# INTIMATE PARTNER VIOLENCE IN ORTHOPAEDIC SURGERY

# INTIMATE PARTNER VIOLENCE IN ORTHOPAEDIC SURGERY: LESSONS LEARNED AND FUTURE DIRECTIONS

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## ABSTRACT

The overarching theme of this thesis is to discuss the research to date on intimate partner violence (IPV) in orthopaedic surgery and to begin to study selected issues that have been understudied in orthopaedic surgery and IPV. This thesis outlines the current state of knowledge in the field of IPV and orthopaedic surgery and provides some insight into three selected "emerging issues" in the field which warrant future research including: education of orthopaedic surgeons and residents to reduce barriers and improve perceptions; IPV perpetrators; and outcomes for victims of IPV. The findings demonstrate that a short course on IPV for orthopaedic trainees led to an improvement and retention of knowledge three months after the course. IPV education should be integrated into training programs for orthopaedic surgeons. Our systematic review on IPV perpetrator factors indicates that using alcohol or drugs, experiencing child abuse, witnessing interparental aggression, low socioeconomic status, and psychological conditions like depression and anxiety were commonly associated with IPV perpetration. Perpetrator treatment programs should take into consideration modifiable and preventable factors that are associated with IPV perpetration. This thesis proposes a pilot prospective cohort study as the first step toward determining how experiences of IPV affect orthopaedic outcomes such as injury-related complications. The proposed study will determine feasibility and assist in the development a larger-scale multinational prospective cohort study that will engage health care professionals from around the world to increase awareness of how IPV affects patients' musculoskeletal outcomes. In the past decade, the field of orthopaedic surgery has become more aware of the issue of IPV, but there are many questions that remain. Future research into the above issues will be an excellent first step to fully understanding the issue of IPV in orthopaedic patients, and may lead to improved support of victims of IPV in the future.

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**TABLE OF CONTENTS**

## LIST OF FIGURES

## LIST OF TABLES

## LIST OF APPENDICES

## LIST OF ABBREVIATIONS

| | |
|---|---|
| ANOVA | Analysis of Variance |
| CI | Confidence Interval |
| COA | Canadian Orthopaedic Association |
| EQ5D | EuroQuol 5D |
| FDA | Food and Drug Administration |
| FLOW | Fluid Lavage of Open Wounds |
| ICF | Informed Consent Form |
| IPV | Intimate Partner Violence |
| IMPACT | Interdisciplinary Partner Abuse Course for Traumatologists |
| NOS | Newcastle-Ottawa Scale |
| NR | Not Reported |
| POSITIVE | Patient Opinions of Screening for IPV |
| PRAISE/PRAISE-1 | Prevalence of Abuse and IPV Surgical Evaluation |
| PRAISE-2 | Prospective Abuse and IPV Surgical Evaluation |
| PVS | Partner Violence Screen |
| REB | Research Ethics Board |
| RTF | Return to Function |
| SD | Standard Deviation |
| WAST | Woman Abuse Screening Tool |
| WHO | World Health Organization |

# Chapter 1: Intimate Partner Violence in Orthopaedics: Looking Back on a Decade of Research

## INTRODUCTION

IPV is defined by the World Health Organization (WHO) as "acts of physical, sexual, and emotional abuse by a current or former intimate male partner, whether cohabiting or not"[1]. The definition also includes "controlling behaviors, including acts to constrain a woman's mobility or her access to friends and relatives, extreme jealousy, etc."[1]. IPV is the most common cause of non-fatal injury to women worldwide[2], bringing with it not only physical injury, but also psychological trauma, and economic burden[3,4].

Family medicine and emergency medicine have, in the past, been the dominating medical specialties to focus their attention on IPV. However, in the last decade, the field of orthopaedic surgery has come to attention as a very plausible screening setting[5]. Several studies have been completed to assess prevalence of IPV in orthopaedics[6-9], perceptions of IPV screening among patients and surgeons[10-12], what barriers may be faced in implementing screening within a fracture clinic[13,14], and beginning to examine the optimal method for implementing a support program for IPV in orthopaedic clinics[15-17].

It is only in approximately the last decade that the orthopaedic surgeons have begun to focus their attention on IPV as an issue that affects their patients. Bhandari et al, published one of the first pieces of original research on IPV in orthopaedics in 2006[18]. The findings indicated that musculoskeletal injuries including strains, sprains, fractures, dislocations, and foot injuries, were the second most common physical manifestation of IPV[18]. This study prompted a flurry of research activity in

orthopaedics related to IPV, particularly since 2010, including surveys, systematic reviews, and prevalence studies.

