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Title: A systematic review and meta-analysis of factors that relate to aggression perpetrated against nurses by patients/relatives or staff.

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Authors' contributions-

Karen-leigh Edward – concept, data collection, data extraction, data interpretation
and manuscript development

Steve Lui – data collection, data collation

John Stephenson – meta-analytic design, statistical analysis, data interpretation,
figures, tables

Karen Ousey – data collection, data extraction, data interpretation, manuscript
development

Philip Warelow – data extraction, manuscript development

Jo-Ann Giandinoto – data collection, data collation

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Abstract

Aims and objectives- The aim of this meta-analysis was to identify the factors that related to aggression (verbal abuse, or physical abuse/assault) perpetrated against the nurse or other health professional by patients/relatives or staff. In light of the paucity of systematic reviews on this common issue in nursing, the objective was to present a comprehensive systematic review and meta-analysis of these papers.

Background – Aggression towards nurses is common around the world and can be the impetus for nurses leaving the profession or developing anxiety when working in particular settings.

Design- Systematic review with meta-analysis

Data Sources- The databases of Medline (1966 to 2015), CINAHL (1982 to 2015) and PsychInfo (1920 to 2015).

Methods- Meta-analyses were conducted to assess the effect of the factors of gender and context (dichotomised as mental health/psychiatric or non-mental health/psychiatric).

Results - A total of 1571 papers were screened by two reviewers. At the final decision 14 were selected for analysis. A higher proportion of female nurses than male nurses were reported to be the victims of verbal abuse, with the difference in proportions being statistically significant. A statistically significant higher proportion of male nurses than female nurses were reported to be the victims of physical abuse. There was a significantly higher proportion of mental health nurses reported experiencing physical abuse as compared to non-mental health nurses.

Conclusions – The analysis reveal female nurses have greater odds of verbal abuse than male nurses and male nurses have greater odds of physical abuse than female nurses. Overall mental health nurses had 3 times higher odds of physical assault than other nurses.

Relevance to clinical practice-

In light of the findings it is recommended organisational support improve in high aggression potential clinical areas and for nursing curriculums to incorporate education about the management of challenging behaviours in undergraduate programs.

(word count 300 words)

Key words: aggression, meta-analysis, nurse, physical assault, verbal abuse, workplace violence

Summary box

What does this paper contribute to the wider clinical community?

- This meta-analysis has revealed female nurses have about 21% greater odds of verbal abuse from patients/relatives or staff than male nurses; and that male nurses have about 18% greater odds of physical abuse from patients/relatives or staff than female nurses
- Psychiatric or mental health nurses have about 3 times the odds of physical assault from patients/relatives or staff than nurses in non-psychiatric/mental health settings
- In light of the findings it is recommended that organisational support improve in high aggression potential clinical areas and the findings hold implications for nursing curriculums by way of incorporating education about the management of challenging behaviours in all undergraduate programs

Introduction

The literature clearly articulates that aggression and violence against health-care staff is a global problem (Roche *et al.* 2010). This aggression and violence is shown via an upward trend in physical assaults against health-care professionals resulting in staff absence, legal, security, and reduced productivity costs to the care providers. A personal experience of aggression in the workplace leads to serious consequences for the healthcare professionals, the patient, patient care and the organisation.

Background

Exposure to traumatic experiences over a career of nursing, and a lack of control over these experiences, contribute to poor recruitment, poor retention, and may manifest as exhaustion, a sense of being physically run down, feeling anger, being cynical and negative, or a sense of being under siege, which could lead to other complications such as depression and anxiety. Common physically violent acts from against nurses include being spat on, being hit, being pushed/ shoved, scratched and kicked, and are perpetrated usually by patients who were being cared for. Miscommunication is often an underlying cause associated with physical assault (Kamchuchat *et al.* 2008). As a consequence nurses globally report a range of emotional responses to physical assault ranging from symptoms of stress (Gates *et al.* 2011) to feelings of sadness, shock, confusion anger and embarrassment (Reininghaus *et al.* 2007). Although there is an excess of information relating to workplace violence and aggression, types of perpetrators and systems for managing violence and aggression, there is presently no comprehensive systematic review or meta-analysis of these papers. The benefits of such an analysis relates to insights gained that may influence recruitment to particular areas of nursing, identification of 'at risk' nurse types (in consideration of gender or context/setting) and areas for future examination into this contemporary and relevant professional issue.

Aim

The aim of this study was to identify the factors that related to aggression (verbal abuse or physical abuse or assault) perpetrated against the nurse or other health professional by patients/relatives or staff by means of a meta-analysis.

Objectives

The objectives of this review were to (1) synthesise available evidence related to physical and verbal abuse towards male and female nurses in clinical settings; (2) to identify any potential gender differences experienced by nurses of physical and verbal abuse in clinical settings; and (3) to identify any potential impacts of clinical setting type in relation to physical and verbal abuse experience by nurses in practice.

