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## Review

## Nursing research on intimate partner violence in China: A scoping review

Quanlei Li<sup>a,\*</sup>, Huaping Liu<sup>b</sup>, Kuei-Ru Chou<sup>c</sup>, Chia-Chin Lin<sup>d</sup>, Iat-Kio Van<sup>e</sup>,  
Patricia M. Davidson<sup>a</sup>, Jacquelyn C. Campbell<sup>a</sup>

<sup>a</sup> School of Nursing, Johns Hopkins University, 525 N. Wolfe Street, Baltimore, MD, USA

<sup>b</sup> School of Nursing, Peking Union Medical College, No. 33, Ba-Da-Chu Road, Beijing, China

<sup>c</sup> School of Nursing, College of Nursing, Taipei Medical University, No. 250, Wu-Hsing Street, Taipei, Taiwan

<sup>d</sup> School of Nursing, LKS Faculty of Medicine, University of Hong Kong, 4/F, William M.W. Mong Block, 21 Sassoon Road, Pokfulam, Hong Kong SAR, China

<sup>e</sup> Kiang Wu Nursing College of Macau, Est. Repouso No. 35, R/C, Macao SAR, China

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## ABSTRACT

Intimate partner violence (IPV) is a serious public health issue, and nurses have the potential to screen, navigate to interventions, and provide support, but responses to IPV differ greatly in mainland China, Hong Kong, Macao, and Taiwan. We conducted a scoping review to examine the nursing literature on IPV in the above four regions in China. We conducted a comprehensive search of 11 Chinese and English databases from database inception to January 31, 2020, for eligible papers including empirical studies, reviews, reports, and expert opinion articles. We hand searched references lists and other studies published by the first and corresponding authors of included articles. Two reviewers independently screened articles and extracted data, and three reviewers cross-checked the extracted results. We also conducted quality appraisal for applicable empirical studies. A total of 58 Chinese-language and 63 English-language articles were included, 58 from Taiwan, 44 from Hong Kong, 13 from mainland China, and six from institutions outside China, but none from Macao. The quantitative and qualitative studies described the prevalence and complex nature of IPV, comparable to non-nursing and international studies. Nurse-led advocacy and Qigong (traditional Chinese mind-body health practice) interventions showed promise for improving mental health in women in Hong Kong. There was a low level of knowledge and preparedness to respond to IPV among Chinese nurses, especially in mainland China. Mixed methods studies in Hong Kong and Taiwan as complex designs were generally well-conducted. Nursing case reports from Taiwan uniquely supplemented the evidence base. In Hong Kong and Taiwan, varying designs were used to study various facets of IPV, targeting victims, nurses and other key stakeholders. In mainland China and Macao, IPV research was limited in quantity, quality, and diversity. As more research in the area of IPV is needed, factors influencing nursing research on IPV also merit investigation, while taking into consideration socio-economic-political-cultural factors.

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## 1. Introduction

Intimate partner violence (IPV) can be defined as behaviour within an intimate relationship that causes physical, sexual, or psychological harm [1], which is a serious public health issue but often overlooked and underreported [2]. Compared to men, women

are more vulnerable in terms of prevalence and severity of IPV victimisation [3,4]. Globally, one in three women with intimate relationship has been a victim of IPV [5]. Substantial evidence has linked the victimisation of women experiencing IPV with negative physical and mental health consequences [6,7]. Growing concerns about the high prevalence and adverse health impacts of IPV lead to calls for collaborations within and outside the health sector [8]. Among health care professionals, nurses are uniquely positioned to respond to IPV [9]. As the largest single professionals in the health sector [10], nurses serve at the front line of health care delivery and are often the first point of contact for IPV victims [11], who

\* Corresponding author.

E-mail addresses: [qli59@jhu.edu](mailto:qli59@jhu.edu) (Q. Li), [huapingliu@pumc.edu.cn](mailto:huapingliu@pumc.edu.cn) (H. Liu), [kueiru@tmu.edu.tw](mailto:kueiru@tmu.edu.tw) (K.-R. Chou), [cclin@hku.hk](mailto:cclin@hku.hk) (C.-C. Lin), [van@kwnc.edu.mo](mailto:van@kwnc.edu.mo) (I.-K. Van), [pdavidson@jhu.edu](mailto:pdavidson@jhu.edu) (P.M. Davidson), [jcampbe1@jhu.edu](mailto:jcampbe1@jhu.edu) (J.C. Campbell).

most often perform in-person identification interventions among all health care professionals [12]. However, significant disparities exist in nursing practice, education, research, and policy at national, regional, and global levels, greatly impairing the potential of nursing to achieve sufficient health care and the Sustainable Development Goals (SDGs), in the context of IPV, SDG Goal 5 is gender equality [10,13]. Thus, it is important to identify and summarise the state of nursing research in this arena.

China is the most populous country in the world with more than 1.4 billion people, including mainland China [14], two Special Administrative Regions of Hong Kong and Macao [15,16], and Taiwan [17]. Despite differences in dialects (e.g., Mandarin, Cantonese, Hokkien), characters (simplified Chinese, traditional Chinese), political systems (socialist, capitalist), legal and regulatory systems, and even sovereignty disputes [17], Chinese populations share similar cultural backgrounds, and all face the challenging issue of IPV. For example, the life-time prevalence of IPV was estimated to range from 17.4% to 24.5% for psychological violence, from 2.5% to 5.5% for physical violence, and from 0.3% to 1.7% for sexual violence in general population in mainland China [18]. The life-time and past-year prevalence of IPV against women was reportedly 9.4% and 1.5% in Hong Kong in 2006 [19]. The life-time and past-year prevalence of IPV against women was reported as 24.5% and 9.8% in Taiwan in 2016 [20]. Totally 24 female and 2 male victims of IPV were documented in Macao in 2019 [21].

Influenced by Confucian philosophy, violence towards women is not concordant with Chinese cultural values that emphasise harmony, but wife battering has been justified by its patriarchal ideology [22]. Furthermore, domestic violence is considered as a private, often shameful, family affair that should not be disclosed to outsiders [23]. However, in contexts of long-term influence of Western culture in Hong Kong and Macao, rapid social development in Taiwan since 1960s, and tremendous economic growth in mainland China within four decades, Chinese women's status have been improved and power dynamics in intimate relationships have been altered [24]. In addition, gender equality and women's empowerment has been actively advocated by organisations like UN Women China since the late 1990s [25]. IPV against women has gained increased attention as a research topic after the UN Fourth World Conference on Women held in Beijing in 1995 [26]. An increasing number of studies showed some evidence about prevalence, determinants, correlates, and consequences of IPV in Chinese populations over the last three decades [27]. Nurse researchers from Hong Kong and Taiwan contributed to the growing body of evidence, and IPV is integrated into nursing education and practice in responding to almost the earliest laws against domestic violence in Asia [28–32]. Ample literature illustrates the unique role of nurses in IPV prevention and intervention in Chinese settings, but mainly in Hong Kong and Taiwan where approximately 59,000 and 175,000 nurses are practicing [33,34]. Laws on domestic violence in mainland China and Macao were both launched in 2016, and require reporting of IPV from medical institutions [35,36]. More than 4.5 million nurses in mainland China are the largest group of its health care workforce [37]. However, IPV is not considered within the scope of nursing practice in spite of reporting laws, and only limited nursing research on IPV exists from mainland China and Macao, the city with about 2,500 nurses [38]. Nursing's responses to IPV have progressed at different paces in the four regions, leading to large variations in nursing research on IPV.

