REVIEWS

The impact of 12-hour shifts on nurses' health, wellbeing, and job satisfaction: A systematic review

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ABSTRACT

Objective: This review was conducted to investigate the impact of applying 12-hour shifts in comparison to 8-hour shifts on nurses' health wellbeing and job satisfaction.
Methods: MEDLINE, CINHALE, PsycINFO, EMBASE, Web of Science, and SCOPUS databases were searched, covering the period between 1980 to 2017. Studies were included if they concerned nurses working for 12-hour shifts in comparison to 8-hour shifts in hospital settings, based on observational/surveys studies.
Results: In the yielded 12 studies, 3 studies reported that 12-hour shifts had an impact on nurses' health and wellbeing, such as cognitive anxiety, musculo-skeletal disorders, sleep disturbance, and role stress; however, there was no significant difference between 12- and 8-hour shifts with digestive and cardiovascular disorders, psychological ill health, and somatic anxiety. Of the 4 studies measuring the impact of 12-hour shifts on fatigue, three studies showed that the nurses experienced more fatigue in the 12-hour shifts in comparison to 8-hour shifts; nevertheless, one study did not find a significant difference in fatigue and critical thinking performances between 12- and 8-hour shifts. Nine of the 12 studies measured job satisfaction in 12- and 8-hour shifts, 5 studies showed a greater dissatisfaction regarding 12-hour shifts, while 3 studies found that the nurses were more satisfied with 12-hour shifts than with 8-hour shifts; but one study pointed out that there was a difference between the two shifts considering pay and professional status.
Conclusions: The findings of the review suggest that 12-hour shifts resulted in negative health concerns and job dissatisfaction; however, there is a need for more empirical evidence to support this.

Key Words: Twelve hour shift, Eight hour shift, Nurses' health, Nurses' wellbeing, Nurses' job satisfaction

1. INTRODUCTION

In the past two decades, many changes have been implemented in healthcare working systems. One of these changes has been the assimilation of shift-work systems and flexibility in work schedules. The need for 24 hours care makes healthcare professions work with different shift systems, such as 8 h, 9 h, 10 h or 12 hour shifts. However, the common shift-work systems divided a 24 h day in two (12 h) or three (8 h) shifts. This requires the staff to be adaptable to the various forms of shift work schedules.[1]

When considering the negative impacts of shift-work on workers' health, fatigue and sleepiness are the most common complaints among staff. Job performances, lack of psychosocial well-being, and job dissatisfaction have also been well reported in the literature.[2,3] Community based studies of fatigue demonstrate the prevalence of fatigue in

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primary care studies, which is defined as loss of energy and tiredness among workers ranging from 10% to 45%.[2,4] This prevalence is associated with lack of physical activity and psychosocial variables such as depression and anxiety, and psychological problems. The data of NHANES (National Health and Nutrition Examination Survey), indicates that female respondents suffered from fatigue at 20.4%, which is higher than that suffered by male respondents at 14.3%. This finding points to a higher risk among women than men at 1.5 times more risk.[5] Therefore, fatigue is considered as a symptom resulting from shift work, which has an impact on health. It has a significant effect on the levels of alertness, concentration, judgment, mood, and performance which might also be a reason for the increased risk of injury and medical errors.[6,7] Moreover, fatigue also impairs memory, problem solving, and decision making-abilities.[8,9] Fatigue problems are believed to cost the United States about 18 billion dollars in accidents and lost productivity, while 76,000 injuries among shift workers were reported.[6,10]

With regard to sleepiness, several studies have indicated that the average of sleep duration from the 1910 to 2002 has decreased from 9 to 6 hours on workdays.[11,12] A survey study showed that American nurses have an average of 84 minutes more sleep on non-workdays.[13] Thus, shift work is suggested as a cause of sleep disorders among nurses, where they feel sleepy during a shift. When considering the contributing factors of sleepiness, the literature identifies that long working hours and rotating shifts as the main causes for sleeping disorders. In the night and with rotating shifts, the nurses rarely obtain an adequate amount of sleep. In fact, the nurses experienced less sleeping hours (1 to 4 hour) than in normal sleeping situation.[14,15] More studies have revealed that long shift hours and overtime are strongly linked to the difficulties of being awake through a shift which leads to the increased risk of making an error.[13,16]

Despite the fact that the exact amount of sleep required for healthy adults has not been determined, the impact of sleepiness is well documented. Relevant literature indicates that insufficient sleep has an adverse effect on adult's health. Although literature demonstrates relevant studies with different methodologies, the findings report the same results. It is found that an inadequate amount of sleep has an impact on mood, job performance, motivation, cognitive skills, and safety.[17,18] Moreover, depression and irritability significantly increased, plus the feelings of stress with low hours of sleep. Furthermore, a growing body of literature concludes that lack of sleep is connected with the metabolism and appetite problems with, increasing the risk of obesity.[19,20] In addition, insufficient sleep can alter glucose tolerance levels and increases the risk of development of diabetes.[21] Furthermore, few hours of sleep impact on hormone levels such as leptin, cortisone, and thyrotropin all dependent on sleep duration.[22]

The Maastricht Cohort study on fatigue at work demonstrated that increasing the hours of work per day resulted in a greater need for recovery from work.[9] This study also indicated that working for six or fewer hours per day lowered the need for recovery time. Overtime, extended work shifts, and working for more than 8-hours can have an adverse effect on health, such as the risk of musculoskeletal disorders, cardiovascular symptoms, hypertension, injury, and the risk of diabetes, as well as increased mortality and morbidity rates, and a higher rate of accidents.[8,23–27] Fatigue has been found to increase over the length of the duration of shifts among the healthcare professions, such as in 12-hour shifts.[3] Moreover, the quality of nurses' work suffered with long working hours (9 h and 12 h).[28]

However, while systematic reviews have been conducted to examine the impact of working hours on health, it is noticeable that no review has examined the impact of 12-hour shifts compared to 8-hour shifts on nurses' health and wellbeing, and job satisfaction. For example, a review was conducted to investigate the effect of residents' working hours on patients' safety, including mortality rates, medication errors, and adverse events,[29] whereas a further review which examined the differences between 8 and 12-hour shifts considering the worker's outcomes and safety in the industrial sector.[30] Despite the fact that nurses work different shift work systems which are similar to industrial workers, they cannot be compared to industrial shift workers for various reasons. The nurses' work environment is different from that of the industrial worker, and nurses deal often with life and death situations.