Research questions

The research questions for this review are the following –

- (1) Do female nurses experience more physical and/or verbal abuse in the workplace compared to male nurses?
- (2) Does clinical setting impact the incidence of physical and/or verbal abuse towards nurses?

Methods

Inclusion and exclusion criteria

This analysis included any quantitative research (randomised control trials, prospective studies, cohort studies and survey studies) with nurse participants in any health care setting who experienced actual or potential aggression (verbal or physical) in the workplace; papers written in English; papers published up to 2015; and papers reporting on nurse

aggression/violence. The term health care professional was used in an attempt to ensure that all papers that examined violence, aggression and occupational anxiety in nursing were located.

Exclusion criteria – Papers not written in English. Studies in which the outcomes were formulated in terms of rates of abuse, or as regression models, were excluded from consideration. Studies with low response rates (below about 20%) were also excluded to avoid possible selection bias.

Types of outcome measures

Subject to a sufficient number of appropriate studies being identified, two outcomes were considered for each meta-analysis: (a) occurrence of verbal abuse; (b) occurrence of physical abuse/assault. In both cases these measures were expressed in terms of a proportion of respondents who had experienced one or more incidents of abuse over a period of time. For each analysis for which a sufficient number of appropriate studies could be identified, the proportion of respondents self-reporting as having experienced abuse, with an associated confidence interval, was tabulated. The odds ratio for the factor under consideration, with associated confidence intervals, was calculated and presented in a forest plot together with a synthesized estimate (and associated confidence intervals) calculated using the Mantel-Haenszel method.

Search Methods

The databases of Medline (1966 to 2015), CINAHL (1982 to 2015) and PsychInfo (1920 to 2015) were searched for papers. The search terms used were – health care professional,

nurse, Violence, Threatened behaviour, Verbal aggression, Anxiety, Coping and Depersonalisation.

Selection of studies

In total 1571 papers were screened after searching the databases. Of these 1434 were either not on topic or were duplications, thesis, not in English or not reporting research (see figure 1).

[insert figure 1 here]

Quality appraisal

Quality of the research was with reference to the Critical Appraisal Skills Program (CASP) qualitative research checklist and Critical Appraisal Skills Program (CASP): Cohort Studies is a methodological checklist (Taylor *et al.* 2000).

Data extraction and management

Data extraction was completed independently by 2 review authors (KLE, PW) using an extraction tool designed for the project. Extracted data were collated by 2 reviewers (KLE, KO) with any disagreements being discussed between the review team and data included if there was consensus.

Assessment of risk and bias in included studies

If the reviewers disagreed on inclusion of studies, the final decision was made by consensus. Consensus was based on evidence of associations between an overestimation of effect, blinding, and incomplete outcome data.

Data Synthesis and Data Analysis

Data was then synthesised by two reviewers (KLE, KO). A PRISMA approach used by the Cochrane Collaboration was used to summarize the evidence accurately (Liberati *et al.* 2009). Meta-analyses were conducted to assess the effect of the factors of gender and context (dichotomised as mental health/psychiatric or non-mental health/psychiatric).

Results

The final number included in this meta-analysis was 14 papers which reported quantitative data on the outcomes of interest for this analysis. Papers included studies conducted in Israel, Portugal, United States of America, Italy, Sweden, Great Britain, Australia, Canada, Germany and Holland.

Experience of verbal and physical abuse suffered by male and female nurses and medical staff

The proportion of male and female nurses who self-reported as having suffered verbal abuse (VA) was analysed to assess the factor of the gender of the victim in abuse incidence. Relatively few studies reported rates of verbal abuse for male and female staff members separately. In many cases this was due to the samples studied being entirely or almost entirely female. Seven studies were identified which provided self-reported VA data for both male and female nurses separately, summarised in Table 1 below.

[insert table 1 here]

A total of 2042 nurses and health professionals (65.1% female) participated in the included studies of verbal abuse. The primary outcomes considered in these studies were:

occurrence of VA within the last 12 months; (Kitaneh & Hamdan 2012, Zampieron *et al.* 2010); occurrence of verbal abuse within the last 6 months (Sa & Fleming 2008); occurrence of verbal abuse during career (Bernaldo-De-Quirós *et al.* 2015, Sakellaropoulos *et al.* 2011). A higher proportion of female nurses than male nurses were reported to have been the victims of VA in the studies of Bernaldo-De-Quirós *et al.* (2015), Kitaneh and Hamdan (2012), Sa and Fleming (2008), Sakellaropoulos *et al.* (2011) and Zampieron *et al.* (2010). A higher proportion of male nurses than female nurses were reported to have been the victims of VA in the studies of Kwok *et al.* (2006) and Talas *et al.* (2011). However, the studies indicate wide variation in the proportion of both male and female nurses who have suffered VA, with estimates ranging from 6.25% to 88.2% in males; and from 14.3% to 89.7% in females. The odds ratios for gender in each of the individual studies ranged from 0.78 to 2.50, and was statistically significant only in the study of Zampieron *et al.* (2010).