The purpose of this scoping review was to examine the nursing literature on IPV in China, including mainland China, Hong Kong, Macao, and Taiwan, in order to inform culturally congruent and acceptable strategies to address this complex issue. The advantage of using a scoping review over a systematic review is that a scoping review has a broader scope than traditional systematic review as the inclusion criteria are more expansive and less restrictive [39].

Therefore, it was possible to include a wider breadth of literature in order to fulfill the purpose of the review. A search for previous scoping and systematic reviews on IPV research in China identified several publications [23,27,30], but no review on this topic was found at our scale.

## 2. Methods

### 2.1. Overview

In addition to IPV, other relevant terms such as domestic violence, marital violence, and dating violence were searched. We found that IPV against women was most often reported and the topic of nursing research, but we included any studies that included male victims of IPV as well. The protocol was not registered. We followed applicable items from the Joanna Briggs Institute reviewer's manual and the PRISMA extension for scoping reviews to ensure rigor [40,41].

### 2.2. Search strategy

We (QL, HL, KC, IV) conducted a search of the literature published from database inception through January 31, 2020, in six Chinese and five English electronic databases. Chinese databases included China National Knowledge Infrastructure (CNKI), Wanfang Data (Wanfang), VIP, China Biology Medicine disc (CBMdisc), Airiti Library, and National Digital Library of Theses and Dissertation in Taiwan (NDLTD). English databases were PubMed, Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, and Cochrane Library.

Search terms in simplified Chinese (used in mainland China) and traditional Chinese (used in Hong Kong, Macao, and Taiwan), as well as Medical Subject Headings (MeSH) and free text words, were used accordingly for each database, including "intimate partner violence", "domestic violence", "spouse abuse", "gender-based violence", "battered women", "family violence", "spousal violence", "marital violence", "wife abuse", "dating violence", "violence against women", "cold violence", "nursing", "nurses", "midwifery", "health personnel", "China", "Chinese", "Hong Kong", "Macao", "Taiwan", and "Taiwanese". The search strategy for all databases in all languages is provided in the appendix (pp 1–4).

For included studies, we hand searched references lists and other articles published by the first and corresponding authors to further identify relevant papers not captured by search strategies. Papers obtained through manual search were limited to those published before 2020.

### 2.3. Selection criteria

Due to the nature of the scoping review, methodology and type of the studies were not limited [42]. Articles were deemed eligible if the following inclusion criteria were met: (1) focused on any facets of IPV (e.g., prevalence, risk factors, consequences, correlations, interventions, victims' experience, nurses' perceptions) in or relevant to China; (2) published in academic nursing journals, or non-nursing journals but the first and/or corresponding author with a nursing background, or thesis/dissertation from candidates with a nursing background; (3) language was either simplified Chinese, traditional Chinese, or English; (4) study designs were either empirical study (e.g., quantitative study, qualitative study, mixed methods study), review (e.g., literature review, scoping review, systematic review), report, or expert opinion (e.g., commentary, editorial). Articles were excluded if they were: (1) studies recruited participants outside China; (2) research on domestic violence directed at elder abuse or child abuse; (3) translation reports, conference abstracts, book chapters, guidelines. Based

on classifications from Gray et al. [43], we further categorised quantitative research into four types: descriptive, correlational, quasi-experimental, and experimental. For the purpose of this study, we defined reports and grouped them into four categories: (1) nursing case report: an article that concretely documents nursing care for an individual case, including review of the literature, case profile and history, nursing process of assessment-diagnosis-planning-implementation-evaluation, and discussion; (2) nursing experience report: an article that generally summarises key points of nursing for a group of patients; (3) project report: an article that concretely documents a particular improvement project with assessment, goal(s), review of literature, planning, implementation, evaluation, and discussion; (4) case report: an article that concretely describes and interprets one or two cases.

#### 2.4. Quality assessment

Based on the study design, QL and HL independently examined methodological quality of applicable empirical studies using appropriate appraisal tools selected from CONSORT (for randomised trial) [44], COREQ (for qualitative research) [45], GRAMMS (for mixed methods study) [46], SPIRIT (for study protocol) [47], and STROBE (for observational study) [48], seen in the appendix (pp 5–10). In order to appraise the quality of the wide variety of studies, we created criteria for categorising the quality of studies into four groups (low, low-to-moderate, moderate-to-high, and high) mainly on the basis of comparison within and across different designs. Detailed criteria and rationale for each appraisal tool are provided in the appendix (p 11). No studies were excluded on the basis of appraisal results. Discrepancies between two reviewers were solved through discussion; if a consensus was not reached, a third reviewer (KC) made the final decision.

#### 2.5. Data extraction

Included studies were grouped into four categories of mainland China, Hong Kong, Taiwan, and outside China, based on the location of the first author's institution or the leading institution if more than one was reported. Data were extracted by QL and HL with a data extraction table designed by the research team and tested a priori. Data extracted included first and corresponding authors, year, institution and its location, funding, publication language, journal, page number, key words, design, aim, study site, participants and setting, key findings, and IPV-related terms. KC, CL, and IV cross-checked the extracted data to ensure accuracy. Additionally, the latest 2-year impact factor of applicable journal was recorded via Annual Report for Chinese Academic Journal Impact Factors (journals from mainland China) [49], Academic Citation Index (journals from Taiwan) [50], or Journal Citation Reports (journals in Science Citation Index) [51].

#### 2.6. Role of the funding source

There was no funding source for this study.

### 3. Findings

The initial database search yielded 1,915 articles and 15 were obtained through manual search (Fig. 1). After removing 442 duplicates, 1,488 remained for screening of title and abstract, and 1,123 were excluded as they did not meet the eligibility criteria. Of the 365 remaining articles for full-text screening, 121 were included in the final analysis. Due to copyright policy, two full-text journal articles [52,53] and one master's thesis [54] were not accessed, three master's theses were partially obtained [55–57], which were able to be included based on available information. One article obtained

through database search was firstly published online in May 2019 and officially published in March 2020, which was still included [58].

Among 121 included articles, 58 (48%) were from Taiwan, 44 (36%) from Hong Kong, 13 (11%) from mainland China, six (5%) from outside China, and no article from Macao. Besides 110 journal articles, there were six master's theses and three doctoral dissertations from Taiwan, as well as two doctoral dissertations from outside China. Table 1 presents numerical summary of the 118 (98%) full-text articles (including nearly full-text), and all 121 included studies and full summary tables are presented in the appendix (pp 12–36).