2. METHODS OF THE REVIEW

The objective of this review is to investigate whether 12-hour shift has an impact on nurses' health, wellbeing and job satisfaction in comparison to 8-hour shifts. Thus, a three-step search strategy was used in this review to identify published and unpublished studies reported in English from 1980-2017. Starting the search from 1980 was selected because most studies were conducted when the 12-hour shift was introduced in healthcare systems that is crucial to find out if there is any issues or changes in the evidence from 1980 until 2017. Initially, limited searches of MEDLINE and CINAHL were undertaken to identify keywords contained in the titles or abstracts and the index terms used to describe relevant articles. A second extensive search using identified keywords was then undertaken across all included databases which are MIDLINE, CINHAL, PsychINFO, EMBASE, Web of

Science, and SCOPUS (Elsevier). The third step included a hand-search of the references lists and bibliographies of all potential studies to identify relevant articles, this hand-search has accessed several journals such as the Nursing Times Journal, Nursing Management Journal, Nursing Administration Journal, and Online dissertation abstract.

2.1 Search terms

The search started by dividing the research question into parts for an easier and accurate search process. The results of the search terms are shown in the Table 1.

Table 1. Search terms used in the databases

Electronic databases used	Key component	Keywords
MEDLINE CINHAL EMBASE Web of Science SCOPUS (Elsevier)	Shift work	"12 hour shift" "8 hour shift" "twelve hour shift" "long hour$" "shift length" "shift schedule" "working shift" "12 hour shift$" "shift work" "shift pattern"
	Nurses' health-wellbeing	"physical health" "health" "mental health" "exhaustion" "psychological stress"
	Fatigue	"Chronic fatigue" "muscle fatigue" "tiredness" "mental fatigue"
	Sleep	"sleep disturbance" "sleep deprivation" "sleep apnea" "sleep disorder"
	Job satisfaction	"Job satisfaction" "Attitude of health personnel" "Job performance" "burnout"

The search was established with each keyword, and then by grouping, and combining terms together using boolean technique to achieve the best literature.

2.2 Types of studies

This review considers any Randomized Controlled Trials (RCTs) published after 1980 that evaluate the effect of 12-hour shifts on nurses' health, wellbeing, and job satisfaction. In the absence of RCTs, other research designs such as non-randomized controlled trials, cohort studies, experimental and non-experimental studies, observational studies, and before and after studies were also considered for inclusion in a narrative review to enable the identification of current approaches and possible outcome measures.

2.3 Types of participants

The review examined studies that included all nurses (male and female). Studies that evaluate the effects of working hours on patients and other health care providers were excluded from this review. Also, studies that have a combination of nurses, doctors, and technicians in their sample were excluded.

2.4 Types of interventions

This review included the studies that evaluated the impact of 12-hour shifts in comparison to 8-hour shifts on nurses' health, wellbeing, and job satisfaction by comparing these two types of shift schedule. Moreover, studies that included an evaluation of the 12-hour shift on nurses, and studies that combined the 12-hour shift with working hours per week were also included.

2.5 Types of outcome measures

Working hours among nurses have been assessed by various methods. However, the most common ways of assessing the impact of 12-hour shifts are to measure nurses' health and their satisfaction. Thus, for this systematic review, the primary outcome of interest is the impact on nurses' health and wellbeing: including physical psychological health disorders, fatigue, alertness, critical thinking, sleep disturbance and stress. The secondary outcome is job satisfaction which is measured by nurses' behaviour, nurses' attitude, burnout, and emotional exhaustion.

2.6 Retrieval of references and handling

In this review, in order to identify more studies, checking and hand-searching of bibliographies were used. At first, all the studies written in the English language from 1980 to 2017 which met the inclusion criteria and matched the key terms were included. Secondly, in quantitative studies, all the abstracts were reviewed according to the review objective. After that, the full texts were obtained, and appropriate references were identified. In addition, the list of included and excluded studies was decided and confirmed after examination.

2.7 Assessment of methodological quality

After the comprehensive search, all the primary studies chosen were examined with regard to the quality of study design. In order to avoid bias, two reviewers assessed the quality of the studies included within the review, and identified whether or not they were of high quality on selection, performance, measurement and attrition thus minimising bias.[31] The quantitative papers were assessed for methodological validity prior to inclusion, by using standardised critical ap-

praisal instruments from the Joanna Briggs Institute Meta Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI). The methodological quality of the 13 final studies included in this review was examined. Of the 13 final studies, all used observational designs; 6 used descriptive cross-sectional studies, and 5 used a survey. One used a before and after design, and the final one used a quasi-experimental design. After the assessment, 12 studies were included in this review and one descriptive study was excluded due to the low methodological quality. Both reviewers decided to exclude the study as a result of unclear criteria of sample inclusions, confounding factors and how they were dealt with, also outcome assessment measures, in addition to insufficient descriptions between both groups, and the follow-up was also not conducted.

2.8 Data collection

Data from primary studies were extracted and gathered by using data extraction tools based on JBI-MAStARI. The extracted data included specific details on the study design, sample, setting, shift examination, measurement tool, outcome measures, key findings, and statistical analysis.

2.9 Data analysis

In this review, the extracted data from the included studies was synthesised and presented in narrative form instead of meta-analysis, as a result of a lack of concurrence in methodology within the relevant studies. The lack of homogeneity in data means meta-analysis may not be undertaken, as the pooling of data may not be feasible.[32,33] In order to make it clear, the studies were grouped together for analyses within three categories, such as fatigue, physical, psychological health, wellbeing, and job satisfaction.

2.10 Literature search result

The results of the identified studies in each database are shown in Table 2.

Table 2. Results of search strategy

Database	Dates searched	Total references	Total potential identified studies
CINHAL	1982-2017	2703	187
MIDLINE	1980-2017	1896	230
Psycho INFO	1982-2017	1290	94
Scopus	1980-2017	1945	87
Web of Science	1980-2017	82	43
Manual research			17
Total		7916	658

The databases and manual search yielded 658 studies. Of these 658 studies, 194 were identified as being potentially relevant after reviewing the titles and abstracts. Reviews, letters, conference papers and comment studies were excluded, leaving 159 studies to be formally analyzed by using an inclusion and exclusion criteria which was developed by the researcher for this review. From the 159 studies, 135 studies did not meet the inclusion criteria, such as studies including nurses and other healthcare providers as participants, comparing rotating shifts among nurses, comparing 8- vs. 9-hour shifts or measuring the impact of 12-hour shifts on patients' outcomes and medication administration errors. Of the 24 studies left, 7 studies were not accessible (7 articles were not accessible on the university databases). Of the 18 studies, 4 studies were published with foreign languages. This resulted in the selection and analysis of 13 studies. One study was excluded because of the low methodological quality, resulting in a final sample of 12 studies. Figure 1 presents a visual representation of the overall search process.

