (2015), Australia and New Zealand | Survey | Academic hospitals | Data not provided | Residents, fellows and consultants | Surgical consultants (50%), other medical consultants (24%) and nursing staff (26%) | Low response rate | Low |
| Cresswell et al. (2016), UK | Before-after | Academic hospital | Data not provided | Residents | Data not provided | Insufficient description of study purpose, inadequate enrollment and sample size, no blinding of outcome assessors, outcomes not clearly | High |

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| | | | | | | described, lack of statistical analysis or ITS design and high loss to follow-up | |
| Loerbroks et al. (2015), Germany | Survey | Academic hospitals | Data not provided | Residents | Data not provided | None | Low |
| Malinauskiene et al. (2014), Lithuania | Survey | Non-academic clinics | NAQ used | Family medicine consultants | Bullying from patients (11.8%), from colleagues by (8.4%), from superiors by (26.6%) | None | Low |
| Mavis et al. (2014), USA | Survey | Academic hospitals | Mistreatment either intentional or unintentional occurs when behavior shows disrespect for the dignity of others and unreasonably interferes with the learning process | Medical students | Clinical faculty in the hospital (31%) residents/ interns (28%), nurses (11%) | Low response rate, inadequate description of study population and statistical analysis | Moderate |
| Oser et al. (2014), USA | Survey | Academic hospital | Data not provided | Medical students | Residents > clerkship faculty > other attendings > other students > | None | Low |

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| | | | | | preceptors = nurses | | |
| Oku et al. (2014), Nigeria | Survey | Academic hospital | Data not provided | Medical students | Medical students (23.7%), consultants (21.7%), lecturers (17.5%), consultants (16.5%), nurses (16.5%), other staff (4.1%) | None | Low |
| Gan et al. (2014), Canada | Survey | Academic hospital | Data not provided | Medical students | Consultants | Low response rate, inappropriate sampling, small sample size and classification bias | High |
| Fried et al. (2015), USA | Before-after | Academic hospital | Power mistreatment defined as "made to feel intimidated, dehumanized, or had a threat made about a recommendation, your grade, or your career | Medical students | Residents (49.7%), clinical faculty (36.9%), preclinical faculty (7.9%) | None | Low |

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| Al-Shafaee et al. (2013), Oman | Survey | Academic hospitals | Being coerced into carrying out personal services unrelated to the expected role of interns and instances in which interns were excluded from reasonable learning opportunities offered to others, or threatened with failure or poor evaluations for reasons unrelated to academic performance | Residents | Internal medicine (60.3%), surgery (29%), pediatrics (15.5%). specialists (51.7%), consultants (50%), residents (12.1%), nurses (24.1%) | Inappropriate sampling, inadequate sample size, inadequate description of study population and coverage bias | High |
| Owoaje et al. (2012), Nigeria | Survey | Academic hospital | Data not provided | Medical Students | Consultants (69.1%), residents/ fellows (52.4%), other students (15.7%), nurses (7.8%), laboratory technicians (4.1%) | Low response rate | Low |

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| Askew et al. (2012), Australia | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Consultants (44%), managers (27%), patients (15%), nurses/ midwives (4%), junior consultants (1%) | Low response rate | Low |
| Meloni et al. (2011), Australia | Before-after | Academic hospital | Data not provided | Hospital employees | Data not provided | Lack of blinding of outcome assessors, high loss to follow-up, lack of statistical analysis or ITS design, and unit of analysis not clearly described | High |
| Dikmetas et al. (2011), Turkey | Survey | Academic hospital | Data not provided | Residents | Surgeons > Internists | Low response rate | Moderate |
| Eriksen et al. (2011), Norway | Survey | Academic hospital | NAQ used | Hospital employees | Colleagues. Specific occupations not described | Low response rate, inappropriate sampling and inadequate statistical analysis | Moderate |
| Imran et al. (2010), Pakistan | Survey | Academic hospitals | Threats to professional status, threats to personal | Residents | Consultants | Inappropriate sampling, classification | Moderate |