Other fields have, despite their efforts, proven often ineffective in screening for IPV. Screening in emergency departments comes with difficulty given the acute state of the patient and the fast pace of the department[5]. IPV is often left undocumented in emergency medicine and family medicine clinics, despite a strong focus on IPV in these two specialties[19-21]. Orthopaedic surgeons may have an advantage over emergency physicians in identifying IPV, since they typically see their patients multiple times over the course of treatment, which may assist in building trust and allows multiple opportunities for orthopaedic clinic staff to identify IPV[5]. Additionally, orthopaedic clinic patients are often not in acute distress, unlike in the emergency department. Given the link between IPV and musculoskeletal injuries, and that orthopaedic clinics may be ideal to identify IPV, there should be a greater emphasis on orthopaedic clinics as a point of contact for victims of IPV.

## PREVALENCE OF IPV IN ORTHOPAEDIC CLINICS: IS IT WORTH THE FOCUS ?

In order to consider orthopaedics as a viable point to screen women, it is important to understand the prevalence of IPV in orthopaedics and in other specialties. A survey of Canadian Orthopaedic Association (COA) members demonstrated that the majority of orthopaedic surgeons believed that the prevalence of IPV was less than 1% in their clinic[10].

A systematic review by Sprague et al showed that the lifetime prevalence of any type of IPV is 38% in family medicine and 40% in emergency medicine[22]. In 2013, the PRAISE Investigators published the landmark PRAISE study which found that the overall prevalence of IPV was 1 in 6 among 2945 women attending orthopaedic fracture clinics in Canada, the United States, the Netherlands, Denmark, and India[8]. Furthermore, 1 in 50 women in fracture clinics were there because of an IPV-related injury[8].

**PATIENT OPINIONS**

Patient opinion and beliefs concerning screening within an orthopaedic fracture clinical setting are important to understand. As a follow-up to the PRAISE study which highlighted the high prevalence of IPV within fracture clinics, the POSITIVE study aimed to determine patients' opinions of IPV screening[17]. Briefly, 750 men and women at five clinical sites in Canada and the Netherlands completed the cross-sectional survey[17]. The study showed that 74% of patients agreed that fracture clinic staff should ask patients about IPV and that 94% believed that orthopaedic surgeons should look for the causality of injury in their patients[17]. The majority (73%) of participants indicated that they would be comfortable disclosing IPV in the fracture clinic[17]. These findings show that patients are generally comfortable with being asked about IPV in the fracture clinic setting.

## CHALLENGES AND BARRIERS

Unfortunately, there are still many barriers to address in terms of screening for IPV in fracture clinics. Eliminating these barriers is crucial to implementing effective IPV programs. A systematic review by Sprague et al. aimed to determine the barriers to IPV screening for medical professionals[13]. A very common perception was that it was not the health care provider's responsibility to screen for IPV; health care providers often stated that they had more pressing issues pending[13]. Time constraint was an issue reported in nearly all of the included studies[13]. Other common barriers included personal discomfort, lack of knowledge, and fear of making the patient angry[13].

IPV is a challenging issue to address within a clinical setting given the prejudices and misunderstandings associated with the subject matter[10]. Sprague et al. also studied the perceptions of IPV among a population of 200 medical students, 45% of which believed that inquiring about IPV risked offending the patient[12]. Furthermore, 91.2% of medical students and 96.9% of surgical residents assumed IPV prevalence in their intended practice to be 10% or less - much lower than 1 in 6 which the PRAISE study identified[12,8].

Another study by Sprague et al explored barriers within three focus groups with orthopaedic surgeons, senior orthopaedic trainees, and junior orthopaedic trainees (20 participants) as well as two interviews with opinion leaders in the orthopaedic community[14]. The study identified four major categories of barriers: surgeon perception barriers (orthopaedic culture, lack of champion), perceived patient barriers

(language, culture, brief patient-surgeon interaction, gender, power imbalance, belief that patient will not disclose), fracture clinic barriers (inability to see patient alone, lack of privacy, inadequate patient history, volume of patients, lack of policies), and barriers specific to surgical trainees (lack of education and training, preoccupation with specialty, multiple demands)[14]. Participants indicated that there are a lack of protocols to follow in orthopaedic clinics, contrasting IPV screening with screening for child abuse[14]. They stated that when screening for child abuse, the next steps are clear, but with IPV, they are not[14]. This is a challenge that can be targeted not only through education, but by creating an accessible support team that may be contacted upon a positive IPV screen. Participants proposed that the clinics should have a private location so that patients may disclose confidential information[14]. Having information packages was also rated as helpful so that surgeons could provide resources to IPV victims[14]. Having a screening form for all patients upon entry to the clinic was also identified as being potentially beneficial[14].