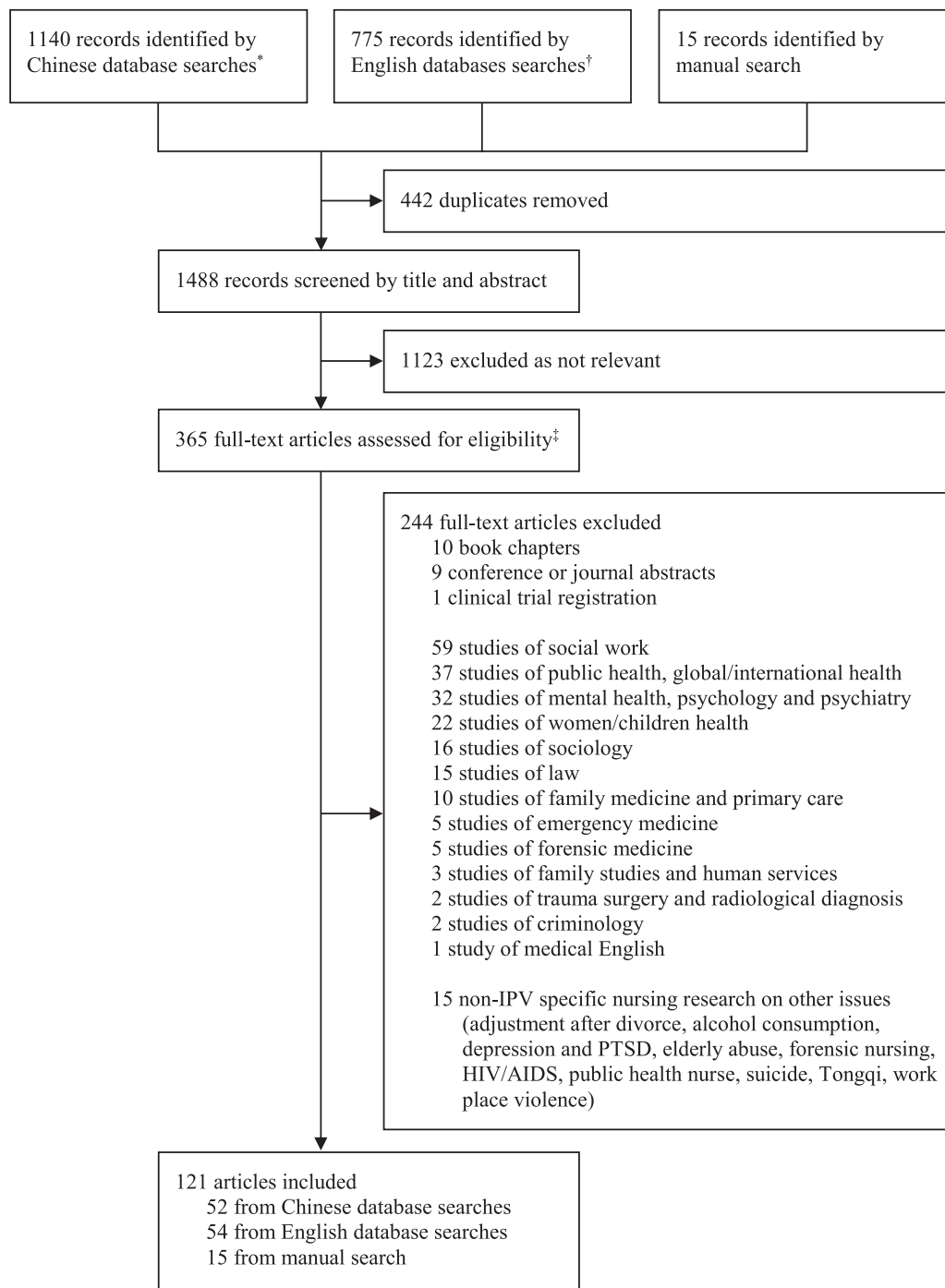
#### 3.1. Time trends of studies and geographical distribution of institutions

The year with the highest number of included studies was 2008 (11/121 [9%]), whereas a continuously increasing trend of 121 nursing studies on IPV in China was not obvious from 1996 to 2019 (Fig. 2), whether observed independently or together. In Taiwan, studies emerged soon after the Domestic Violence Prevention Act was enacted in 1998. In Hong Kong, a notable increase in the number of articles occurred in 2010, the year in which the Domestic and Cohabitation Relationships Violence Ordinance was enacted after the second amendment. In mainland China, articles had been published continuously since the Anti-domestic Violence Law was enacted in 2016.

The geographical distribution of institutions was uneven within Taiwan, Hong Kong, and mainland China. In Taiwan (n=58), about 70% of the studies were produced from institutions located in Kaohsiung (19 [33%]), Tainan (9 [16%]), Taoyuan (7 [12%]), and Taipei (7 [12%]); the leading institutions were College of Nursing at Kaohsiung Medical University (11 [19%]) in Kaohsiung, Department of Nursing and Institute of Allied Health Sciences at National Cheng Kung University (4 [7%]) in Tainan, and Graduate School of Crime Prevention and Corrections at Central Police University (4 [7%]) in Taoyuan. In Hong Kong (n=44), the majority (36 [82%]) of the studies were conducted from School of Nursing at University of Hong Kong. In mainland China (n=13), institutions were mostly located in east (7 [54%]) and central China (5 [38%]), with only one (8%) in west China. Regarding institutions outside China (n=6), three (50%) were from School of Nursing at Johns Hopkins University (Baltimore, the USA) [59–61], and other three were from Los Angeles [62] and Kent [63] in the USA, and London [64] in the UK.

#### 3.2. Empirical studies

According to Table 1, empirical studies accounted for the largest proportion (75/118 [64%]) of included articles. The majority (57/75 [76%]) were quantitative studies, followed by qualitative (10/75 [13%]) and mixed methods studies (8/75 [11%]). Among quantitative studies (n=57), there were six (11%) descriptive studies and 44 correlational studies (77%) that used observational approaches, with the former mainly adopting descriptive statistics while the latter more focusing on describing the relationships. We identified quasi-experimental research from Taiwan but categorised them into mixed methods studies because they all involved qualitative data collection [65–67]. Seven (12%) randomised controlled trials (RCTs) as experimental studies identified were all from Hong Kong. Ten qualitative studies were mainly from Hong Kong and Taiwan, and all eight mixed methods studies were only identified in the above two regions. With varying levels of complexity, these empirical studies demonstrated a broad scope of IPV research targeting IPV victims, such as investigating prevalence, risk factors, consequences, correlates of IPV, adapting or developing an instrument,



**Fig. 1.** Study selection process of the scoping review.

\*From CNKI (n=673), Wanfang (n=111), VIP (n=69), CBMdisc (n=41), Airiti Library (n=118), and NDLTD (n=128).

†From PubMed (n=116), Embase (n=250), CINAHL (n=75), Scopus (n=318), and Cochrane Library (n=16).

‡Three full-text papers were not obtained, and three degree papers were partially obtained.

evaluating the effects of an intervention, exploring the real experience of victims, through quantitative, qualitative, or mixed methods approaches.