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| | | | standing, isolation, overwork, and destabilization | | | and coverage bias | |
| Ogunsemi et al. (2010), Nigeria | Survey | Academic hospital | Data not provided | Residents | Administrative staff (58%), from the hospital chief executive( 41.4%), from patient relatives (40.4%), nurses (32.7%), residents (30%), patients (20%) | Inadequate sample size | Low |
| Best et al. (2010), USA | Before-after | Academic hospital | Data not provided | Unspecified | Data not provided | Study purpose not clearly described, insufficient enrollment, no blinding of outcome assessors, lack of statistical or individual-level analysis or ITS design | High |
| Nagata-Kobayashi et al. (2009), Japan | Survey | Academic hospitals | Assigned you tasks as punishment; threatened to fail you unfairly in residency; competed maliciously or unfairly with | Residents | Surgery (27.6%), internal medicine (21.4%), emergency medicine (11.5%), anaesthesia | Low response rate | Low |

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| | | | you; made negative remarks to you about becoming a consultant or pursuing a career in medicine | | (11.3%). Consultants 34.1%, patients 21.7%, nurses 17.2% | | |
| Scott et al. (2008), New Zealand | Survey | Academic hospital | A threat to professional status and personal standing, isolation, enforced overwork, destabilization | Residents | Consultants (30%), nurses (30%), patients (25%), radiologists (8%), residents/ fellows (7%) | Low response rate, inadequate sample size and description of study population | Moderate |
| Gadit et al. (2007), Pakistan | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Senior colleagues | Inadequate sample size | Low |
| Shrier et al. (2007), USA | Survey | Academic and non-academic hospitals | Data not provided | Consultants | Colleagues (24%), patients (19%), teachers (18%), supervisors (15%), | Inappropriate sampling, inadequate sample size, and coverage bias | Moderate |
| Cheema et al. (2005), Ireland | Survey | Academic hospitals | Data not provided | Residents | Senior residents (51-70%), nursing staff 47-59%, administration (15%-16%), colleagues (12%-13%) | Low response rate | Low |

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| Rautio et al. (2005), Finland | Survey | Academic hospital | Data not provided | Medical students | Lecturers (27.9%), research/senior research fellows (27.7%), professors (16.6%), associate professors (13.6%) | Low response rate, inappropriate sampling, inadequate sample size, and coverage bias | High |
| Wear et al. (2005), USA | Survey | Academic hospital | Data not provided | Medical students | General surgeons and obstetricians | Low response rate, inappropriate sampling, inadequate sample size, classification and lack of validated measurement tool | High |
| Carr et al. (2000), USA | Survey | Academic hospitals | Data not provided | Consultants | Superiors and colleagues | None | Low |
| Quine (1999), UK | Survey | Non-academic clinics | Data not provided | Consultants | 54% greater seniority, 34% same seniority, 12% less senior. 49% of bullies older than victim | None | Low |

*Regarding sexual harassment: the most common sources were attending surgeons (69% overall, 71% female, 18% male); trainee (46% overall, 47% female, 9% male); attending nonsurgical (22%, 22% female, 18% male); other allied health professionals (16%, 15% female, 36% male); nursing (14%, 12% female, 73% male); admins staff (4%, 2% female, 36% male). Re: harassing behaviors: the most common sources were attending orthopaedic surgeon (76% overall, 75% female, 86% male); trainee (30%,32%female, 14% male); attending physician; nonsurgical (e.g., anesthesiologist, internist) (20%, 21% female, 11% male, nursing staff (18%,18% female, 20% male); administration staff (13%, 12% female, 17% male); and other allied health professional (9%, 10% female, 9% male)

**Academic hospitals/clinics were defined as teaching hospitals/clinics with a university affiliation
†Interrupted time series
‡The NAQ is the negative acts questionnaire, a validated tool for assessing the prevalence of workplace bullying