The synthesized estimate for the difference in reported rates of VA between male and female staff indicated a significantly higher proportion of female staff experiencing VA than male staff. The Mantel-Haenszel pooled estimate for the female:male odds ratio, $OR_{MH}=1.21$ (95% CI: (1.05, 1.40) indicated that female nurses and health professionals have approximately 21% higher odds of VA than men at best estimate. This estimate, plus mean estimated odds ratios and associated confidence intervals for the individual studies, are illustrated in Figure 2 below.

[insert figure 2 here]

The proportion of male and female nurses and health professionals who self-reported as having suffered physical abuse/assault (PA) was also analysed to assess the factor of the

gender of the victim in abuse incidence. As for the analysis of VA, relatively few studies were found which reported rates of abuse for male and female staff members separately. Ten studies were identified which provided self-reported PA data for both male and female staff members separately, summarised in Table 2 below.

A total of 3383 nurses and health professionals (69.4% female) participated in the included studies of physical abuse/assault. An additional study (Gacki-Smith *et al.* 2009) also reported this data, but was excluded from the analysis due to its low response rate of 10.9%.

[insert table 2 here]

The primary outcomes considered in these studies were: occurrence of physical abuse within the last 6 months (Ryan *et al.* 2008); within the last 12 months; (Kitaneh & Hamdan 2012, Morgan *et al.* 2005, Zampieron *et al.* 2010) and occurrence of physical abuse during career (Lawoko *et al.* 2004, McKinnon & Cross 2008, Sakellaropoulos *et al.* 2011).

Females were reported to suffer higher proportions of physical abuse than males in the studies of Bernaldo-de-Quiros *et al.*, Morgan *et al.* and Sakellaropoulos *et al.*; all other studies reported males to suffer higher proportions of physical abuse than females. The odds ratio for gender was non-significant in all studies except the study of Talas *et al.* (2011); and the study of McKinnon *et al.* (2008), for which the significance of the odds ratio could not be assessed, as the proportion of male staff experiencing PA was reported to be 100%. As for the assessment of the effect of gender on the incidence of verbal abuse, the studies indicate wide variation in the proportion of both male and female nurses who have suffered physical abuse, with estimates ranging from 9.24% to 100.0% in males; and from 8.93% to 85.5% in females.

The synthesized estimate for the difference in reported rates of PA between male and female staff indicated evidence for a significantly higher proportion of male staff experiencing PA than female staff, with the Mantel-Haenszel pooled estimate for the female:male odds ratio, $OR_{MH}=0.82$ (95% CI (0.71, 0.94)) indicating that in the sample, men had approximately 18% higher odds than women of PA. A sensitivity analysis was conducted by excluding the study of McKinnon et al., for which a complete assessment of the gender effect was unavailable: the synthesized estimate and its associated 95% confidence interval were not substantively affected ($OR_{MH}=0.84$; 95% CI (0.73, 0.96)). The inference of significance was also not affected.

The estimate from the main study, plus mean estimated odds ratios and associated confidence intervals for the individual studies, are illustrated in Figure 3 below.

[insert figure 3 here]

Experience of verbal and physical abuse suffered by psychiatric/mental health workers and non-psychiatric/mental health workers

The proportion of mental health (MH)/psychiatric nurses and other medical staff; and the proportion of medical staff working in non-MH or psychiatric wards (principally accident and emergency wards and nursing homes) who self-reported as having suffered VA was analysed. However, only two studies were identified which reported rates of verbal abuse for staff members from both MH/psychiatric and non- MH/psychiatric backgrounds separately, and from which appropriate odds ratios could be calculated. In many cases this was due to the

samples studied being focussed on a single context only; for example psychiatric nurses. Hence a meta-analysis was not conducted on this data.

For PA, several studies were identified which provided self-reported VA data for nurses working in both MH/psychiatric contexts and non-MH/psychiatric contexts, summarised in Table 3 below.

[insert table 3 here]

A total of 917 nurses and health professionals (35.6% mental health/psychiatric nurses; 64.4% non-mental health/psychiatric nurses) participated in the included studies of physical abuse/assault.

The primary outcome considered in all of the above studies was occurrence of PA within the last 12 months. The studies of Merez et al., Morgan et al. and Zampeiron et al. found MH/psychiatric nurses to self-report as having experienced PA in greater proportions than non-MH/psychiatric nurses; however only Merez found a substantial variation. The study of Franz et al. found greater self-reported PA proportions in on-MH/psychiatric nurses than in MH/psychiatric nurses.