2.11 Data synthesis

The data was synthesized and grouped under three main outcome measures which were physical, psychological health, wellbeing, fatigue, and job satisfaction. Summaries of the outcome measure are clarified in Tables 3 and 4.

3. RESULT

3.1 The impact of 12-hour shifts on nurses' physical and psychological health and wellbeing

Three studies have examined the effects on nurses' health and wellbeing. Iskra-Golec et al. (1996) conducted a study to find out the impact of working hours (12 h day/night shifts vs. 8 h day/afternoon shifts) on nurses' health and wellbeing by comparing two groups of ICUs nurses working for either 12 (n = 96) or 8 (n = 30) hour shifts.[34] The findings demonstrated that the total mean score of the 12-hour shift group reported (15.42) digestive problems compared to the 8-hour shift group (15.68). The mean score of the 12-hour shift and 8-hour shift groups revealed that both groups experienced

cardiovascular symptoms (15.29, 16 respectively). 12.36 mean score of psychological ill-health was found with the 12-hour shift group, while it was 11.08 with the 8-hour shift group. Mean of health measures of somatic anxiety (aggravated by bodily symptoms) of tension, such as butterflies in the stomach[35] among the 12-hour shift group shows (17.38), whereas in the 8-hour shift it was 16.33. However, a significant difference in the mean score between both groups was found in cognitive anxiety (aggravated by mental concern) where the 12-hour shift group reported (16.16) higher than the 8 hour shift group (13.48).