**Table 2: Self-reported description of specific bullying behaviours**

| Behaviour | No. of studies/ Total studies* | Total cohort No. affected/ total participants who completed surveys on behaviours (%)* | Men No. affected/ total men who completed surveys on behaviours (%)† | Women No. affected/ Total women who completed surveys on behaviours (%)† |
|---|---|---|---|---|
| **Threats to professional status** | | | | |
| Persistent unjustified criticism | 12/28 | 4495/16700 (26.9) | 535/1690 (31.7) | 552/1402 (39.4) |
| Excessive monitoring of work | 6/28 | 1752/6079 (28.8) | 442/1525 (27.7) | 441/1298 (34.0) |
| Intimidatory use of discipline | 15/28 | 1531/19471 (7.9) | 366/2381 (15.4) | 363/2209 (16.4) |
| Spread of gossip/rumours | 7/28 | 2977/10060 (29.6) | 88/596 (14.8) | 94/453 (20.8) |
| False allegations | 6/28 | 613/3796 (16.1) | 59/596 (9.9) | 54/453 (11.9) |
| Refusal of leave, training or promotion | 9/28 | 1604/8551 (18.8) | 296/2594 (11.4) | 458/2340 (19.6) |
| **Isolation** | | | | |
| Social/professional exclusion | 17/28 | 6160/21099 (29.1) | 420/2027 (20.7) | 1064/2814 (37.8) |
| **Overwork** | | | | |
| Undue pressure to produce work | 7/28 | 2509/6562 (38.2) | 233/1525 (15.3) | 355/1570 (22.6) |
| Setting impossible deadlines | 6/28 | 1571/6079 (25.8) | 164/1525 (10.8) | 189/1298 (14.6) |
| **Destabilization** | | | | |
| Shifting goalposts | 1/28 | 54/417 (12.9) | Not reported | Not reported |
| Removal of areas of responsibility without consultation | 8/28 | 1397/6193 (22.6) | 160/1525 (10.5) | 171/1298 (13.2) |

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| Withholding information that affects performance | 9/28 | 3836/12503 (30.7) | 219/1553 (14.1) | 267/1328 (20.1) |
| Ordered to work below one's competence level | 10/28 | 2934/8119 (36.1) | 81/625 (13.0) | 99/483 (20.5) |

*Total number of studies that described types of bullying behaviours, including studies that did not stratify results by sex. As a result, the denominator for the number of participants in total is not the sum of the denominators for men and women. The denominator was calculated from the total number of individuals who completed surveys on specific bullying behaviours, while the numerator was calculated from the number of individuals who indicated they experienced the specified bullying behaviour. Not all survey studies offered respondents the same options to respond to, and as a result the denominators for each bullying behaviour differ.
†Of the studies that separated data by gender or solely included the results of one gender and included the specified bullying behaviour.

**Table 3. Self-reported impact of academic bullying**

| Effect of academic bullying | No. of studies/ Total studies* | Total cohort No. of affected participants/ total participants who completed surveys on the impact of bullying (%)* | Men No. of affected men/ total men who completed surveys on the impact of bullying (%)† | Women No. of affected women/ total women who completed surveys on the impact of bullying (%)† |
|---|---|---|---|---|
| **Psychologic** | | | | |
| Psychologic distress including depressive/PTSD symptoms | 14/33 | 5597/14285 (39.1) | 1750/5172 (33.8) | 1636/3529 (46.4) |
| Reduced confidence in clinical skill | 8/33 | 564/2112 (26.7) | 68/212 (32.1) | 97/597 (16.2) |
| **Career** | | | | |
| Missed career opportunities | 17/33 | 2823/9442 (29.9) | 357/1898 (18.8) | 1104/2530 (43.6) |
| Considerations of quitting | 7/33 | 1034/2880 (35.9) | Not reported | Not reported |
| Termination of employment | 5/33 | 228/4419 (5.2) | 4/139 (2.9) | 4/150 (2.7) |
| Leave of absence | 2/33 | 50/748 (6.7) | Not reported | Not reported |
| Self-reported worsening of clinical performance | 8/33 | 1673/4841 (34.6) | 42/161 (26.1) | 22/101 (21.8) |

*Total number of studies that described the impact of bullying, including studies that did not stratify results by sex. Not all participants were given the same options to select from.