The synthesized estimate for the difference in reported rates of PA between MH/psychiatric nurses and non-MH/psychiatric nurses indicated evidence for a significantly higher proportion of MH/psychiatric nurses experiencing PA than non-MH/psychiatric nurses. The Mantel-Haenszel pooled estimate for the odds ratio for MH/psychiatric nurses versus non-MH/psychiatric nurses, $OR_{MH}=2.91$; 95% CI (2.20, 3.85) indicated that MH/psychiatric nurses have approximately three times higher odds than non-MH/psychiatric nurses of PA at

best estimate. This estimate, plus mean estimated odds ratios and associated confidence intervals for the individual studies, are illustrated in Figure 4 below (the confidence interval associated with the study of Merez et al. is not included in full).

[insert figure 4 here]

A sensitivity analysis was conducted excluding the Merez study, for which the calculated odds ratio was substantially different from the odds ratios calculated from other studies. The corresponding synthesized estimate showed no evidence for a difference in proportion of PA suffered by nurses working in the two contexts ($OR_{MH}=1.37$; 95% CI: (0.94, 1.98)). Hence the inference of a significant difference between the contexts is dependent on the decision whether or not to include the Merez analysis.

Assessment of heterogeneity

A certain degree of statistical, clinical and design heterogeneity is evident in the analysed studies; arising from differences in the gender balances in each included study, differences in the definition of PA, and in the method of obtaining the sample. Differences in sampling procedures between the studies considered are detailed in Table 3 above: the study of Morgan et al. (2005) was focussed on staff working with elderly patients and provided a comparison of data from nurses working at institutions with and without dementia special care units; whereas other studies provided more direct contrasts of the MH/psychiatric context versus the non-MH/psychiatric context (e.g. emergency department). This study was also based on almost entirely female respondents. Non-MH/psychiatric nurses surveyed by Franz et al. (2010) worked in nursing homes rather than hospitals. The study of Zampieron

included cases of assaults by patients' relatives, with most other studies being focussed on assaults by patients alone. Despite the study of Franz et al. having a considerably smaller sample than the other included studies, the confidence interval associated with this study was narrower than the Merez and Zampieron studies, indicating a higher degree of homogeneity within the respondents analysed by Franz et al.

Discussion

The gender issue

This meta-analysis has revealed female nurses have about 50% greater odds of verbal abuse from patients/relatives or staff than male nurses. This factor was statistically significant, and is based on a total sample size of over 2000. The gender issue in nursing in part may be apparent (for instance nursing being a female dominated profession) and men remain the minority in nursing programs worldwide. (Meadus & Twomey 2011) However, we suggest that this forms only part of the picture pertaining to verbal abuse and female nurses being at greater risk. High trait anxiety is associated with attentive processing and may influence a processing bias in threat-related stimuli (Tan *et al.* 2011). Some studies have suggested gender differences in processing potential threat or threat related stimuli, where females are more sensitive to threatening stimuli than males and potentially could over-estimate the threat involved (Goos & Silverman 2002, McClure 2000, McClure *et al.* 2004). Additionally, research over time suggests females experience trait anxiety more commonly than males (Breslau *et al.* 1995, Broadbent & Broadbent 1988, Simonds & Whiffen 2003). With this in mind, reporting of verbal abuse may be higher among female nurses due to an over-estimation of the threat posed compared to male nurses who may under-estimate threat-risk.

Male nurses have about 18% greater odds of physical assault from patients/relatives or staff than female nurses, with this factor being based on a total sample size of over 3300. This statistically significant finding points to a factor in potentially 'at risk' staff for physical assault. More specifically, male nurses may be located in higher numbers in higher risk areas (such as mental health and emergency departments) and for reasons not known may be called upon to moderate challenging behaviours of patients and/or their family/friends (McKinnon & Cross 2008). Importantly, consideration must be made to the representation of males in each study included in this meta-analysis, which was small in comparison to the female nurse participants.

Clinical setting plays a role

Psychiatric or mental health nurses have about 3 times the odds of physical assault from patients/relatives or staff than nurses in non-psychiatric/mental health settings. This factor was statistically significant and is based on a total sample size of over 900. This finding may have a number of consequences pertaining to recruitment and retention in mental health nursing. Recruitment to mental health nursing is poor in comparison to other areas of healthcare (Bruckner *et al.* 2011, Kakuma *et al.* 2011, Thomas *et al.* 2012). Some researchers suggest stress being a factor and call for nurses to find a balance and to embrace the positive aspects of the role (Ward 2011) while other researchers suggest student nurses 'don't know what they are missing' due to the lesser mental health content in nursing curriculums compared to acute medical and aged care content (Happell & McAllister 2014, Moxham *et al.* 2011, Warelow & Edward 2007). Furthermore, there has been the suggestion of not enough mental health placement clinical hours to ensure the student knows about the area of health enough to make a decision to enter the mental health nursing ranks (Mullen & Murray 2002).