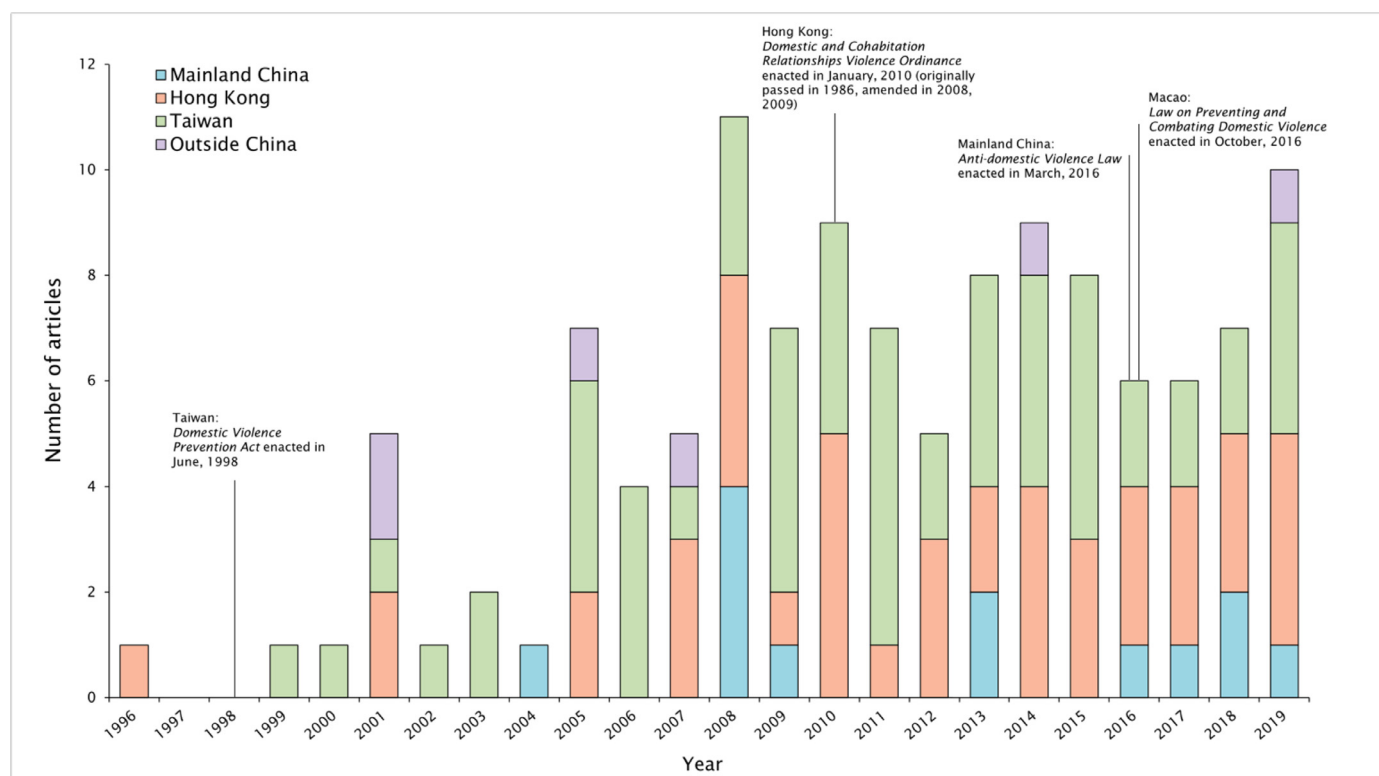
Information on prevalence was usually reported as part of the results in studies that screened for IPV during the recruitment procedure. In this scoping review, the lifetime prevalence of IPV among women was 43%, and the past-year prevalence ranged from 11.5% to 26%; [61,68] more specifically, the past-year prevalence of psychological abuse was reported as 22.9%, followed by physical abuse ranging from 6.5% to 10.1%, and sexual abuse ranging from

2.2% to 4.0% [69,70]. Prevalence ranged according to setting and sampling procedures; most were convenience samples. Even so, prevalence and patterns were comparable to similar non-nursing studies in and outside China [23,71]. The one exception was of Vietnamese immigrant women in Taiwan that used snowball sampling and therefore found a past-year prevalence of marital violence as high as 70.4% [58]. Only one study was identified that specifically focused on males, in which the authors found that IPV was positively associated with alcohol and drug use in men who have sex with men (MSM) living with HIV in Taiwan [62].

**Table 1**  
Number of articles identified, stratified by region and study design.

	Mainland China	Hong Kong	Taiwan	Outside China	Total
Empirical study					
Quantitative study					
Descriptive study	2/0	0/1	2/1	0/0	4/2
Correlational study	3/1	0/20	9/7	0/4	12/32
Quasi-experimental study	0/0	0/0	0/0	0/0	0/0
Experimental study	0/0	0/7	0/0	0/0	0/7
Qualitative study	1/0	0/3	2/3	0/1	3/7
Mixed methods study	0/0	0/4	3/1	0/0	3/5
Review					
Literature review	3/0	0/3	4/0	0/1	7/4
Scoping review	0/0	0/1	1/0	0/0	1/1
Systematic review	0/0	0/1	0/0	0/0	0/1
Report					
Nursing case report	0/0	0/0	22/0	0/0	22/0
Nursing experience report	3/0	0/0	0/0	0/0	3/0
Project report	0/0	0/0	2/0	0/0	2/0
Case report	0/0	0/1	0/0	0/0	0/1
Expert opinion					
Commentary	0/0	0/1	0/0	0/0	0/1
Total	12/1	0/42	45/12	0/6	57/61

Data are shown as articles published in Chinese/English. A total of 118 full-text articles (including nearly full-text) were presented. Macao is not shown due to no identified article.

**Fig. 2.** Annual numbers of nursing articles on IPV in China.

Studies on pregnant women from mainland China [72], Hong Kong [73–78], and Taiwan [79,80] provided evidence on the prevalence of IPV during pregnancy ranging from 5.0% to 11.2%, and an overall prevalence of IPV that ranged from 15.3% to 27.8% depending on setting and sampling (see appendix pp 12–36). Common risk factors identified across three regions for IPV during pregnancy included less education, poor socio-economic status, as well as alcohol and cigarette use. Adverse maternal consequences were also reported; the most frequently reported were more likelihood to deliver a low-birth-weight infant, and less initiation of breastfeeding. The studies specifically focusing on IPV during pregnancy were all published at a relatively early time between 2005 and 2008.

The study from mainland China was the only one with low study quality.

Following rigorous procedures for cultural adaptation, studies from Hong Kong translated and validated Chinese versions of several instruments measuring and/or screening for IPV, including the Abuse Assessment Screen (AAS) [81], the Extended-Hurt, Insult, Threaten, Scream (E-HITS) [82], the Revised Controlling Behaviors Scale (CBS-R) [83], the Psychological Maltreatment of Women Inventory (PMWI) [84], the Woman Abuse Screening Tool (WAST) [85], and the Scale of Economic Abuse-12 (SEA-12) [86]. These validated instruments demonstrated satisfactory psychometric properties among Chinese population in Hong Kong; but they were not

able to be directly used among Chinese population in mainland China, with the difference in Chinese characters in the two regions serving as one of the most obvious reasons. A study from mainland China developed and tested a scale for measuring an emotionally abusive behavior called cold violence [87], featuring passive-aggressive withholding of emotional support [81]. The study focused on a particular population called Tongqi [87], wives of MSM, since they frequently experienced this form of emotional violence from their MSM husbands [88]. The above studies were all rated as high quality, except the mixed methods study which was moderate-to-high quality [83].

Seven experimental studies from Hong Kong represented advocacy and Qigong interventions targeting abused Chinese women. Taking cultural variations into consideration, four advocacy interventions were tailored for four groups of abused women [89], including pregnant women [78], women in domestic violence shelters [90], and community-dwelling women [68,91,92]. The fourth advocacy intervention that focused on immigrant women from mainland China was reported at a conference [93], identified in the expert opinion from the original author [89]. The above advocacy interventions were based on the concept of empowerment [89], generally including safety planning, choice making, and problem solving; components like empathic understanding, parenting skills, health assessment and dietary teaching based on Traditional Chinese Medicine, as well as telephone calls for social support were added accordingly for different groups of abused women. One of the few high quality RCTs in the world showed an IPV advocacy intervention resulted in significantly less IPV (psychological and minor physical violence but not severe physical violence) and significantly less depression [78]. Another tested intervention was Baduanjin, a specific type of Qigong as a traditional Chinese mind-body health practice combined with breathing and meditation, with telomerase activity and mental health as outcomes [94,95]. The Qigong practice resulted in significant reductions in perceived stress and depressive symptoms, but did not show a significant benefit on telomerase activity. The above studies for the most part were well conducted and had moderate-to-high or high study quality, suggesting the importance to ensure both cultural appropriateness and methodological rigor.