†Of the studies that separated data by gender or solely included the results of one gender and included the impact of bullying.

**Table 4. Barriers to addressing academic bullying**

| Barrier | No. of studies/Total studies* | No. of participants/ total participants (%) |
|---|---|---|
| **Low reporting rates** | | |
| Lack of awareness of what constitutes bullying | 5/35 | 73/642 (11.4) |
| Lack of awareness of reporting process | 15/35 | 1115/4215 (26.5) |
| Lack of perceived benefit | 9/35 | 667/1621 (41.1) |
| Fear that bullying would worsen | 13/35 | 969/2696 (35.9) |
| Fear of career ramifications | 15/35 | 1094/2664 (41.1) |
| Concerns regarding confidentiality | 4/35 | 56/445 (12.6) |
| **Institutional factors** | | |
| Hierarchical nature of medicine | 7/35 | Not reported |
| Recurring cycle of abuse | 3/35 | Not reported |
| Normalization of bullying | 10/35 | Not reported |
| Lack of enforcement | 13/35 | 586/1400 (41.9) |

*Total number of studies that described barriers of bullying behaviours

## Figure titles and legends

### Figure 1: PRIMSA diagram of included studies

We identified 68 articles relevant to academic bullying. We describe the reasons for exclusion at each stage of screening

**Figure 2: The definition, manifestations, impact, victims, and perpetrators of academic bullying**

Academic bullying is defined as an abuse of authority through punishing behaviours that include overwork, destabilization, and isolation. Victims are commonly men, while perpetrators are commonly male consultants. Individual and institutional factors contribute to the ongoing cycle of bullying.

**Supplementary figure S1: Search strategy**

We included search terms relevant to academic bullying

**Supplementary figure S2: Risk of bias of survey studies included in this review**

Most studies in this review had at least a moderate risk of bias. Common sources of bias included inappropriate sampling techniques and low sample sizes

**Supplementary figure S3: The risk of bias of before-after studies included in this review**

Most studies in this review had at least a moderate risk of bias. Common sources of bias included lack of blinding or a control group and low sample sizes