## OVERVIEW OF THE THESIS

The above outlines the past decade of orthopaedic research focusing on IPV, including some landmark studies that provide the rationale for continuing to conduct IPV research in orthopaedic surgery clinics. There are currently recommendations to implement an identification and support program for IPV victims in orthopaedic clinics, but certain important questions need to be answered before a large-scale IPV program can be implemented. The overarching theme of this thesis is to discuss the research to date on IPV in the field of orthopaedic surgery (Chapter 1) and to begin to study selected issues that have been understudied in the field of orthopaedic surgery

and IPV (Chapters 2-4). Selected emerging issues in the field include: 1) education of orthopaedic surgeons and residents to reduce barriers and improve perceptions (Chapter 2); 2) IPV perpetrators (Chapter 3); and 3) outcomes for victims of IPV (Chapter 4). This thesis concludes with a brief discussion of the findings and conclusions (Chapter 5).

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# Chapter 2: Prospective Evaluation of a Short Partner Abuse Course for Orthopaedic Surgery Trainees (IMPACT)

## ABSTRACT

**Introduction:** Intimate Partner Violence (IPV) is a serious global issue that plays a large role in the preventable morbidity and mortality rate in women. Providing clinicians with increased IPV knowledge will help to overcome such barriers, and ultimately lead to better help for victims of abuse. This prospective study aimed to investigate to what extent a half-day course on IPV improved orthopaedic surgical trainees' knowledge and attitudes about IPV.

**Methods:** Thirty three surgeons and surgical residents attended IMPACT, a course that provide lectures and discussion about the basics of IPV, what to do when a patient is a victim or perpetrator, the current state of IPV research, and the orthopaedic surgeon's role in preventing IPV. Attendees were asked about their IPV knowledge, attitudes, and practices in the trauma setting immediately prior to, immediately after, and 3 months post course. The knowledge test included 25 questions with a maximum score of 25 points. Their scores were compared to determine the viability of the course and its impact on IPV knowledge and retention.

**Results:** Thirty-three trainees (30 males and 3 females) completed the pre-course knowledge test. Twenty five participants completed the immediate post-test and 27 participants completed the 3-month follow-up test. The mean percentage of correct answers before the course was 57% and increased to 73% after the course and was 68% three months later ($F=9.505$, $p<0.05$).

**Conclusions:** Our findings demonstrate that short course on Partner Violence and Abuse Course for Traumatologists (IMPACT) led to an improvement and retention of knowledge 3 months after the course. IPV education should be integrated into training programs for orthopaedic surgeons. IPV training should be conducted several times throughout the training program and should focus not only on lecture-style learning, but also applying the necessary skills in clinic, and reinforcing knowledge.

## INTRODUCTION

Intimate Partner Violence (IPV) is a serious global issue that significantly contributes to preventable morbidity and mortality among women[1]. The World Health Organization reports that 1 in 3 women globally will experience physical or sexual IPV or domestic abuse in their lives[2]. IPV victims experience more physical and mental health problems[3,4], including orthopaedic injuries[5,6], and use health care resources more frequently than non-abused women[7,8]. A recent systematic review of 37 IPV prevalence studies reported the lifetime prevalence of IPV in emergency and family medicine is 40% and 38% respectively[9].

Fifteen percent of IPV-related injuries are serious enough to warrant medical attention[10]. These injuries often require the consultation of orthopaedic surgeons. A previous study conducted by Bhandari et al.[6] reported that sprains, dislocations, fractures, and foot injuries accounted for 28% of all clinical manifestations of IPV among women who were identified in a 2-year period by a domestic abuse community program. However, the number of IPV cases known by orthopaedic surgeons in Canada may be underestimated; 87% of orthopaedic surgeons who took part in a Canada-wide study believed that female victims of IPV accounted for less than 1% of patients in their care[11]. Moreover, 9% of the respondents believed that inquiring about IPV was an invasion of the patient's privacy, and 11% believed that ruling out IPV as the cause of injury was not part of their duty[11]. This may be explained by the fact that clinicians in disciplines such as Family Medicine

and Emergency Medicine have focused their attention on this issue in the past; however orthopaedic surgeons have only just begun discussing IPV in their clinical practice[12,13].