Qualitative studies from mainland China [96], Hong Kong [97–99], Taiwan [55,100,101], and outside China [64] all reported experience of victims who suffered from IPV, predominantly focusing on female victims. The study from mainland China analysed crisis hotline recordings of 29 female and one male callers, and found that 63.3% of the victims of domestic violence reported suicidal thoughts [96]. Six studies from Hong Kong and Taiwan mainly using in-depth interviews or focus groups, described the lived experience of abused Chinese women, with major themes such as feelings of shame, sense of insecurity, endurance or escape, and help-seeking [55,97–101]. The study focusing on South Asian women in Hong Kong added cultural factors influencing help-seeking behaviors [64].

Mixed methods studies as complex study designs were adopted in Hong Kong [24,83,102,103] and Taiwan [65,66], which had a descriptive, correlational, or quasi-experimental quantitative strand mixed with a qualitative strand in various ways. A recent study from Hong Kong evaluated the Dating Compassion, Assessment, Referral, and Education (CAFE) Ambassador Programme, a primary prevention program aiming to enhance behavioral intentions of college students to help peers experiencing dating violence, with a quasi-experimental study and qualitative evaluation using focus groups [103]. However, the specific type of mixed methods design, justification for using a mixed methods approach, and integration of quantitative and qualitative findings were lacking or insufficient in studies from Hong Kong; no studies from Taiwan explicitly described their methodology as mixed methods, nor did they suffi-

ciently report integration of quantitative and qualitative data. Thus, the study quality was rated as moderate-to-high, even though the quantitative and qualitative strands in these studies were well conducted.

When studying nurses, empirical studies further contributed to the evidence, such as knowledge, attitudes, beliefs, and behaviors of nurses towards IPV. In Hong Kong, a study in 1996 with low-to-moderate quality showed that only 6.7% of emergency nurses (n=225) received formal training on wife battering, 9.3% believed that wife battering was a private matter, and 86.2% were not prepared to respond to wife battering [104]. In Taiwan, studies published between 2007 and 2014 revealed that from 23.5% to 64.7% of samples of between 71 and 476 of emergency nurses received education on IPV with knowledge, attitudes, and practice positively correlated [63,105–109]. Among 774 nurses, those who were older, had longer years of practice, and worked in district hospitals and regional hospitals had more accurate perceptions on marital violence [110]. Study quality for applicable studies from Taiwan was high [105,107,108,110]. In mainland China, a study in 2018 with low-to-moderate quality reported that only 13.6% of the 486 doctors and nurses in community health care centres received education on domestic violence, 78.7% believed domestic violence was a private personal issue; only 9.8% understood the Anti-domestic Violence Law well [111]. Two mixed methods studies from Taiwan were both doctoral dissertations, but neither explicitly described methodology as mixed methods. One study developed a scale for measuring nurses' clinical competences on domestic violence against women using focus groups, and then investigated emergency nurses using the developed scale via cross-sectional survey [109]. The other study analysed health care and evidence collection actions in emergency rooms, through a cross-sectional questionnaire survey among abused women, quasi-experimental study with nurses and nursing students, and in-depth interviews with judicial officers [67]. Among studies reporting sex of nurses or nursing students, almost all of the participants were females in both quantitative studies (2429/2524 [96%]) and qualitative focus groups (37/39 [95%]) as they are in nursing in general in China [63,67,104–107,109,110]. In this scoping review, only one study reported anything about the prevalence of domestic violence among nurses: 8 out of 252 (3%) emergency nurses were reported as victims, and perpetrators were brothers or fathers instead of intimate partners [63].

### 3.3. Ethical review of studies

Table 2 presents a summary of 74 empirical studies in terms of IRB (Institutional Review Board) approval and informed consent, excluding one protocol from Hong Kong [95]. All studies from outside China (5/5 [100%]), most studies from Hong Kong (29/34 [85%]) and Taiwan (23/28 [82%]) obtained IRB approvals or permission to conduct the research. For studies from mainland China (n=7), only one study (14%) reported IRB approval [88]. One analysis of medical records from Taiwan implied that IRB approval was unnecessary [112], whereas the other three similar studies obtained IRB approvals [113–115]. For research requiring informed consent procedures, all studies from outside China (5/5 [100%]), the majority of studies from Taiwan (25/26 [96%]) and Hong Kong (28/32 [88%]) obtained informed consents, whether in written, verbal, electronic, or automatic form. Only three (43%) of seven studies from mainland China reported informed consents [88,96,116]. Ethical considerations were treated seriously in studies from Hong Kong, Taiwan, and outside China. Even for the protocol from Hong Kong, the study had already obtained IRB approval, stating written informed consents to be obtained [95], and the authors did so [94].

**Table 2**  
Number of articles reporting IRB approval and informed consent, stratified by region.

	Mainland China	Hong Kong	Taiwan	Outside China	Total
IRB approval					
IRB approval obtained	0/1	0/29	9/7	0/5	9/42
Permission obtained	0/0	0/0	4/3	0/0	4/3
Not reported	6/0	0/5	3/2	0/0	9/7
Total	6/1	0/34	16/12	0/5	22/52
Informed consent					
Written	0/0	0/24	10/4	0/1	10/29
Verbal	1/0	0/1	0/1	0/0	1/2
Electronic	0/1	0/0	0/0	0/0	0/1
Automatic*	0/0	0/0	0/0	0/1	0/1
Not specified	1/0	0/3	5/5	0/3	6/11
Not reported	4/0	0/4	0/1	0/0	4/5
N/A†	0/0	0/2	1/1	0/0	1/3
Total	6/1	0/34	16/12	0/5	22/52

Data are shown as articles published in Chinese/English. A total of 74 empirical studies were included. Macao is not shown due to no identified article. IRB=Institutional Review Board. N/A=not applicable.

\*Informed consents were implied by completing and mailing back the envelope.

†Analysis of medical records.

### 3.4. Reviews

Review articles accounted for the smallest proportion (14/118 [12%]) of articles, shown in Table 1.

Five articles from Hong Kong involved three types of review: literature review [117–119], scoping review [28], and systematic review [29]. Literature reviews summarised evidence on psychological intimate partner abuse among Chinese women [117], connections among IPV, neurophysiology, neurochemistry and neuroanatomy in abused women [118], cross-cultural understanding of depression among abused women [119]. The scoping review targeting Chinese obstetric/gynecology patients found that most of the included studies from mainland China and Hong Kong focused on prevalence and risk factors of IPV, but meaningful comparisons were difficult due to there being no standardised tools [28]. The systematic review focusing on post-traumatic stress disorder among Chinese female victims of IPV yielded only five studies, revealing a paucity of research on the topic, highlighting the differences in methodology, and emphasising the need for cultural considerations [29]. Not listed in Table 1, the review article without full-text presented IPV research in pregnant Chinese women with a focus on ten years of experience from the Domestic Harmony Research Team in Hong Kong [53].