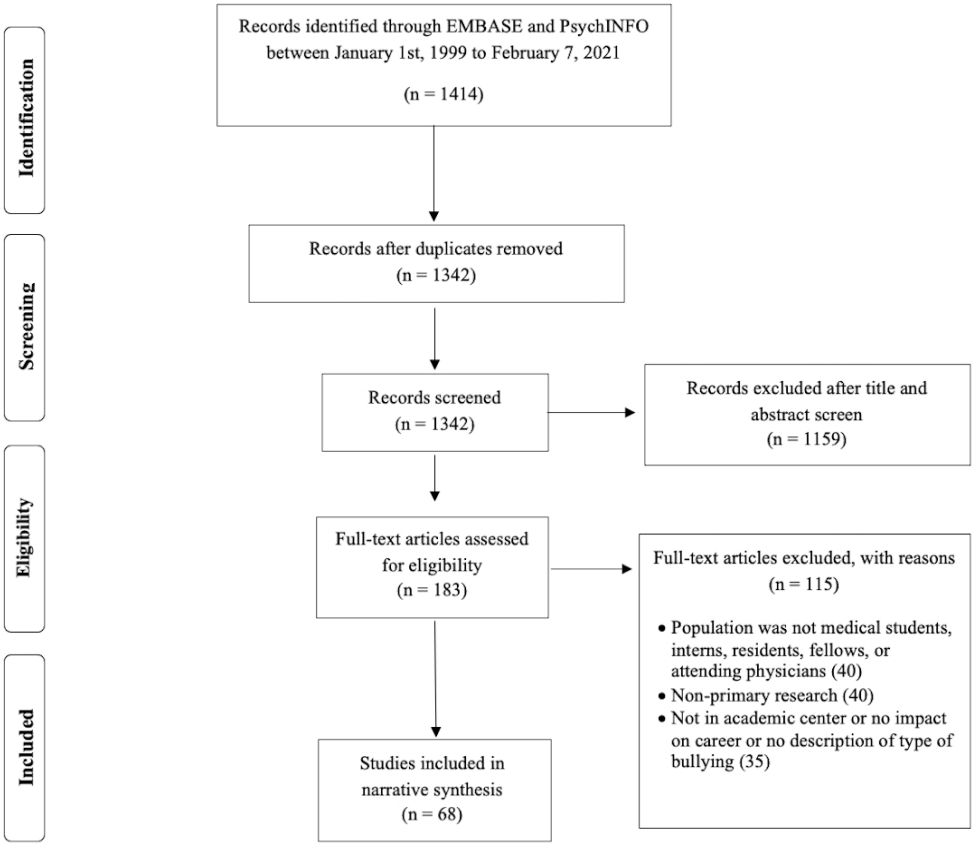


Figure 1: PRIMSA diagram of included studies

We identified 68 articles relevant to academic bullying. We describe the reasons for exclusion at each stage of screening

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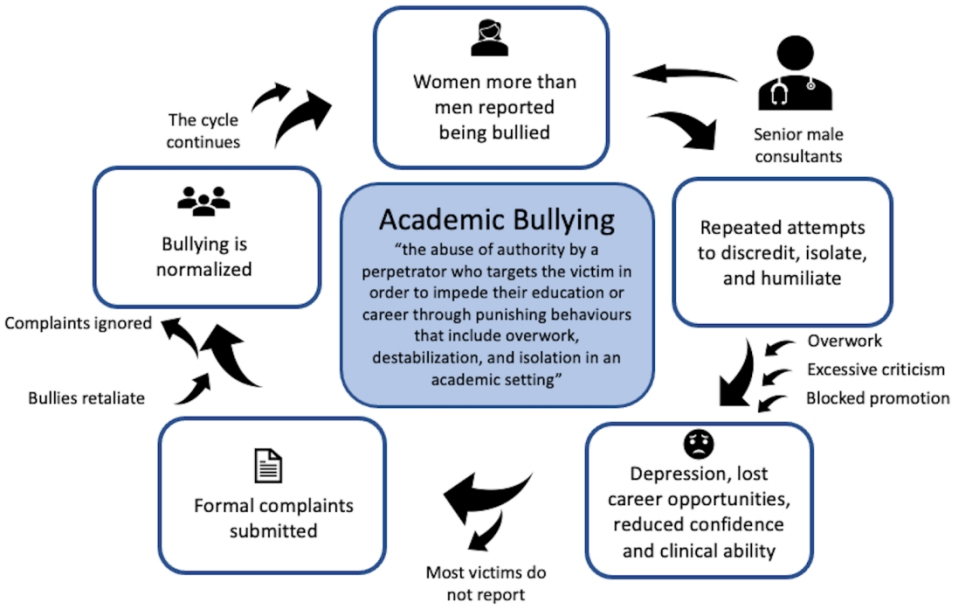



Figure 2: The definition, manifestations, impact, victims, and perpetrators of academic bullyingAcademic bullying is defined as an abuse of authority through punishing behaviours that include overwork, destabilization, and isolation. Victims are commonly men, while perpetrators are commonly male consultants. Individual and institutional factors contribute to the ongoing cycle of bullying.

136x88mm (300 x 300 DPI)