There are many barriers that surgeons face when they suspect a patient is a victim of IPV [14,15]. However, research suggests that many of these challenges can be overcome with increased knowledge of IPV in a clinical setting[12,14,15]. We believe that educating orthopaedic surgeons and other health care professionals on how to support women who have experienced IPV with courses such as the Multidisciplinary Partner Abuse Course for Traumatologists (IMPACT) will help clinicians feel more comfortable with the issue. This may ultimately lead to better help for victims of abuse. Based on a meta-analysis of 9 randomized trials, Madden et al (unpublished) found that IPV education programs for health care professionals significantly increased knowledge and screening behaviours of health care professionals compared to those without the training. An additional 25 non-randomized studies out of 27 concluded that IPV educational programs significantly increased knowledge and skills with regards to screening patients for IPV. None of these studies were conducted in the field of orthopaedic surgery.

This prospective study aimed to investigate to what extent a half-day course can change the knowledge, attitudes, and practices of orthopaedic trainees about IPV in the trauma setting and appropriate IPV screening and support methods immediately following the course and three months following the course.

## METHODS

### Study Design

We conducted a prospective study wherein orthopaedic trainees (fellows, residents, and medical students) completed a self-reported written questionnaire before attending the Interdisciplinary Partner Abuse Course for Traumatologists (IMPACT), immediately following the IMPACT course, and at three months following the IMPACT course.

### Ethics and Confidentiality

We received approval from the Hamilton Integrated Research Ethics Board (Project 12-339) before conducting this study. We did not seek written consent for this study as submission of questionnaires was taken as consent. We kept all test scores strictly confidential and removed identifiers as soon as possible following the test. The coding list was available only to one member of the study team.

### Eligibility

The study has minimal inclusion and exclusion criteria. To be eligible, participants had to attend the half-day course, be an orthopaedic surgery trainee (including orthopaedic surgery fellows, orthopaedic residents, and medical students on an orthopaedics elective), and be able to understand, read, and write in English. Participants were excluded if they were unwilling to complete the study questionnaires. Orthopaedic trainees at McMaster University were required to attend the course as part of their training, but were told that they could decline participation in the study without penalty.

**Course Development**

The course was developed with consultation from IPV researchers, social workers, clinical psychologists, research methodologists, surgeon-educators, and orthopaedic surgeons, as well as an in depth literature review on IPV education. The course consisted of seven modules, all of which were tailored to orthopaedic surgery trainees. The modules of the course are listed in **Figure 1**.

Module 1 was presented by a social worker from a local women's shelter. During the course, the presenter covered important definitions and put into perspective the impact of IPV on its victims, providing a background understanding of IPV and its consequences. In Module 2, a surgeon-educator provided an in depth case presentation of IPV victims that may present to orthopaedic surgeons and residents at a trauma center. This module was followed by an overview of all the known IPV research conducted to date in the field of orthopaedic surgery. A leading IPV researcher then presented a model for practice that highlighted important recommendations for implementing a system to help surgeons recognize IPV victims. These recommendations included asking all women about IPV and integrating three direct questions from the Women Abuse Screening Tool (WAST) into routine history taking. Following this lecture an experienced social worker from a local hospital domestic violence program emphasized the steps a surgeon could take if they suspect their patient is a victim of IPV. Another module by a clinical psychologist who specializes in counseling IPV perpetrators was given which highlighted what to do if

the patient was a suspected perpetrator. The course ended with a presentation by a representative of the Canadian Orthopaedic Association (COA) that provided the COA's position on IPV emphasizing how surgeons can help IPV victims and that surgeons are encouraged to educate themselves about IPV[12].

**Survey and Knowledge Test**

The questionnaire chosen for the study was a self-reported written questionnaire developed by the study team. We were unable to find an existing knowledge test that specifically tests basic knowledge of IPV as it relates to orthopaedic surgery and physical injury; therefore, we developed a knowledge test in collaboration with orthopaedic surgeons, methodological experts, IPV researchers, and social workers. We pilot tested the questionnaire on 5 research assistants and one orthopaedic resident to improve the knowledge test clarity. After pilot testing, we removed the ambiguous questions and improved the clarity of some wording based on feedback from the research assistants and resident.