For reviews from Taiwan, four literature reviews focused on domestic violence and mental health problems among aboriginal women [120], domestic violence and sexual abuse in nursing curriculum in Taiwan [31], health consequences and care for victims of gender-based violence [121], as well as the development of forensic nursing from the perspective of domestic violence and sexual assault [32]. The scoping review in 2009 as the first systematic search for nursing studies on IPV in Taiwan yielded only ten eligible papers from 389 search results (2.6%), suggesting a lack of focus on domestic violence from the nursing profession in Taiwan similar to what we have found in our scoping review for studies from Taiwan during the same time period (from 2001 to 2007, seen in Fig. 2); the scoping review also showed that four nursing case reports demonstrated the unique role of nurses in identifying and supporting victims [30].

Three literature reviews from mainland China summarised evidence on domestic violence among women during pregnancy [122,123], and health care providers' interventions in domestic violence [124], all of which summarised the research findings similar to what we have done above.

Published in 2001, the literature review from outside China comprehensively synthesised IPV research in Chinese population for the first time, finding a lack of responsiveness by the health care system in mainland China to address IPV, advocating a need to increase the government, society, and health care system's awareness of IPV, and highlighting the need to study culturally related issues of IPV and develop culturally appropriate instruments [60].

All of these reviews found limited consensus findings and called for more research in the area. In our scoping review (n=15), only three articles (20%) specifically bridged IPV and nursing profession [30–32] and only one limitedly discussed about male victimisation, all from Taiwan [121].

### 3.5. Reports

Reports accounted for a quarter (28/118 [24%]) of included articles in Table 1, and nursing case reports (22/28 [79%]) from Taiwan uniquely supplemented the evidence base in quantity and diversity. Frequently guided by nursing theories such as Watson's Caring Theory or Roy's Adaptation Model, nursing case reports documented a wide range of types of IPV victims and their nursing care, such as married, divorced, or co-habiting women, unmarried pregnant woman, immigrant women, married man, as well as male perpetrator of domestic violence [125]. The majority (18/22 [82%]) of the patients were encountered in emergency departments, highlighting the crucial role of emergency nurses in responding to IPV. Congruent with the scoping review from Taiwan [30], the increasing number of nursing case reports clearly proved that nurses were able to identify victims and provide appropriate support, even many abused women did not disclose IPV at first. Incongruent with the findings from Taiwan [63], friends as non-family members were often noticed as an escort, despite the Chinese saying "shameful family affairs should not be disclosed to outsiders". Nursing case reports further revealed information less reported in empirical studies, for example, motorbike accident, accidental fall, and knife cuts during cooking were commonly given reasons for injury from abused women. These studies usually didn't report ethical approvals or informed consents, but relevant ethical requirements were fulfilled [126]. On the contrary, the identified nursing experience reports from mainland China introduced nursing of patients with oral and maxillofacial injuries [127], upper arm fractures [128], and tympanic membrane perforations [129] due to domestic violence, but they merely documented nursing experience with insufficient theoretical or practical bases, and ethical approvals or informed consents were absent.

### 3.6. Expert opinion

We identified one commentary from Hong Kong [89]. The first author of the paper, also the corresponding author, is a distinguished nursing scholar with extensive experience in practice, education, and research focusing on IPV prevention and intervention, and about half of the included studies from Hong Kong were first-authored by her. The expert opinion summarised and commented on four advocacy interventions designed for Chinese women in Hong Kong, underscoring the need to ensure cultural congruence [89].

### 3.7. Terms, multidisciplinary collaborations, and other characteristics of included articles

IPV (42 [35%]), domestic violence (33 [27%]), and marital violence (26 [21%]) were mostly used terms in all 121 included articles, with IPV mainly adopted in Hong Kong (28/44 [64%]), domestic violence in mainland China (10/13 [77%]), and marital violence in Taiwan (26/58 [45%]). Other relevant terms included dating violence (4/121 [3%]), wife battering (2/121 [2%]), intimate partner abuse (2/121 [2%]), and gender violence (1/121 [1%]). For Chinese-language articles with English-language titles, abstracts, and key words, five (100%) from mainland China and 16 (100%) from Taiwan reported conceptually equivalent terms of domestic/family violence in Chinese and English; however, papers from Taiwan inappropriately used English-language IPV (4/22 [18%]) and domestic violence (4/22 [18%]) to denote Chinese-language marital violence.

After 11 theses and dissertations as well as two articles without full-text are removed, Table 3 presents summary of characteristics for 108 journal papers regarding author, collaboration, page, journal, impact factor, funding, and study quality. Although authors with a nursing background published most of the included articles (102/108 [94%]) serving as both first and corresponding authors, we noticed obvious multidisciplinary collaborations (48/108 [44%]) in studies mainly from Hong Kong, Taiwan, and outside China. Non-nursing co-authors were mostly from the fields of medicine, public health, and social work. Furthermore, about half (46/108 [43%]) of the articles were published in nursing journals, with the rest mainly in medical science journals (22/108 [20%]), violence journals (18/108 [17%]), women's health journals (10/108 [9%]), and public health journals (5/108 [5%]); articles from Taiwan tended to be published in nursing journals (36/49 [73%]), while most articles from Hong Kong (36/42 [86%]) and mainland China (11/13 [85%]) were published in non-nursing journals. Chinese-language local journals from mainland China and Taiwan generally had low impact factors, whether they were nursing journals or not. The proportion of studies with high quality was 73% (24/33) in Hong Kong, followed by 67% (2/3) from outside China, 59% (10/17) in Taiwan, and 29% (2/7) in mainland China. We didn't assess theses and dissertations using appraisal tools, but their study quality is generally assured by academic advisors and committee members, and empirical studies derived from these degree papers generally had high study quality.

### 3.8. Summary of findings

Nursing researchers from Hong Kong and Taiwan provide leadership in the study of IPV. At early stage, empirical studies more used descriptive or correlational designs, which served as a first step to study the prevalence and nature of IPV with a focus on IPV during pregnancy. Several studies of abuse during pregnancy, predominantly from Hong Kong and Taiwan, actually showed a similar prevalence to that in other studies in high income countries ranging from 3.4% to 11.0% [130]. Nurses' knowledge, attitudes, beliefs, and behaviors towards IPV were explored, reflecting a grow-

ing awareness of IPV along with later studies showing more knowledge and training about IPV. The increasing body of evidence targeting victims and nurses formed the basis for more complex studies, such as RCTs and mixed methods designs. Diverse populations were more the focus of studies as time went on, such as women in domestic violence shelters, college students on campuses, and sexual minorities. More studies with funding occurred, demonstrating recognised significance and study quality [131,132]. While reports documented the nursing care of patients, reviews together with expert opinion article synthesised and critiqued the growing evidence to inform future research. However, there is a dearth of nursing research on IPV from mainland China, and no studies from Macao. Empirical studies were predominantly cross-sectional designs. Although the first article from mainland China was published in 2004 [133], high quality empirical studies didn't occur until the year of 2018 [88], two years after mainland China's Anti-domestic Violence Law was enacted. International collaborations with institutions in the USA, UK, or Canada were frequently seen in studies from Hong Kong; but such collaborations were quite rare in studies from mainland China, and none from Taiwan. Studies from institutions outside China supplemented the evidence base in mainland China, Hong Kong, and Taiwan. Especially, two doctoral dissertations and publications derived from them provided the first high quality study on prevalence and risk factors of IPV in mainland China [59,61], and the only study reporting prevalence of domestic violence among nurses in Taiwan when firstly investigating nurses' responses to domestic violence [63].