**Supplementary table S1: Pooled prevalence of specific bullying behaviours by level of training**

| Behaviour | No. of studies/ Total studies* | Medical Students No. of participants/ total participants (%) * | Residents and fellows No. of participants/ total participants (%)* | Consultants No. of participants/ total participants (%)* |
|---|---|---|---|---|
| **Threats to professional status** | | | | |
| Persistent unjustified criticism | 10/24 | 200/301 (66.4) | 3596/12708 (28.3) | 600/2881 (20.8) |
| Excessive monitoring of work | 4/24 | Not reported | 1020/2445 (41.7) | 564/2824 (20.0) |
| Intimidatory use of discipline | 14/24 | 641/13914 (4.6) | 640/3594 (17.8) | 38/1112 (3.4) |
| Spread of gossip/rumours | 5/24 | Not reported | 2085/6366 (32.8) | 755/2881 (26.2) |
| False allegations | 4/24 | Not reported | 36/102 (35.3) | 509/2881 (17.7) |
| Refusal of leave, training or promotion | 8/24 | 74/551 (13.4) | 379/3441 (11.0) | 894/3403 (26.3) |
| **Isolation** | | | | |
| Social/professional exclusion | 16/24 | 418/1546 (27.0) | 3687/12385 (29.8) | 1272/4445 (28.6) |
| **Overwork** | | | | |
| Undue pressure to produce work | 7/24 | Not reported | 827/2928 (28.2) | 1326/2824 (47.0) |
| Setting impossible deadlines | 6/24 | Not reported | 351/2445 (14.4) | 965/2824 (34.2) |
| **Destabilization** | | | | |
| Shifting goalposts | 1/24 | Not reported | 54/654 (8.3) | Not reported |
| Removal of areas of responsibility without consultation | 6/24 | 11/56 (19.6) | 267/2503 (10.7) | 784/2824 (27.8) |

| | | | | |
|---|---|---|---|---|
| Withholding information that affects performance | 7/24 | Not reported | 2465/8869 (27.8) | 1140/2824 (40.4) |
| Ordered to work below one's competence level | 7/24 | 182/269 (67.7) | 1276/3676 (34.7) | 975/2881 (33.8) |

*Total number of studies that described types of bullying behaviours that separated data by level of training

**Supplementary table S2: The pooled impact of academic bullying by level of training**

| Effect of academic bullying | No. of studies/ Total studies* | Medical Students No. of participants/ total participants (%) * | Residents and fellows No. of participants/ total participants (%) * | Consultants No. of participants/ total participants (%) * |
|---|---|---|---|---|
| **Psychiatric** | | | | |
| Psychiatric distress including depressive/PTSD symptoms | 12/28 | 422/579 (72.9) | 2142/5256 (40.8) | 178/996 (17.9) |
| Reduced confidence in clinical skill | 4/28 | 119/262 (45.4) | Not reported | 177/1259 (14.1) |
| **Career** | | | | |
| Missed career opportunities | 14/28 | 484/3020 (16.0) | 149/426 (35.0) | 1789/5854 (30.6) |
| Considered quitting | 9/28 | 109/317 (34.4) | 5/100 (5.0) | 908/2375 (38.2) |
| Terminated employment | 4/28 | Not reported | 135/3574 (3.8) | 11/348 (3.2) |
| Leave of absence | 2/28 | Not reported | Not reported | 50/748 (6.7) |
| Self-reported worsening of clinical performance | 6/28 | 202/579 (34.9) | 1168/3179 (36.7) | 51/563 (9.1) |

*Total number of studies that described the impact of academic bullying and separated data by level of training

**Supplementary table S3. Suggested policies, interventions and reported outcomes**

| Intervention | Outcome |
|---|---|
| **Zero-tolerance/Anti-bullying policy** | |
| (Cheema et al., 2005) * | Data not provided |
| (Wear et al., 2005) * | Data not provided |
| (Gadit et al., 2007) * | Data not provided |
| (Nagata-Kobayashi et al., 2009) * | Data not provided |
| (Imran et al., 2010) * | Data not provided |
| (Meloni and Austin, 2011) | Increased employee engagement and workplace satisfaction<br>Increased trust among victims that reports would be appropriately managed (44% to 64%)<br>Victims felt safer reporting incidents of bullying (67% to 84%)<br>Improved awareness of where and whom to report to (67% to 84%) |
| (Fried et al., 2012) | Reduced power abuse (43% to 30%) but no change in overall mistreatment rates |
| (Askew et al., 2012) * | Data not provided |
| (Mavis et al., 2014) * | Data not provided |
| (Chadaga et al., 2016) * | Data not provided |
| (Kapoor et al., 2016) * | Data not provided |
| (Peres et al., 2016) * | Data not provided |
| (Wolfman et al., 2019) * | Data not provided |
| **Bullying workshops** | |
| (Oku et al., 2014) * | Data not provided |
| (Kulaylat et al., 2016) * | Data not provided |