The knowledge test and course content were developed independently with the intention of testing the participants' general IPV knowledge, not the ability to recall what was presented at the course. The knowledge test consists of 25 IPV knowledge questions and includes the following response options: 1) True; 2) False; and 3) Unsure. Course participants completed the same set of questions at each of the three study time points. **Appendix A** lists the questions the participants were evaluated on as well as the correct

answers. Only the answers from the IPV knowledge section are used to determine the primary outcome of the study. The maximum score that could be achieved was 25 and the minimum score was 0.

The pre-test questionnaire also included demographic questions such as race, gender, age, and for how long the participant has been practicing orthopaedic surgery, as well as questions such as whether the participant had taken a previous course in IPV. The post-test questionnaire collected some feedback information about the course, including course format, satisfaction with the learning objectives, and audience interest. The 3-month questionnaire had additional questions regarding how the course had impacted the clinicians' practices.

**Survey Administration**

The first questionnaire was administered on site at the start of the course. Before distributing the questionnaire, the protocol, risks and benefits of the study were discussed with the participants and they were given the opportunity to ask any questions about the study. The second questionnaire was also administered onsite immediately after the course. The third and final questionnaire was sent to participants by email three months following the date of the course. The email provided a link to a secure website where the questionnaire could be answered confidentially. Research personnel followed up with course participants up to four times for each time period and again in person at rounds for the 3-month follow up questionnaire.

### Data Analysis

Demographic data were analyzed descriptively. Continuous data are reported as means and standard deviations, and categorical data by frequency counts and proportions. The comparative data were analyzed using a one-way repeated measures ANOVA test to determine the differences between the group means of the three tests and completed a Bonferroni post-hoc test. All analyses were completed using SPSS version 20.

## RESULTS

### Study Participant Characteristics

Thirty three orthopaedic trainees attended the IMPACT course and completed the pre-test. Twenty five course participants completed the immediate post-test and 27 participants completed the 3-month follow up test. The study flow diagram (**Figure 2**) illustrates the change in participant numbers through the progress of the study. Eight residents needed to leave the session before the immediate post-test was completed due to clinical duties. The study team made every attempt to contact these residents for the 3-month follow up test.

The study participants consisted mainly of surgical residents (87.5%) and were typically male (90.9%), approximately half were Caucasian (45.4%), and had a mean age of 30.4 (range 24-46) (**Table 1**).

**Perceived Knowledge and Attitudes**

Overall, the participants' baseline responses on knowledge and attitudes were favourable. For example, 93.8% of participants agreed that IPV is an important issue, which rose to 100% immediately after the course (**Table 2**). The largest improvement in attitude was in the question "I am skeptical that the health care system has the resources to screen for IPV." 53.1% of trainees endorsed this statement before the course, but this dropped to 36.0% following the course and remained low at 33.3% at the 3 month follow up test. Conversely, only 6.5% of trainees thought that asking about IPV is dangerous for the patient before the course but this rose to 32.0% after the course and remained higher than baseline 3 months later (14.8%). 34.4% of trainees agreed that they would not know what to do if their patient disclosed IPV before the course. This improved to only 8.0% of trainees not knowing what to do after the course but the attitude was not retained 3 months later (25.9% wouldn't know what to do at 3 months) (**Table 2**).

**Knowledge Test**

The mean percentage of correct responses pre-course was 57.2% (95% CI: 51.6-62.8; SD 16.5). **Figure 3** shows the mean percentage of correct, incorrect, and unsure responses of all three tests. The difference between the three means was significantly different according to the repeated measures ANOVA test ($F_{79}$=9.505; p<.001).

The mean percentage of correct responses immediately after the course improved from 57.2% to 72.8% (95% CI: 69.4-76.3; SD 8.8). This difference was statistically

significant (p>0.001; **Table 3**). Three months following the course, the mean percentage of correct scores dropped slightly from the post-course scores but still remained significantly higher than the baseline scores at 67.5% (95% CI: 62.4-72.6; SD 13.5) correct (p=0.018; **Table 3)**. The difference between the mean post-course scores and mean 3 month scores was not significant (p=.530), indicating that the results did not decrease significantly three months after the course.