While these aforementioned issues may be contributing factors to poor recruitment to the area of mental health/psychiatric nursing, perhaps the potential for physical assault has had more of an impact on student decision making to become a mental health/psychiatric nurse than previously considered.

The extent of these effects, but probably not the overall existence or non-existence, may be quite sensitive to the choice of studies which are included. For example, the study of Merez et al. gave a substantially different odds ratio for physical abuse among psychiatric/MH and non-psychiatric/MH than did other studies in the meta-analysis. The meta-analyses of both verbal and physical abuse indicate a large amount of heterogeneity between studies; arising from differences in the roles of staff participating in the studies, differences in the definition of VA and PA, and in the method of obtaining the sample. It is difficult to distinguish between these potential sources of heterogeneity. The study of Sa and Fleming considered only verbal abuse from co-workers; Kitaneh et al. found the most common perpetrators to be patients' relatives or visitors, and their sample included both doctors and nurses. Kitaneh's study was also the only one in which males outnumbered females. The low response rate (less than 30%) of the study of Sakellaropoulos *et al.* (2011) from which the highest rates of VA in both males and females, and one of the lowest odds ratio for gender were reported, may have resulted in selection (response) bias for that study. Response rates for this study, and that of Kwok et al., and Zampieron et al., were considerably lower than other studies considered. The extreme proportions of PA suffered by males reported by Morgan et al. (6.67%) and McKinnon et al. (100.0%) may be a reflection of the small number of males in both of these studies (6 and 20 respectively).

Further differences in proportions of reported VA and PA, and the relative frequencies of abuse suffered by males and females, may have occurred due to cultural variation: the

analysis included studies from Western countries and those based in Islamic areas (the study of Kitaneh et al. was conducted in an Arab population).

Conclusion

This meta-analysis has identified that mental health nurses have higher odds of physical abuse than those nurses in non-mental health settings. However, this conclusion is based on the inclusion of the study by Merez et al. (2006); for which an outlying estimate of the odds ratio was recorded, although there is no evidence that the value obtained from this study is invalid. All nurses regardless of clinical area are at risk of some form of aggression. Female nurses were highlighted as having greater odds of verbal abuse than males, and males as having greater odds of physical abuse. Both these findings based on large total sample sizes, were statistically significant and of substantive importance.

Relevance to clinical practice

There is a need for healthcare organisations to consider these findings when in consideration of the required support for clinicians to manage the effects of both physical and verbal abuse, for example, access to counselling services, wellbeing programmes, annual training related to management of challenging behaviours and flexible working patterns. Additionally healthcare educators must ensure nurses (student and registered) are provided with the knowledge and skills to avoid challenging/aggressive situations or if necessary the skills to manage challenging/aggressive situations. This is currently not commonly seen in nursing curricula.

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Table 1: Study characteristics of studies providing verbal abuse data by gender

Study	Main author/study date	Location	Sample	Total sample size	Response rate	VA (%) in males (95% CI)	VA (%) in females (95% CI)	Odds ratio (95% CI)
1	Bernaldo-de-Quiros (2014)	Spain	Physicians and nurses recruited from pre-hospital emergency services	441	33.7%	46.1 (40.3, 51.9)	49.7 (41.9, 57.5)	1.15 (0.78, 1.70)
2	Kitaneh (2012)	Israel	Physicians and nurses recruited from several departments in 5 public hospitals	142	88.7%	52.9 (38.9, 66.9)	63.7 (53.7, 73.7)	1.56 (0.77, 3.15)
3	Kwok (2006)	Hong Kong	Nurses recruited from a university teaching hospital	320	25%	65.4 (47.1, 83.7)	(59.5 (53.9, 65.1)	0.78 (0.34, 1.80)
4	Sa (2008)	Portugal	Nurses recruited from medical in-patient units in a public health system	107	71.0%	6.25 (0.0, 19.1)	14.3 (7.0, 21.5)	2.50 (0.30, 21.1)
5	Sakellaropoulos (2011)	USA	Randomly selected members of American Association of Nurse Anesthetists	184	29.3%	88.2 (80.4, 96.0)	90.0 (84.1, 95.3)	1.16 (0.44, 3.00)
6	Tallas (2011)	Turkey	Physicians and nurses recruited from emergency departments of 6 hospitals	270	47.5%	81.1 (74.8, 87.4)	77.9 (70.5, 85.2)	0.82 (0.45, 1.49)
7	Zampieron (2010)	Italy	Nurses recruited from several departments in 2 hospitals (one University; one general)	578	37.0%	32.8 (24.3, 41.3)	43.1 (38.6, 47.7)	1.56 (1.02, 2.38)