| | |
|---|---|
| (Cresswell et al., 2016) * | Data not provided |
| (Benmore et al., 2018) | Increased willingness to try to repair the harm caused by bullying and became more conscious of giving feedback |
| (Castillo-Angeles et al., 2019) | Bullying behaviour persisted |
| (Colenbrander et al., 2020) * | Data not provided |
| (Stasenko et al., 2020) * | Data not provided |
| **Tracking and reporting mistreatment data** | |
| (Gan and Snell, 2014) | No difference in mistreatment |
| (Mavis et al., 2014) * | Data not provided |
| (House et al., 2018) | Decreased unprofessional or disrespectful behaviour by faculty as reported by students [4.8% (2015-16) to 1.7% (2016-17)] |
| (Elghazally et al., 2020) * | Data not provided |
| (Hammoud et al., 2020) * | Data not provided |
| **Staff education on bullying and the reporting process** | |
| (Cheema et al., 2005) * | Data not provided |
| (Wear et al., 2005) * | Data not provided |
| (Gadit et al., 2007) * | Data not provided |
| (Scott et al., 2008) * | Data not provided |
| (Imran et al., 2010) * | Data not provided |
| (Fried et al., 2012) | No change in reporting rate |
| (Al-Shafaee, 2013) * | Data not provided |
| (Mavis et al., 2014) * | Data not provided |
| (Oku et al., 2014) * | Data not provided |

| | |
|---|---|
| (Crebbin et al., 2015) * | Data not provided |
| (Chadaga et al., 2016) * | Data not provided |
| (Peres et al., 2016) * | Data not provided |
| (Chung et al., 2018) * | Data not provided |
| (D'Agostino et al., 2019) * | Data not provided |
| (Chowdhury et al., 2019) * | Data not provided |
| (Zurayk et al. 2019) * | Data not provided |
| (Colenbrander et al., 2020) * | Data not provided |
| (Elghazally et al., 2020) * | Data not provided |
| (Lind et al. 2020) | Multiple effect** |
| (Brown et al., 2020) * | Data not provided |
| **Develop a committee to handle and support reporting** | |
| (Gadit et al., 2007) * | Data not provided |
| (Best et al., 2010) | Resolutions reached 96% of formal reports |
| (Kapoor et al., 2016) * | Data not provided |
| (Kemp et al., 2018) * | Data not provided |
| (Kappy et al., 2019) | Fewer comments on mistreatment |
| (Ayyala et al., 2019) * | Data not provided |
| (Brown et al., 2019) * | Data not provided |
| (Lind et al. 2020) | Multiple effects** |
| (Samora et al., 2020) * | Data not provided |
| (Hammoud et al., 2020) * | Data not provided |
| **Accessible and confidential reporting** | |

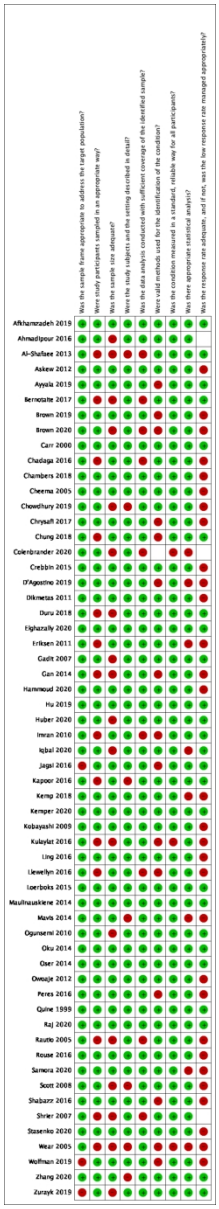
| | |
|---|---|
| (Imran et al., 2010) * | Data not provided |
| (Fried et al., 2012) | Reduced power abuse (43% to 30%) but no change in overall mistreatment rates |
| (Askew et al., 2012) * | Data not provided |
| (Al-Shafaee, 2013) * | Data not provided |
| (Crebbin et al., 2015) * | Data not provided |
| (Mavis et al., 2014) * | Data not provided |
| (Colenbrander et al., 2020) * | Data not provided |
| (Brown et al. 2019) * | Data not provided |
| (Samora et al., 2020) * | Data not provided |