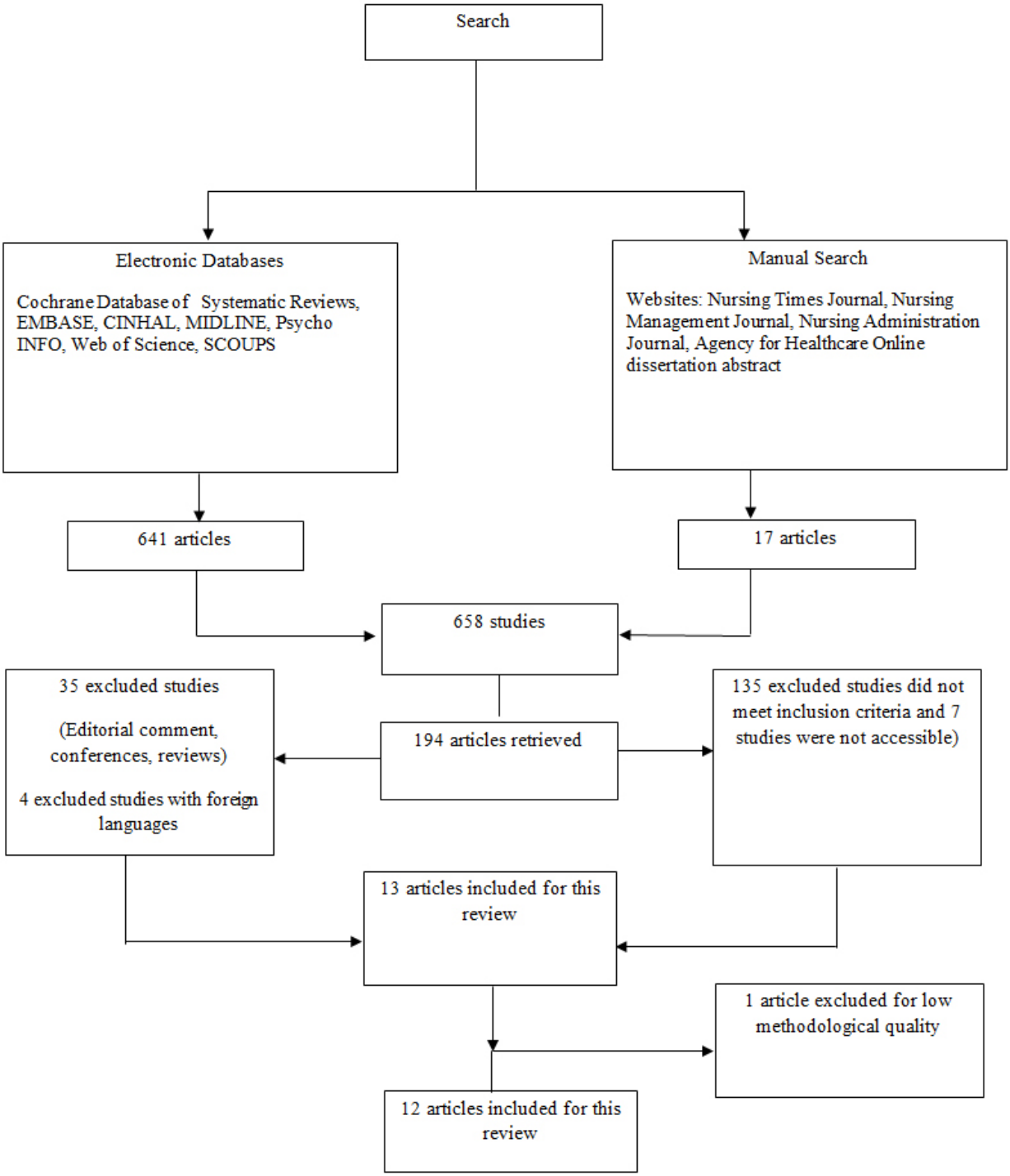

Figure 1. Search and retrieval process

Table 3. Studies included in the review

No	Authors	Study title	Study design	Sample size	Outcome measure	Measurement tool	Settings	Shift analysed
1.	Field and Loverid-ge (1988)	Critical thinking and fatigue: How do nurses on 8 and 12 hour shifts compare?	Quasi-experimental design	102 registered nurses	Critical thinking and fatigue	Subjective Symptoms of Fatigue (Yoshitake, 1978) and Three-Minute Reasoning Test (Beddeley, 1968)	Critical care unit, Acute-care Hospital, Southern California	8 and 12 hour shifts
2.	Iskra-Golec et al. (1996)	Health, well-being and burnout of ICU nurses on 12- and 8-h shifts	Descriptive study	Nurses working 12 hour (n = 96), and nurses working 8 hour (n = 30)	Health, wellbeing, and burnout	Standard Shift work Index (Barton et al.,1990), and Maslach Burnout Inventory (Maslach and Jackson, 1981)	Intensive care units, Cracovian hospital, Wales, UK	8 and 12 hour shifts
3.	Szczurak et al. (2007)	Estimation of the psychological load In the performance of nurses' work based on subjective fatigue symptoms	Descriptive study	108 of nurses	Psychological fatigue	Japanese scale (Subjective Symptoms of Fatigue (Yoshitake, 1978)	Cardiology and surgical units, Poland	8 and 12 hour shifts
4.	Lipscomb et al. (2002)	Work schedule characteristics and reported musculoskeletal disorder of registered nurses	Descriptive cross-sectional design	1163 registered nurses	Musculoskeletal disorders of the neck, shoulder, and back	Nordic Questionnaire of Musculoskeletal Symptoms (Kuorinka et al., 1987), and Job Control Questionnaire (Karasek, 1985)	Two states in the United States (Illinois and New York) registered nurses	≤8 and ≥12 Combined with working hours per week
5.	Hoffman and Scott (2003)	Role stress and career satisfaction among registered nurses by work shift patterns	Descriptive cross-sectional design	500 registered nurses	Role stress, and career satisfaction	Nursing Stress Scale, and Index of Work Satisfaction (Hoffman and Scott, 2003)	Michigan registered nurses working in critical care, medical-surgical, mental health, and paediatric units, US	8 and 12 hour shifts
6.	Palmer (1991)	Eight- and 12- hour shifts: comparing nurses' behaviour patterns	Descriptive study	40% random sample of registered and licensed vocational nurse	Nurses behaviour	Developed questionnaire including job performance, attendance, continuing education, and general job satisfaction (Palmer, 1991)	Critical care, emergency, and perinatal, medical-surgical, paediatric and diabetes units in Foothill Presbyterian Hospital, Glendora, California	8 and 12 hour shift
7.	Todd et al. (1993)	12-hour shifts: job satisfaction	Before and after study design	320 nurses	Job satisfaction of nurses	Likert Scale (Clark, 1975)	10 wards of a country hospital in North Ireland, UK	8 and 12 hour shift
8.	Kundi et al. (1995)	Attitudes of nurses towards 8-h and 12-h shift systems	Descriptive study	1,124 nurses	Attitude of nurses	Developed questionnaire including shift schedule and shift preference	9 hospital in the US, Vienna city and 3 private hospitals	8 and 12 hour shift
9.	Stone et al. (2006)	Comparison of nurse, system and quality patient care outcomes in 8-hour and 12-hour shifts	Descriptive cross-sectional design	805 nurses	Job satisfaction and emotional exhaustion	Maslach Burnout Inventory (MBI) (Maslach and Jackson, 1981), and Job Enjoyment Scale (Taunton et al. 2004)	99 direct care units in Fourteen hospitals in New York city	8 and 12 hour shift nurses
10.	Dall'Ora et al. (2017)	Association of 12 h shifts and nurses' job satisfaction, burnout and intention to leave: findings from a cross-sectional study of 12 European countries	Cross-sectional survey	31627 registered nurses in 2170 general medical/surgical units within 488 hospitals	Job satisfaction and emotional exhaustion	The survey included a total of 118 questions organised in five sections: investigating work environment, burnout and job satisfaction, 'About your most recent shift at work in this hospital', which had the purpose to measure shift length and nurse staffing levels. The 'About you' section aimed to investigate demographic details such as age, gender and education. Maslach Burnout Inventory (MBI) was used to assess emotional exhaustion.	12 European countries.	≤8 and ≥12 hour shifts
11.	Estryn-Béhara and Van der Heijden (2012)	Effects of extended work shifts on employee fatigue, health, satisfaction, work/family balance, and patient safety	Secondary analysis	25,924 European nurses	Nurses' health, wellness and job satisfaction	Satisfaction with workschedules for well-being and for family life (single questions), and extent of Work-family conflict (W/FC) (five-item scale) Netemeyer et al. (1996). health problems we used several indicators, Burnout Kristensen and Borritz (2001), Work-ability index IIlmarinen et al. (1997).	hospitals (N = 147), nursing homes (N = 185), and home care institutions (N = 76).	≤8 day/night shifts and ≥12 hour day/night shifts
12.	Stimpfel et al. (2012)	The Longer The Shifts For Hospital Nurses, The Higher The Levels Of Burnout And Patient Dissatisfaction	A secondary analysis of cross-sectional data	22,275 registered nurses	Job satisfaction Burnout	Job satisfaction was assessed by using point Likertscale. Burnout was measured using the nine-item emotional exhaustion subscale of the Maslach Burnout Inventory.	577 hospitals In California, New Jersey, Pennsylvania, and Florida	8-9 hours, 10-11 hours, 12-13 hours

Table 4. Summary of study outcome measures

Main category	Authors	Specific outcome	Staff preferred shift (8h/12h)	Shift analyzed
Working hours and physical and psychological health and wellbeing	Iskra-Golec et al. (1996)	Health and wellbeing (digestive and cardiovascular disorders, cognitive and somatic anxiety, and sleep)	√	8 and 12 h
	Lipscomb et al. (2002)	Health complaints (neck, shoulder, and back)	√	≤8h and ≥12h
	Hoffman and Scott (2003)	Stress	√	8h and 12h
Working hours and fatigue	Field and Loveridge (1988)	Fatigue	-	8h and 12h
	Iskra-Golec et al. (1996)	Fatigue	√	8h and 12h
	Szczurak et al. (2007)	Fatigue	-	8h and 12h
	Estryn-Béhara et al. (2012)	Fatigue	√	
Working hours and job satisfaction	Palmer (1991)	Nurse's behavior	√	8h and 12h
	Todd et al. (1993)	Job satisfaction	√	8h and 12h
	Kundi et al. (1995)	Job satisfaction	√	8h and 12h
	Hoffman and Scott (2003)	Job satisfaction	-	8h and 12h
	Stone et al. (2006)	Job satisfaction	√	8h and 12h
	Iskra-Golec et al. (1996)	Job satisfaction with free time	√	8h and 12h
	Dall'Ora et al. (2017)	Job satisfaction, burnout and intention to leave	√	8h and 12h
	Stimpfel et al. (2012)	Job satisfaction, burnout and intention to leave	√	8h and 12h
	Estryn-Béhara and Van der Heijden (2012)	Job satisfaction, burnout and intention to leave	√	8h and 12h

Sleep disorder was one of the outcome measures studied by Iskra-Golec et al. (1996).[34] The results showed that nurses working longer shifts reported significant general sleep disturbances compared to the 8-hour shift group (F = 10.35). Moreover, the 12-hour shift group were more tired after sleep than the 8 hour shift group, despite the fact that they slept longer and had a higher ratio of average sleep length, to the length of sleep declared as sufficient (0.84) in the 8-hour shift group (0.62).