Nurses' knowledge on IPV was enhanced since IPV was considered within the scope of nursing practice. Nurses' attitudes, beliefs, and behaviors towards IPV not only influenced health care for IPV victims, but also improved IPV research and practice since quasi-experimental and experimental nursing studies emerged as potentially effective interventions to respond to IPV. Nursing science perse was advanced through IPV research and multidisciplinary collaborations, for example, the development of forensic nursing in Taiwan [32].

## 4. Discussion

To the best of our knowledge, this is the first study to scope, compare, and synthesise nursing studies on IPV in mainland China, Hong Kong, Macao, and Taiwan. Our findings show that IPV has been an integral part of nursing research in Hong Kong and Taiwan, where varying designs are used to study various facets of IPV, targeting victims, nurses and other key stakeholders. In mainland China and Macao, IPV has been a largely overlooked issue in nursing, with IPV research limited in quantity, quality, and diversity. Researchers from outside China, who are originally from or have connections with mainland China, Hong Kong, and Taiwan, contribute to the research in corresponding region, some play the leading role. For articles published in early 2020, we noticed nursing researchers from Hong Kong and Taiwan further deepened and expanded IPV research through investigating risk factors and psychological outcomes of economic abuse [134], and examining related factors of intention to perpetrate dating violence [135].

We know well that large variations exist in nursing research on IPV across four regions in China, but we know less about the reasons. Multidisciplinary collaborations may play one of the key roles. A large proportion of included nursing studies from Hong Kong and Taiwan involved researchers from non-nursing disciplines; at least in Hong Kong, a nursing researcher led the multidisciplinary team. Nursing researchers were also identified in studies led by non-nursing researchers from social work and primary care [136–138]. Studies from Hong Kong also involved collaborations with non-government organisation (NGO) like Hong Kong SKH Lady MacLehose Centre [94]. From the perspective of global



**Table 3**

Number of articles presenting other characteristics, stratified by region and study design.

	Mainland China			Hong Kong				Taiwan			Outside China		Total (n=108)
	Empirical Study (n=7)	Review (n=3)	Report (n=3)	Empirical Study (n=35)	Review (n=5)	Report (n=1)	Expert Opinion (n=1)	Empirical Study (n=20)	Review (n=5)	Report (n=24)	Empirical Study (n=3)	Review (n=1)	
Author number													
Single author	0/0	2/0	1/0	0/1	0/0	0/0	0/0	1/1	2/0	5/0	0/1	0/0	11/3
2–5 authors	6/0	1/0	2/0	0/15	0/3	0/1	0/1	6/9	3/0	19/0	0/0	0/1	37/30
6–10 authors	0/1	0/0	0/0	0/15	0/2	0/0	0/0	1/2	0/0	0/0	0/2	0/0	1/22
More than 10 authors	0/0	0/0	0/0	0/4	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/4
Multidisciplinary collaboration													
Yes	1/0	0/0	0/0	0/29	0/4	0/0	0/0	2/6	2/0	1/0	0/2	0/1	6/42
No	1/1	3/0	1/0	0/6	0/1	0/1	0/1	5/7	3/0	23/0	0/1	0/0	36/18
Not sure	4/0	0/0	2/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	6/0
International collaboration													
Yes	0/1	0/0	0/0	0/14	0/3	0/0	0/0	0/0	0/0	0/0	0/2	0/1	0/21
No	6/0	3/0	3/0	0/21	0/2	0/1	0/1	8/12	5/0	24/0	0/1	0/0	49/38
Not sure	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Page number													
1–2 pages	2/0	0/0	3/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	5/0
3–5 pages	3/0	3/0	0/0	0/3	0/1	0/0	0/1	0/2	1/0	1/0	0/0	0/0	8/7
6–10 pages	1/0	0/0	0/0	0/16	0/1	0/0	0/0	2/8	4/0	15/0	0/3	0/0	22/28
11–20 pages	0/1	0/0	0/0	0/11	0/2	0/1	0/0	5/2	0/0	8/0	0/0	0/1	13/18
More than 20 pages	0/0	0/0	0/0	0/5	0/1	0/0	0/0	1/0	0/0	0/0	0/0	0/0	1/6
Journal topic													
Nursing	2/0	0/0	0/0	0/5	0/1	0/0	0/0	4/8	3/0	21/0	0/2	0/0	30/16
Medical science*	3/0	3/0	3/0	0/8	0/1	0/0	0/0	1/1	1/0	1/0	0/0	0/0	12/10
Violence	0/1	0/0	0/0	0/10	0/2	0/1	0/0	2/1	0/0	0/0	0/0	0/1	2/16
Women's health†	0/0	0/0	0/0	0/8	0/1	0/0	0/0	0/0	0/0	1/0	0/0	0/0	1/9
Public health	0/0	0/0	0/0	0/2	0/0	0/0	0/0	0/2	0/0	0/0	0/1	0/0	0/5
Psychology	1/0	0/0	0/0	0/0	0/0	0/0	0/1	0/0	0/0	0/0	0/0	0/0	1/1
Quality of life	0/0	0/0	0/0	0/2	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/2
Social science	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0	0/0	0/0	0/0	1/0
Others‡	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0	0/0	1/0	0/0	0/0	2/0
Impact factor													
Less than 1	1/0	1/0	2/0	0/2	0/0	0/0	0/0	4/3	3/0	5/0	0/0	0/0	4/5
1–2	5/0	2/0	0/0	0/7	0/1	0/1	0/0	0/5	0/0	0/0	0/2	0/0	7/16
2–3	0/0	0/0	0/0	0/9	0/0	0/0	0/0	0/1	0/0	0/0	0/0	0/0	0/10
3–4	0/1	0/0	0/0	0/8	0/1	0/0	0/0	0/3	0/0	0/0	0/0	0/0	0/13
4–5	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
5–10	0/0	0/0	0/0	0/3	0/1	0/0	0/0	0/0	0/0	0/0	0/1	0/1	0/6
More than 10	0/0	0/0	0/0	0/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/1
N/A§	0/0	0/0	1/0	0/5	0/2	0/0	0/1	4/0	2/0	19/0	0/0	0/0	38/8
Funding													
Yes	2/1	0/0	0/0	0/25	0/2	0/1	0/0	0/5	0/0	0/0	0/2	0/0	2/36
No	0/0	0/0	0/0	0/2	0/1	0/0	0/0	0/2	0/0	0/0	0/1	0/0	0/6
Not reported	4/0	3/0	3/0	0/8	0/2	0/0	0/1	8/5	5/0	24/0	0/0	0/1	47/17
Study quality													
High	1/1	3/0	3/0	0/24	0/5	0/1	0/1	5/5	5/0	24/0	0/2	0/1	6/33
Moderate-to-high	1/0			0/8				0/6			0/1		1/14
Low-to-moderate	2/0			0/1				1/0			0/0		3/1
Low	2/0			0/0				0/0			0/0		2/0
N/A¶	0/0			0/2				1/2			0/0		36/12

Data are shown as articles published in Chinese/English. A total of 108 articles were included. Macao is not shown due to no identified article. IPV=intimate partner violence. N/A=not applicable.

\*This category also includes family medicine, general practice, social medicine, and medical education.

†This category also includes midwifery, obstetrics, and gynecology.