*Suggested approach that had not been implemented

** In this study, a substantial decrease in mistreatment (from 62.9% to 40.3%), fear of reporting (from 42.2% to 37.1%), fear of reprisal (from 28.9% to 22.6%), and an increase in knowledge of reporting increased (from 88.8% to 94.2%) was observed.

**Supplementary figure S1:** Search strategy

1. Exp bullying
2. Exp medicine
3. Exp hospitals
4. (sabotage or mistreat* or discredit or humiliation or harassment or demean or bully* or belittle or intimidate or disrespect or coerce or ignore or undermine or exclude or libel or slander or criticism or overwork*).ti
5. (Workplace or career or professional or academic or promotion* or employment or job or profession or reputation or academia).mp
6. (medicine or residency* or "medical school" or "clinical training" or hospital or internship or fellow* or "junior doctor" or "house officer" or "clinical clerk" or "attending physician" or physician or doctor or clinician or hierarchical system or "clinician-scientist" or learner or faculty or “NHS”).ti,ab.
7. Exp aggression
8. 1 or 4 or 7
9. 5 and 8
10. 2 or 3 or 6
11. 9 and 10

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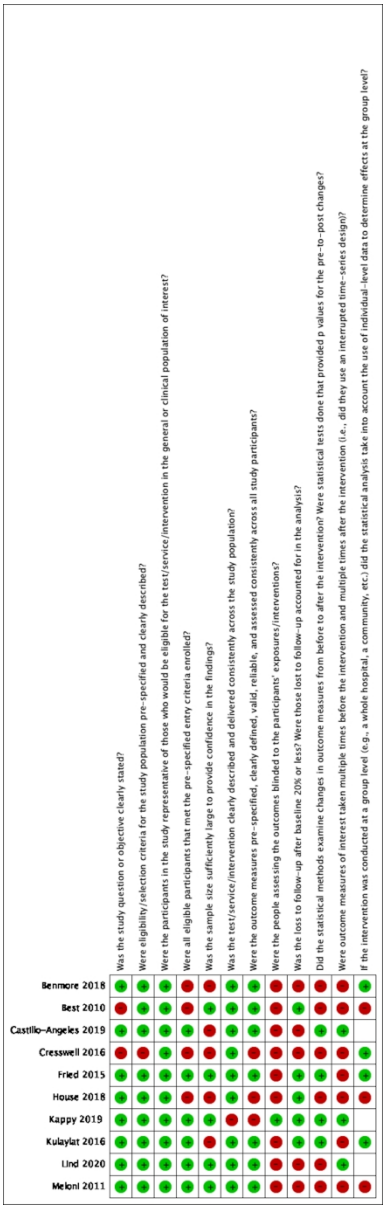


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# PRISMA 2009 Checklist

| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| **TITLE** | | | |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. | 1 |
| **ABSTRACT** | | | |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number. | 2 |
| **INTRODUCTION** | | | |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. | 4 |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS). | 5 |
| **METHODS** | | | |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number. | n/a |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale. | 6 |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched. | 5 |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. | 5 |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis). | 6 |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators. | 6 |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. | 6 |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis. | 6 |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). | 7 |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., $I^2$) for each meta-analysis. | n/a |

# PRISMA 2009 Checklist



| Section/topic | # | Checklist item | Reported on page # |
|---|---|---|---|
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). | 7 |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified. | n/a |
| **RESULTS** | | | |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram. | 8 |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. | 8 |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). | 16 |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot. | 8-15 |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. | N/A |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). | 16 |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). | n/a |
| **DISCUSSION** | | | |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers). | 16-20 |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias). | 20-21 |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. | 22 |
| **FUNDING** | | | |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. | 23 |

*From:* Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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