Lipscomb et al. (2002) carried out a study to examine the relationship between work schedule characteristics such as working for 12-hour shifts or more per week (day shift), and 8-hour shifts or more per week (day shift), and the reported musculoskeletal disorders of the neck, shoulders, and back.[25] This cross-sectional study had a sample of 1,163 nurses selected randomly from the list of actively licensed nurses residing in two states, Illinois and New York, United States.

The results demonstrated that long working hours per day together with a combination of working-hours per week were associated with musculoskeletal disorders. Thus, they found that working 12-hour shifts or more per day, and working for 40 hours or more per week elevated the odds ratio for musculoskeletal disorders of the neck (OR 2.30, 95% CI 1.03-5.11) shoulder (OR 2.48, 95% CI 1.07-5.77), and the back (OR 2.67, 95% CI 1.26-5.66). However, the authors indicated that neither working for 12-hours per day or more, or 40 hours per week or more itself increased the risk of reported musculoskeletal disorders.

Hoffman and Scott (2003) conducted a descriptive cross-sectional study among 500 registered nurses working 8 and 12-hours (12 h day/night shifts, 8 h day/evening/night shifts) in the United States in order to investigate role stress by shift length.[36] The results indicated that nurses working for 12-hour shifts experienced higher levels of stress than those with 8-hour shifts. The significant level of stress was displayed through caring for dying patients (M = 15.7; p = .6) and when managing workload situations (M = 16.3; p = .05) compared to those working 8-hour shifts caring for dying patients and managing workload situations (M = 14.4; M = 15.1 respectively).

3.2 The impact of the 12-hour shift on fatigue

Fatigue was evaluated and tested in four included studies. Field and Loveridge (1988) carried out a quasi-experimental design study to compare fatigue and the ability to undertake critical thinking performance in the first and last hours of the shift between 12 and 8-hour shifts in Southern California.[37] This study includes two experimental groups of critical care nurses (n = 102) working for either 12 or 8-hour day shifts.

Each nurse in both groups undertook two tests. The first test was the Three Minute Reasoning Test[38] which consisted of 64 index cards each containing a short phrase followed by a pair of letters. The participant evaluated the phrase and the order of the two letters to determine if the two items described the same condition. This test was carried out to evaluate staff's ability for critical thinking performance. The nurses were also tested with the Subjective Symptoms of Fatigue Test[39] that included 30 items (yes-no) to obtain subjective symptoms of fatigue. The symptom checklist was found to be a valid indicator of three broad areas of fatigue: drowsiness, difficulty in concentration, and projection of physical impairment. The data of this study was analyzed with a multiple analysis of variance. The nonsignificant levels of fatigue were determined by $p > .05$.

The results demonstrated that the levels of the fatigue score were significantly higher at the end rather than the start of the shift. However, by dividing the sample into 12 and 8-hour shifts, the findings reported that there was no significant difference between the 12 and 8-hour shift groups in feelings of fatigue or any of the subcategories. Moreover, the results of the ability for the critical thinking performance in both groups showed that there was no significant difference between 8 and 12-hour shifts. Thus, these findings would suggest that the level of fatigue at the end of the shift reported a significant increase; however, nurses in the 12-hour shift were no more fatigued than nurses with the 8-hour shift.

Iskra-Golec et al. (1996) conducted a study by comparing two groups of nurses, one group worked a 12-hour shift (n = 96), and the other group worked an 8-hour shift (n = 30).[34] Both groups individually completed the Standard Shift Work Index (SSI)[40] questionnaire during work. The authors found that the group of nurses working the 12-hour shift experienced more chronic fatigue than the 8-hour shift nurses group (Mean score: 26.97, 23.75 respectively).[34]

Szczurak et al. (2007) performed a study to examine the psychological fatigue of nursing personnel by conducting a questionnaire among 108 nurses in a private medical care centre in Poland.[41] The authors used a Japanese scale in the questionnaire which enabled the analysis of the psychological load based on Subjective Fatigue Symptoms.[39] The study included two types of shift systems (12 and 8-hour day shifts). The results demonstrated that the total activity decrease among nurses working for 12-hour shifts in the cardiology unit was 29.34%, while it was 34.77% in surgical unit. On the other hand, the results showed that the total activity decrease among nurses working 8-hour shifts in the cardiology unit was 24.58%, whereas it was 17.36% in the surgical unit.[41]

Estryn-Béhara and Van der Heijden (2012) conducted a study to examine the impact of extended work shifts on employee fatigue and health in ten European countries.[42] The data were collected from three different health care settings: hospitals (N = 147), home care institutions (N = 76) and nursing homes (N = 185). The data were obtained from a total of 25,924 nurses. In analyzing the data, the results showed that nurses working 12-hour shifts feel more often tired.[42]

3.3 The impact of the 12-hour shifts on nurses' job satisfaction

Job satisfaction and burnout were examined within nine studies by measuring nurses' attitude, behaviour, burnout, and satisfaction. Palmer (1991) carried out a study over one full year in Foothill Presbyterian Hospital in California among RNs (registered nurses) and LVNs (licensed vocational nurse).[43] The sample was divided into two groups, one group was scheduled to work 12-hour day/night shifts in critical care, emergency, and perinatal departments, and the other group 8-hour day/evening/night shifts in medical, surgical, paediatric, and diabetes departments. The data was collected from personal files, attendance records, and continuing education class records. Moreover, a developed questionnaire was distributed between the participants that aimed at determining their levels of satisfaction. The records revealed a significant difference between the two shift systems in clinical performance, including team leadership and personal development, where the 8-hour shift nurses had a higher score than the 12-hour shift nurses. In the area of attendance, the data showed a significant difference between 12 and 8-hour shifts. It found that more days missed were reported among 8 hour shift nurses. Furthermore, for both types of shifts, the nurses pointed out that personal illness was the major cause of absence from work (8 h = 12; 12 h = 12). The results of the continuing education class attendance which was provided by the hospital to increase their knowledge showed that 8-hour shift nurses attended more classes (4.8) than those on 12-hour shifts (4.3). A rating scale to identify participant levels of satisfaction revealed a significant difference between both groups, it found that 12-hour shift nurses had a total score of (8.90) which was more than the 8-hours shift nurses (8.06).