Table 2: study characteristics of studies providing physical abuse data by gender

Study	Main author/study date	Location	Sample	Total sample size	Response rate	PA (%) in males (95% CI)	PA (%) in females (95% CI)	Odds ratio (95% CI)
1	Bernaldo-de-Quiros (2014)	Spain	Physicians and nurses recruited from pre-hospital emergency services	441	33.7%	10.9 (7.29, 14.5)	16.5 (10.7, 22.3)	1.62 (0.92, 2.84)
2	Kitaneh (2012)	Israel	Physicians and nurses recruited from several departments in 5 public hospitals	142	88.7%	25.9 (8.82, 43.2)	17.4 (1.04, 33.7)	0.60 (0.15, 2.47)
3	Kwok (2006)	Hong Kong	Nurses recruited from a university teaching hospital	320	25%	23.1 (6.88, 39.2)	20.4 (15.8, 25.0)	0.85 (0.33, 2.22)
4	Lawoko (2004)	GB/Sweden	Psychiatric nurses and psychiatrists recruited from general psychiatric clinics	1426	67.0%	78.1 (73.6, 82.6)	73.1 (69.9, 76.3)	0.76 (0.56, 1.04)
5	McKinnon (2008)	Australia	Nurses recruited from two adult acute psychiatric inpatient units and community-based teams	56	70.0%	100 (100.0, 100.0)	83.7 (72.4, 95.1)	n/a
6	Morgan (2005)	Canada	Nursing aides recruited from rural nursing homes with and without dementia special care units	355	71.0%	6.67 (19.6, 1.00)	7.00 (6.51, 7.48)	1.17 (0.21, 6.50)
7	Ryan (2008)	USA	Medical staff recruited from state psychiatric hospital	93	71.2%	80.0 (62.5, 97.5)	58.9 (47.6, 70.2)	0.36 (0.11, 1.18)
8	Sakellaropoulos (2011)	USA	Randomly selected members of American Association of Nurse Anaesthetists	184	29.3%	78.3 (67.7, 89.0)	85.5 (78.8, 92.1)	1.63 (0.72, 3.67)
9	Talas (2011)	Turkey	Physicians and nurses recruited from emergency departments of 6 hospitals	270	47.5%	47.2 (39.3, 55.3)	33.6 (25.2, 42.0)	0.56 (0.34, 0.93)
10	Zampieron (2010)	Italy	Nurses recruited from several departments in 2 hospitals (one University; one general)	578	37.0%	9.24 (3.99, 14.5)	8.93 (6.31, 11.5)	0.96 (0.48, 1.94)

Table 3: study characteristics of studies providing PA data by context

Study	Main author/study date	Location	Sample	Total sample size	Response rate	PA (%) in MH nurses (95% CI)	PA (%) in non-MH nurses (95% CI)	Odds ratio (95% CI)
1	Franz (2010)	Germany	Nurses and health care workers recruited from 2 nursing homes and a psychiatric clinic	92	38.8%	78.7 (68.2, 89.2)	83.9 (70.4, 97.3)	0.71 (0.22, 2.25)
2	Merecz (2006)	Poland	Nurses attending a professional training course	413	92.6%	79.5 (70.4, 88.6)	20.5 (16.2, 24.9)	15.0 (8.13, 22.7)
3	Morgan (2005)	Canada	Nursing aides recruited from rural nursing homes with and without dementia special care units	355	71.0%	73.3 (66.6, 80.0)	64.5 (57.6, 71.4)	1.51 (0.96, 2.39)
4	Zampieron (2010)	Italy	Nurses recruited from several departments in 2 hospitals (one University; one general)	578	37.0%	77.7 (57.2, 98.4)	71.1 (56.2, 86.0)	1.43 (0.37, 5.46)