‡School journals that covered a wide range of topics.

§Journals without impact factors.

¶Including empirical studies (analysis of medical records, survey using Delphi technique), reviews, and reports.

health [139,140], an effective solution for supporting IPV victims cannot be achieved without knowledge and practice from different disciplines and sectors [141,142], such as nursing, medicine, psychology, public health, social work, criminology, as well as police, NGOs, and shelters. However, it is important that nursing as well as other disciplines should be part of these teams. Nurse researchers who received training or degrees in, for instance, primary care [143], public health [144], and criminology [145], may enhance this multidisciplinary approach, and make interdisciplinary or transdisciplinary collaboration even more possible [146]. Furthermore, the multidisciplinary nature of IPV research was supported by nursing publications in non-nursing journals and vice versa [112]. However, given the fact that IPV has not been considered as a nursing topic in mainland China, that probably explains the finding of so few IPV studies published in local nursing journals, unlike their counterparts in Hong Kong and Taiwan. Other factors might also influence the development of nursing research on IPV, such as nurses' responses to IPV and relevant laws. Socio-economic-political-cultural factors also should always be taken into considerations, including but not limited to urbanisation, economic solvency, mandatory reporting, and patriarchy.

Our study identifies several elements not frequently reported in research on IPV from Western countries. First of all, besides advocacy interventions often seen in Western studies [147], Qigong as a mind-body exercise was firstly adopted as an intervention in abused women in Hong Kong, which significantly improved mental health even though it did not increase telomerase activity [94]. However, to even investigate telomere activity was a highly innovative outcome not seen in any other IPV intervention research. Inspired by previous findings from the author team [95], smartphone application for traditional Qigong training was further developed via embracing modern mobile technology [148]. Secondly, the phenomena of cold violence and Tongqi in modern Chinese society received attention [87,111]. Researchers from Hong Kong translated and validated the tool for measuring economic abuse [86], frequently reported as a form of cold violence with financial control [149]. Researchers from mainland China specifically developed the tool to investigate cold violence, though mainly among wives of MSM [87]. Actually, wives of MSM, or known as Tongqi, is a significant victimised population due to complexly intertwined discrimination and homophobia, with an estimated population of over 13.6 million people in mainland China [150]. Thirdly, unlike common research approaches involving human subjects research approvals, nursing case reports unique to Taiwan provided valuable evidence for understanding IPV and caring for victims of IPV. These nursing case reports holistically profiled victims or perpetrators of IPV with diverse backgrounds, and systematically documented the causes, patterns, and consequences of IPV via observation and interaction during clinical nursing practice [125,151–155].

This scoping review identifies obvious limitations in the literature. First, no matter in Chinese or English languages, IPV, domestic violence, and marital violence were frequently used interchangeably in nursing studies, especially those from Taiwan. These overlapping terms have subtle but significant distinctions, and inappropriate use or unclear definitions can lead to different results [156]. Second, for mixed methods studies from Hong Kong and Taiwan, specific classification, appropriate justification, and sufficient integration for mixed methods design were generally lacking. According to classifications from Creswell and his colleague [157], no study identified in the scoping review explicitly reported any three core mixed methods from convergent, explanatory sequential, or exploratory sequential designs, nor other four complex mixed methods designs, though these studies clearly belonged to one of the above types of classifications. However, the GRAMMS appraisal tool and Creswell text are not necessarily the global standards for quality of mixed methods studies, and do not mean

that the mixed methods studies were not of strong quality. Third, for empirical studies and reports from mainland China, IRB approvals and informed consents were generally less reported, implying the possibility of insufficient review of ethical considerations. The safety of participants and researchers is paramount, and WHO has provided eight ethical and safety recommendations for conducting research on IPV and additional recommendations for intervention research [158,159]. Researchers should be well prepared before, during, and after the study, to ensure the participants in IPV research are at no increased risk and can access necessary resources if needed [160].

We also identify serious knowledge gaps in the existing literature across China. First, the prevalence and risk factors of IPV among nurses were rarely studied. Nurses themselves, especially female nurses, can be victims of IPV due to the facts that nursing still remains a female dominated profession and women are at higher risk of IPV victimisation. Female nurses' own personal experiences of IPV can negatively impact their health and wellbeing; however, the health care services they provide, including identifying victims and providing support, may be influenced positively [161]. Similarly, male nurses were less recruited for investigation regarding opinions, preparedness, and practice towards IPV even though they make up 2.2%, 13.4%, 13.1%, and 3.2% of the nursing profession in mainland China, Hong Kong, Macao, and Taiwan, respectively [34,38,162,163]. Thus we may lose the chance to know how male nurses differ from their female counterparts, and what male nurses can do differently to respond to IPV [164,165]. Second, very few studies explored findings for male victims, female perpetrators, or bidirectional IPV perpetration [166]. Last but not least, no research focused on IPV in extreme events in spite of some mostly anecdotal evidence suggesting IPV can increase during and after human-made or natural disasters [167], such as large-scale protests [168], severe earthquakes [169], as well as COVID-19 pandemic [170].

This scoping review has implications for research, practice, and education in nursing. For mainland China and Macao, IPV is urgently needed to be included in nursing education and research before practice is prepared, such as screening women for IPV [171]. For Macao, strong collaboration with other cities in Guangdong-Hong Kong-Macao Greater Bay Area is needed and can be beneficial [172]. For Hong Kong and Taiwan, while continuing to expand high quality research, efforts can be made to better translate evidence into practice from an implementation science perspective [173]. Additionally, mobile health (mHealth) is increasingly popular and evidence from Western countries show the importance of mHealth interventions [174], which may have great potential applications.

The scoping review itself has several limitations. We searched 11 databases, references lists, and articles published by the first and corresponding authors, but we cannot rule out the possibility that some papers were missed or mistakenly excluded. We did not calculate the exact numbers of individual studies represented by 35 and 28 empirical studies from Hong Kong and Taiwan, while we noticed that multiple published papers were clearly derived from the same study. The completeness of our analysis is limited because three full-text articles were not obtained. Finally, we defined study quality on the basis of results using specific appraisal tools and self-developed criteria, which can influence generalisability if different appraisal tools and criteria are adopted.

## 5. Conclusion

This scoping review summarises nursing literature on IPV from 1996 to 2019 conducted in mainland China, Hong Kong, and Taiwan, with the intention of inspiring future studies in Hong Kong and Taiwan while raising awareness for nurses in mainland China

and Macao on this topic. The health sector has a key role to play in responding to IPV, and nurses have demonstrated the unique position in fulfilling this role. Nursing scholars from Hong Kong and Taiwan have tremendously contributed to IPV research, closely collaborating with researchers from other disciplines and Western countries. Nursing research on IPV in mainland China and Macao is emerging, with potential to add important new evidence.

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## Declaration of Competing Interest

The authors declare no conflict of interest.

## Credit author statement

QL, HL, KC, and IV conducted literature search. QL, HL, and KC examined study quality. QL and HL conducted data extraction. KC, CL, and IV cross-checked extracted data. QL made the figures, QL and HL made the tables. PD and JC contributed extensively to data interpretation and discussion. All authors contributed to study design, data analysis, data interpretation, manuscript write-up, and finalisation.

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*Editor note: The Lancet Group takes a neutral position with respect to territorial claims in published maps and institutional affiliations.*

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.lanwpc.2020.100017](https://doi.org/10.1016/j.lanwpc.2020.100017).

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