Todd et al. (1993) carried out a before and after study to investigate the impact of the shift system (12 h day/night shifts and 8 h day/evening/night shifts) on job satisfaction in 10 wards in two hospitals in Northern Ireland, UK.[44] A survey among 320 nurses was conducted with a follow-up within two phases. The first phase was conducted for one month prior to the introduction of 12-hour shifts, while the second phase was undertaken after 6 months of introducing 12-hour

shifts. The Likert scale[45] which measures job satisfaction includes 12 items within two factors: intrinsic (ambition, content, exciting, opportunity, initiative, and creative) and extrinsic (pay, pride, colleague, hours, conditions, and security) job satisfaction. In addition to the 12 Likert scale items, 7 shift specific items (13-19) were designed for this study including vacations, family, housework, child minders, mental and physical fatigue. The data of this study demonstrated highly significant differences between 12 and 8-hour shifts on six of the 12 job satisfaction items. These differences pointed to the greater dissatisfaction with work under the 12-hour shift system. Thus, the nurses indicated that they were less satisfied in their occupations as ambitious people. The system was poorly paid, there were long working hours, less excitement, and poor working conditions. However, there were no differences between the shift systems regarding the opportunity of promotion, chances of showing initiative, creativity and the security of nursing as a career. Furthermore, the nurses reported a high level of dissatisfaction under the 12-hour shift. This was reflected in the nurses' levels of fatigue, their perception of other people's views on the profession, and their personal lives. Nurses felt that they had less time with their families, their personal life more often came as second priority, and for the married nurses the 12-hour shift was a problem because they had to arrange for child minders. The study concluded that there were significant differences between intrinsic and extrinsic job satisfaction among nurses working for a 12-hour shift as compared to an 8-hour shift, and therefore, the nurses were more dissatisfied with their work on both factors.

Iskra-Golec et al. (1996) compared two groups of nurses (8-hour day/afternoon shifts n = 30, and 12-hour day/night shifts n = 96) considering their job satisfaction working in ICUs by using a questionnaire including (SSI)[34,40] which incorporates job satisfaction, and burnout. The burnout in this study was assessed by means of the Maslach Burnout Inventory,[46] it was measured by emotional exhaustion, depersonalization, and personal accomplishment. The authors found that satisfaction with the free amount of time allowed by the shift system for social and domestic activities was higher among nurses with 12-hour shifts rather than 8-hour shifts (M = 55.45; M = 39,77 respectively) (F = 12.89). However, no significant difference was found between both groups in overall job satisfaction. Moreover, emotional exhaustion among 12-hour shift nurses was significantly higher (M = 21.37) than the 8-hour shift group (M = 16.80) (F = 4.02).

Kundi et al. (1995) performed a descriptive study to explore the nurses' attitudes, and their priorities towards 8-hour day/evening/night shifts and 12-hour day/night shifts by developing a survey and conducted it in twelve hospitals in the city of Vienna, United States.[47] The survey was delivered to 1,124 staff nurses in 103 hospital departments. For the nurses who worked for 12-hour shifts and the data revealed that 26% of the nurses were satisfied with this shift schedule; however, their desire to change the shift was reported at 25% as a result of the adverse effect on their social and leisure time (23%), and participant health (26%). On the other hand, 8-hour shift nurses demonstrated 38% schedule satisfaction, as a result of the low adverse effects of this shift system on social and leisure time (9%) and health (2%). Thus, 11% of nurses desired to change shift.

Hoffman and Scott (2003) carried out a descriptive cross-sectional design study to examine the career satisfaction among registered nurses by shift length.[36] The survey of this study was conducted among 500 registered nurses who worked 8 or 12-hour shifts in critical care, medical-surgical, mental health, and paediatric units, Michigan, United States. The data of career satisfaction was collected by developing the Index of Work Satisfaction (IWS). The findings of career satisfaction among registered nurses identified a similar level of satisfaction between 8 and 12-hour shifts. Both groups of registered nurses demonstrated that they obtained the same levels of satisfaction from the interaction between nurses and physicians, also the ability to work autonomously. However, registered nurses working for 12-hour shifts reported a higher level of satisfaction from their professional status (M = 38.4; SD = 5.2) than those working 8-hour shifts. In contrast, the 8-hour shift nurses were significantly more satisfied with their pay (M = 22.3; SD = 9.4). The IWS mean score of registered nurses working 12-hour shifts reported (M = 12.96; SD = 2.2). Similarly, registered nurses who worked 8-hour shifts had mean scores of 13.17 (SD = 2.2).

In addition, the authors examined the relationship between role stress and career satisfaction by using Pearson's Product-Moment correlation test with NSS and IWS scores. The findings indicated that high levels of stress decrease the level of career satisfaction, therefore, a crucial relationship between level of stress and career satisfaction was identified.

Stone et al. (2006) performed a cross-sectional study by making a comparison of nurse, system and quality patient care outcomes in 8 and 12-hour shifts in fourteen hospitals in New York City.[48] This design was developed and the data collected by survey from adult general inpatient units. The authors identified study variables which were nursing outcomes, while the independent variable was identified based on the type of shift length (12 or 8-hour shifts). Job satisfaction in this survey was measured by using a Job Enjoyment Scale, where the respondents were asked to rate job satisfaction on a 5-point Likert-type Scale.[45] The results showed

that thirteen hospitals were eligible in this study. A total of 99 units were analyzed, the majority of the nurses worked 8-hour shifts 63%, while 36% of the nurses worked 12-hour shifts. By comparing 8 and 12-hour shifts on nurses' outcomes, the authors found that those working 12-hour shifts were more satisfied with their jobs (M = 21.2; SD = 4.3), and experienced less emotional exhaustion (M = 21.4; SD = 12.4) than those with 8 hour shifts (M = 20.3, SD = 4.3; M = 25.9, SD = 12.7 respectively). Furthermore, the nurses with 12-hour shifts were 10 times more satisfied with their schedules (77.11%). Considering the missing shifts, the findings demonstrated that nurses working 8-hour shifts reported missing shifts more than those with 12-hour shifts. Thus, the study indicated that the nurses were more satisfied with 12-hour shifts than with 8-hour shifts.

Dall'Ora et al. carried out a cross-sectional study in 12 European countries to examine the relationship between 12 working shifts and nurses' job satisfaction, burnout and intention to leave the job.[49] The surveys were distributed among 31,627 registered nurses in 488 hospitals in the following countries: England, Belgium, Finland, Germany, Greece, Ireland, Netherlands, Norway, Poland, Spain, Switzerland and Sweden. A total of 30 hospitals (medical and surgical units) were included in each country. Job satisfaction was measured by asking 'How satisfied are you with your job?' Responses were reported on a 4-point scale, ranging from 'very dissatisfied' to 'very satisfied'. The burnout was assessed by using the Maslach Burnout Inventory (MBI).[46] The results reported that a total of 8,666 nurses (27%) encountered high emotional exhaustion. Moreover, a total of 8,268 nurses demonstrated that they being very dissatisfied with their job (26%), whereas 8,016 nurses (25%) were dissatisfied with the flexibility of work schedule and a total of 10,440 nurses (33%) reported their intention to leave the current job. Nurses working long shifts (12 hours) were experienced higher burnout in a comparison to nurses working 8 hours.