Figure 1: Search Outcome PRISMA Flowchart

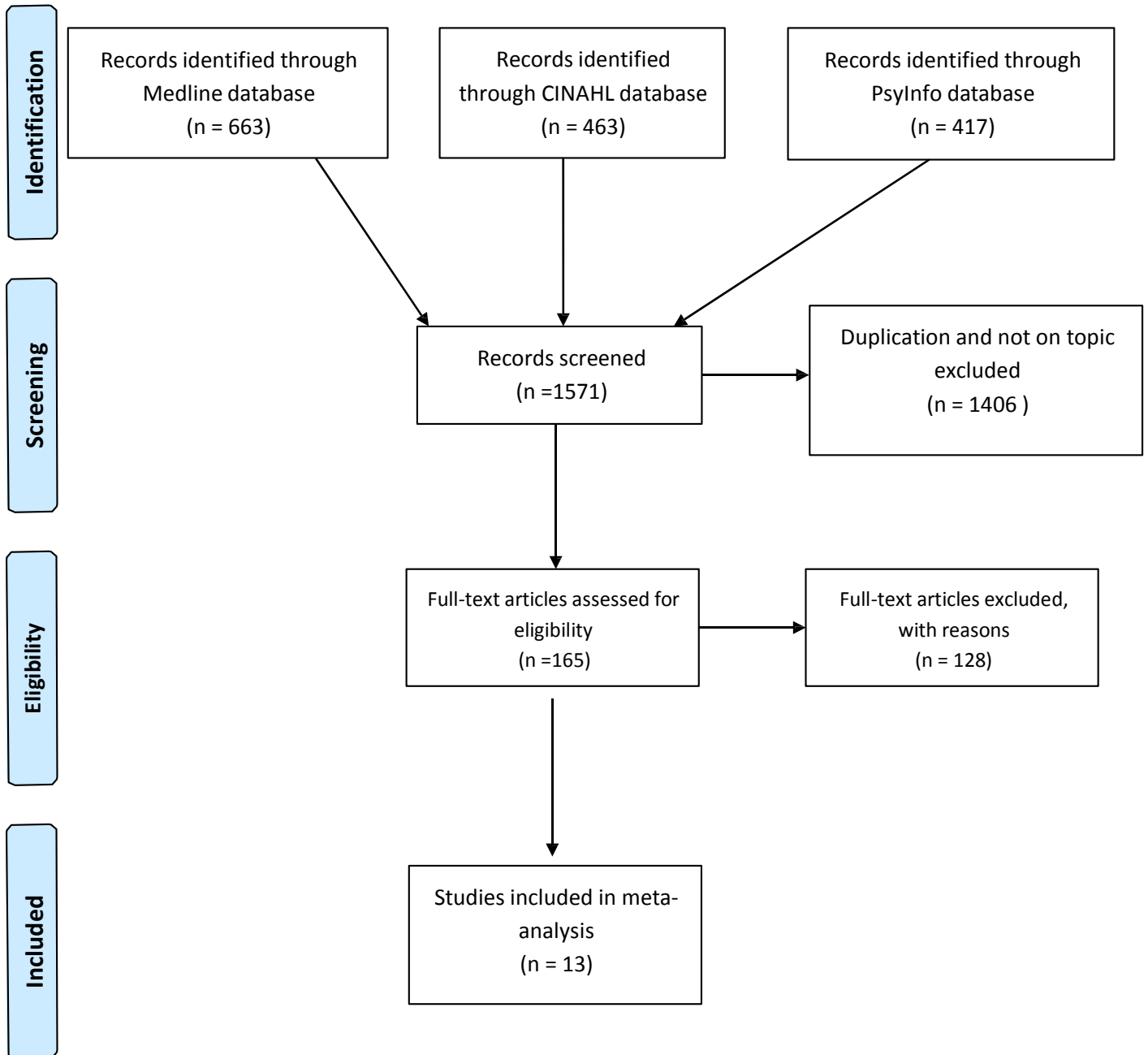


Figure 2: forest plot illustrating odds ratio and associated confidence interval for gender on rates of verbal abuse within 6-12 months