The relationship between nurses' shift length, burnout, job dissatisfaction, and intention to leave the job was also examined in a further study conducted by Stimpfel et al. (2012).[50] This study involved a secondary analysis of cross-sectional data from three sources: the Multi-State Nursing Care and Patient Safety Study, the Hospital Consumer Assessment of Healthcare Providers and Systems and from the American Hospital Association Annual Survey of Hospitals. The study sample were registered nurses (n = 22,275) from the Multi-State Nursing Care and Patient Safety Study. The nurses were working in 577 hospitals in four states: California, New Jersey, Pennsylvania, and Florida. In this study, the Job satisfaction was measured by using a four-point Likert scale–type question, 'How satisfied are you with your job?'. Furthermore, Burnout was assessed by using the the Maslach Burnout Inventory.[46] The study results demonstrated that the increase in the shift length is associated with a significant increase in the odds of burnout, job dissatisfaction, and intention to leave the job. The odds of burnout and job dissatisfaction were up to two and a half times higher for nurses who worked longer shifts than for nurses who worked shifts of 8 hours.

Estryn-Béhara and Van der Heijden (2012) examined the effect of extended work shifts on employee fatigue, health and satisfaction in ten European countries.[42] Nurses in this study were recruited from three different health care settings: hospitals (N = 147), home care institutions (N = 76) and nursing homes (N = 185). The data were obtained from a total of 25,924 nurses. In analyzing the data, the results showed that nurses working for long shifts (12-hour shifts) encountered more interruptions in their job. In addition, nurses working for 12-hour shifts are dissatisfied with their working time relative to their well being and have more frequently a high burnout score.

4. Discussion

According to this review findings, there is little evidence of significant effects of 12-hour shifts on physical and psychological health and wellbeing. Adverse effects on health and wellbeing, such as cognitive anxiety, poor sleep quality, musculoskeletal disorders, and stress were more associated with the 12-hour shift system; therefore, staff sometimes preferred 8-hour shifts to avoid these symptoms. However, the findings for the effect of 12-hour shifts on specifically, fatigue and job satisfaction were inconclusive.

This review has insufficient evidence to determine these effects in comparison to 8-hour shifts and. Therefore, a particular shift system for hospitals, is not recommended, this is due to several reasons. Firstly, the included studies had variable strengths, weaknesses, and different study designs; however, none of these studies was a clinical trial which is rated as the highest type of evidence. Moreover, the variability of the scores is due to two major weaknesses, which are the following up and outcome of people who withdrew from the study. Secondly, the outcome measuring tools used differed among the studies in different settings and countries, especially with reference to fatigue and job satisfaction. Therefore, the results of the individual studies are conflicting, indicating that this evidence is insufficient to generalise the results.

However, the negative effects of 12-hour shifts have been well documented in literature such as stress, sleep disturbances, musculoskeletal disorders, fatigue, and job satisfac-

tion. When considering cognitive anxiety and stress which are related to each other, these adverse effects could result from longer daily exposures to the stress of the nurses' work characteristics, such as the nurse's involvement in life and death situations, and the high level of responsibility in critical situations.[51,52] Moreover, it seems possible that these results are due to the nurses' experiences and fatigue as an adverse effect. These results are consistent with those of other studies which suggest that higher levels of stress are found in inexperienced younger nurses.[53,54] Furthermore, the studies indicated that working conditions together with shift schedules were accountable for the development of burnout especially among female shift-working nurses.[55,56] Therefore, the development of a stress reduction policy in the healthcare organizations that aims to identify work related stress and to prevent it by providing an educational strategy is a crucial issue. Stress management strategies are effective in reducing personal levels of stress and improving nurses' physical health and wellbeing.[57]

The incidence of sleep disturbance was in proportion to the duration of the night shift.[16] Such result is consistent with the findings of this review, where it was found that nurses working for 12-hour shifts reported significant poor general sleep qualities, and felt more tired after sleep. It could be suggested that higher indices of chronic fatigue, anxiety, and emotional exhaustion among nurses working for 12-hour shifts are associated with poor general sleep qualities.[58,59] Thus, to improve the circadian rhythm, good sleep habits and a comfortable environment are important to improve the quality of sleep. This could be explained to staff so that they are better able to manage sleep disturbance.[58,60]

Musculoskeletal disorders were found to be related to 12-hour shifts in this review, despite the fact that this finding had not previously been described in the literature. Although[25] produced the only study that recognized the relationship between work schedule characteristics and musculoskeletal disorders in day shifts; this finding is supported by another study identifying that long working hours are one of the risk factors of back pain; however, it should be noticed that this study did not define long hours as being of 12-hour or more.[61]

The work schedule characteristics which included days of work, length of day, work breaks, and psychological demands were significantly associated with musculoskeletal disorders in the current finding. Therefore, it is suggested that demanding work schedules play an important role in musculoskeletal disorders through exposure to physical or psychological demands or both. This corroborates with the results of a further study which demonstrated that physical and psychological work demands lead to musculoskeletal disorders of the shoulders, lower back, neck and upper back among nurses.[62] Some studies found that musculoskeletal disorders have been consistently associated with patient-handling among nurses.[63,64] The highest rates of non-fatal occupational musculoskeletal disorders have been reported among nurses than in any other healthcare professionals.[65] However, it is recommended that healthcare organizations should provide a healthful working schedule that is required to prevent the risk of musculoskeletal disorders among nurses, they also should provide educational programs which consider Good Body Mechanics by an informal policy. These programs should provide an understanding of basic body movements that will help to prevent work-related musculoskeletal injuries.[66]

With regard to fatigue, two studies in the review identified significant differences of fatigue between 12-hour and 8-hour shift groups of nurses, while the third study concluded that there were no significant differences between both groups. However, shift workers are subjected to fatigue as a result of long hours of mental or physical activity.[14] This result is in accordance with studies reporting that an accumulation of fatigue is associated with extended working days (12-hour shift).[18,67] However, when considering critical care units, fatigue is the most common complaint among emergency nurses, as a result of long working hours of physical activity.[68] While in the ICU, the ICU nurses working for 12 hour shifts were more exposed to a psychological workload than nurses who worked for 8-hour shifts.[69] Thus, physical activity, emotional and mental workloads which result in fatigue could be an explanation for the findings of this review. A further explanation of chronic fatigue is that consecutive 12-hour shifts lead to an accumulation of fatigue that result in a chronic stage. According to these findings, it should be assumed that the quality of care and work performance on 8-hour shifts is higher than on 12-hour shifts with a decrease in the risk of errors.[70] Surprisingly, this review found that there was no significant difference between 12- and 8-hour shift systems, which is consistent with findings.[71] Different findings were shown in Szczurak et al.'s (2007) study, even though the same measurement tool was used in both studies to examine the fatigue at the beginning and end of 12- and 8-hour day shifts among nurses.[41] This inconsistency may be due to differences with regard to personal and work characteristics in both studies, where fatigue was measured in different units (critical care, cardiology and surgical units).

However, it should be noticed that night shifts are more associated with fatigue and low critical thinking performance. Both cognitive performance and alertness in night shifts are reduced; while it is well known that in day shifts, alertness

and cognitive thinking are at their highest level.[72] Between the hours of 3 p.m. and 5 p.m. the shift worker's alertness may decrease. Thus, shift workers become more fatigued in addition to the impairment of mental and physical health on night shifts, while having a high ability for critical-thinking performances in day shifts. To manage this negative effect, the program and system management should be considered for fatigue management. Nurses must be able to recognize signs of fatigue and be willing to institute appropriate interventions. However, studies have identified that healthcare professionals have difficulty in assessing their own levels of fatigue.[73,74] Thus, interventions should be introduced in healthcare organizations which include educational program such as Fatigue Countermeasure,[75] and schedule alterations which allow for information regarding the symptoms of fatigue, sleep hygiene measures, shift work and its adverse effects to be implemented. Furthermore, the hospital process could help in preventing fatigue among nurses by careful scheduling.[76]

Job satisfaction is a complex and multifaceted concept, which can mean different things to different people. It is, therefore, difficult to measure objectively. This review demonstrated differing results which were explained by the different measurement tools used, consequently, different aspects of job satisfaction were measured. In this review job satisfaction was measured by intrinsic and extrinsic factors including the level of workload and chronic fatigue. They also measured the home and work-life balance, such as family responsibilities and social life, and the amount of free time, for example in social and domestic activities. Nurses' behaviour was also measured by clinical performance, attendance, reasons for absence, and continuing education classes, satisfaction with scheduling, schedule preference, and intention to stay. It was also measured by the interaction between nurses and physicians, working autonomously and satisfaction from the professional status obtained and their position on the pay scale. Thus, different aspects of job satisfaction gave conflicting results.

Working conditions are crucial especially when they are associated with job satisfaction among nurses in different hospital settings.[77] The twelve-hour shift is found to be an onerous obligation. This is indicated by similar findings of two studies in the review.[44,47] However, free time and family responsibilities are considered sources of satisfaction for nurses who have a family. For example, the enhancement of the family relationships, social activities and involvement are the advantages provided by 12-hour shifts.[30] This is in agreement with one finding of this review, where lower social and domestic disruption among nurses with 12-hour shifts may be due to the fact that the 12-hour shift system is characterized by having more days off, with 3 days off and more free weekends than with the 8-hour shifts.[34] Thus, the evidence is inconclusive, but nurses' experiences must surely be mediated by the social and cultural context in which they live.

Although 12-hour shifts result in greater dissatisfaction among nurses in some aspects, it is a popular and preferred shift system in educational and private healthcare organizations. The 12-hour shift has the advantage of being cost effective, this shift system has been praised in terms of enhancing recruitment, continuity of care, and morale while at the same time decreasing sick time, personal cost, and turnover. It is, therefore, sometimes described as the best option for the administrators if they are concerned about retaining staff.[30,43] It should be noted that these reported adverse effects of 12-hour shifts (fatigue, sleepiness, and musculoskeletal disorders) have not been investigated in Saudi Arabia or other Middle Eastern/Arabic contexts. This reflects a general lack of nursing research and the use of evidence based practice. Thus, examining the impact of working hours among Saudi hospitals by comparing the two shift systems is a crucial issue to explore. The job satisfaction of Saudi nurses could be measured as an outcome by using intrinsic and extrinsic factors of job satisfaction, including family responsibilities as a significant issue in Saudi culture. General job satisfaction is critical, where a positive relationship has been found between these factors of job satisfaction and organisational commitment.[78] This is consistent to a study which revealed a strong positive relationship between job satisfaction and organizational commitment in Saudi Arabia within a sample of registered nurses.[79] The means and standard deviations demonstrated that nurses were satisfied with their jobs, and therefore, they were committed to their hospital's organisations. This finding is in agreement with study results which showed a close positive correlation between job satisfaction and organizational commitment.[80]

In addition to job satisfaction, safety issues such as investigating the relationship between working hours and patient safety (medication errors), or staff injury by observing the staff while administering medications at flexible times is an identified gap which should be filled by scientific research. However, it is important to notice that fatigue and sleepiness could be risk factors leading to medication errors, thus examining the relationship of these factors is significant also in terms of the quality of care given. Furthermore, it would be interesting to consider the quality of life of 12- and 8-hour shift nurses, this is a new outcome measure that has not been investigated before. All of these outcome measures can be examined by validated measurement tools. Thus, well-designed studies that examine the association between

working hours and nurses' outcomes are needed to build a consistent body of knowledge on the impact of the 12-hour shift on nurses' health and job satisfaction. Such studies should take into account the cultural and social environment and expectations.

Publication bias is a limitation of this review as only published articles were identified by the search strategy; however, 6 studies were not found in the university databases which could have added more strength to the review by the inclusion of more studies. Furthermore, this review includes studies from 1980; however, this is because 12-hour shifts were introduced in this period and therefore, the majority of the studies conducted to examine this type of shift originated from this time. It is well known that systematic reviews are limited by the availability and quality of evidence; thus, another potential limitation is the inclusion of observational studies which indicate a source of bias in addition to the quality variability of these studies. Moreover, this review limits working hours to 12- vs. 8-hour shifts, the author views this as appropriate, as limiting inclusion criteria to the typical work shifts.

5. Conclusion

Nurses in this review reported a variety of health and well-being concerns in relation to the impact of the 12-hour compared to 8-hour shifts such as sleep disturbance, stress, tiredness, fatigue and anxiety. Furthermore, nurses in the recent studies highlighted that they were dissatisfied with 12-hour shifts and reported high emotional exhaustion and intention to leave their job. However, it should be noted that the conclusion of this review is affected by the insufficient of recent evidence, different culture and social environment. Thus, further high-quality studies are required to be conducted in this area of research with experimental and non-experimental research designs.

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Conflicts of Interest Disclosure

The author declares that there is no conflict of interest statement.

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