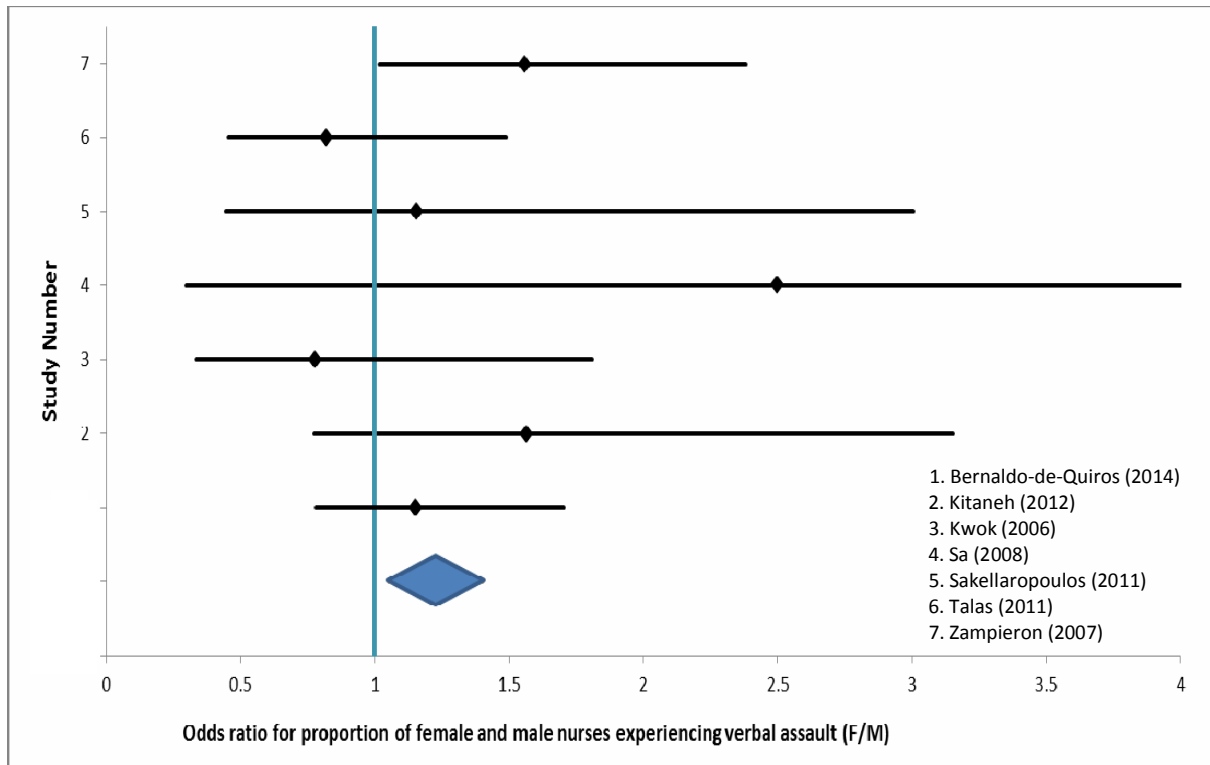


Figure 3: forest plot illustrating odds ratio and associated confidence interval for effect of gender on rates of physical abuse within 6-12 months

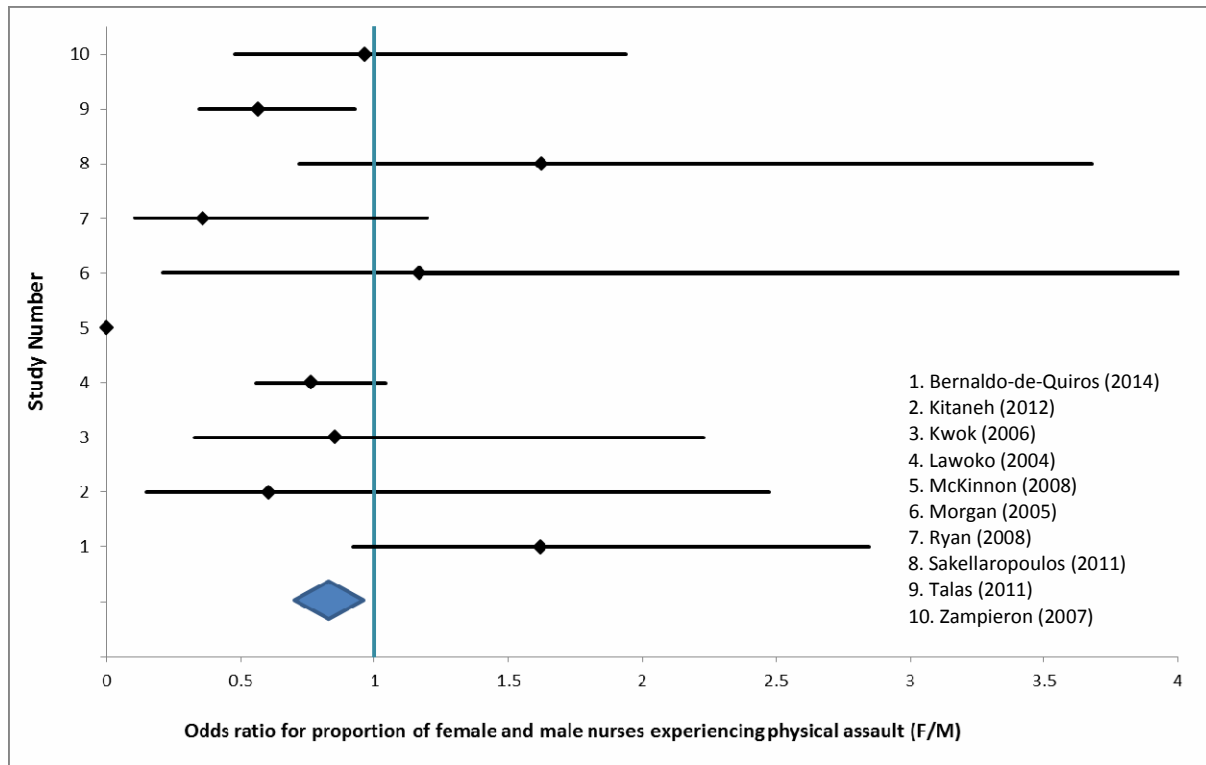


Figure 4: forest plot illustrating odds ratio and associated confidence interval for effect of context on rates of physical abuse within 6-12 months