The greatest improvements in scores (proportion of trainees answering the question correctly) were seen in the following questions: 1) Head and neck injuries are the most common physical manifestations of IPV (improved 21.2% to 96.0%). 2) Musculoskeletal injuries are the most prevalent type of IPV injury (improved 33.3% to 76.0%). 3) There is a lack of IPV screening tools that can be used in a clinical setting (improved 18.2% to 42.4%). 4) The majority of abused women support routine screening for IPV (improved 42.4% to 83.3%). 5) In Canada, it is mandatory for health care providers to report IPV (improved 51.5% to 84.0%). 6) IPV occurs almost exclusively in young, short-lasting relationships (improved 51.5% to 84.0%).

**Participant Course Evaluation**

According to the answers given in the post-course questionnaire all the participants agreed, and of those 54% strongly agreed, that the course was informative and interesting. 96% of the participants also indicated that they would recommend the course to their colleagues.

## DISCUSSION

The study was conducted to gauge the impact of a half-day course on the IPV knowledge of clinicians. This course was designed to provide a pragmatic approach to remedy the gap of IPV knowledge that is currently present in orthopaedic trauma clinicians[11]. Our findings suggest that the IMPACT course made a significant positive difference in the IPV knowledge of those who attended the course, and this knowledge was significantly retained after 3 months.

Several studies have shown that IPV is underreported among women who seek medical attention[16-18]. Orthopaedic surgeons have been consulted for approximately 28% of the physical manifestations of IPV[5], however, it is still very underemphasized in the clinical field. This underreporting and lack of emphasis has been hypothesized to be highly detrimental to outcome, as 44 percent of domestic violence related homicide victims had previously presented to an emergency department within two years prior to their death[17]. Of those patients that presented to an emergency department, domestic violence was documented in medical records in only two cases and there was no intervention noted[17]. This indicates that there is still work to be done to improve reporting and intervention for victims of abuse.

To address the low rates of IPV screening among clinicians, previous studies have explored barriers to IPV screening among various health care professionals such as

Emergency Department health care workers, obstetricians/gynecologists, family physicians, internists and health care staff in family planning organizations[19-21]. It has been speculated that lack of knowledge and training may be an important factor in the low rates of screening for IPV[22]. In 2011, Connor et al. published a study among dental students and measured knowledge, attitudes, beliefs, and self-reported behaviors regarding IPV. The study indicated that a sizeable number of students received no IPV training prior to or during dental school, leading to perceptions that they lack knowledge about IPV and are not well prepared to address the problem of IPV among their patients[22]**.** Similarly, Wathen et al.[23] conducted a survey of students in 222 programs in dentistry, medicine, nursing, and other allied health professions at the undergraduate and graduate levels and found that only 43% of undergraduate medical programs and 46% of undergraduate dentistry programs offered some kind of IPV content, and postgraduate programs ranged from no IPV content (such as in dentistry) to about 41% (nursing).

A recent survey of medical students and surgical residents by Sprague et al.[14] found that there was a general opinion that IPV knowledge was lacking. Another study conducted by Park et al. with 982 final year residents reported that only 21% of the residents felt ready to discuss IPV with their patients[24]. However, comparatively, 62% felt comfortable discussing smoking and 53% felt prepared to talk about diet and exercise[24]. Furthermore, a report by the WHO shows the imperative need to have a component of violence education in clinical training[2].

We believe that bringing together an international community of researchers, surgeons and students in trauma settings and fostering a learning environment will improve knowledge and attitudes about IPV. Studies have emphasized that the expertise and consultation of orthopaedic health care professionals is vital when treating victims of IPV[25]. However, there are limited resources available to orthopaedic surgeons during their training as students, and there is a gap on research addressing knowledge and attitudes of orthopaedic healthcare providers with regards to IPV. As indicated by the results, the IMPACT course is effective in improving IPV knowledge in surgeons. We believe that if IPV knowledge is integrated as part of a medical curriculum for orthopaedic surgeons, it could ultimately make a positive difference in assisting abused women to connect with the resources they need.

We identified a number of areas that were improved by the course, such as overall knowledge scores and the attitude that the health care system has the resources for routine IPV screening. We also identified a number of areas that did not improve after the course, such as the attitude that asking about IPV is dangerous for the patient, as well as attitudes that were not maintained for 3 months like the perception that the trainee would know what to do if a patient disclosed IPV. This indicates that, although the IMPACT course was successful in improving knowledge 3 months after the course, orthopaedic surgery trainees could benefit from reinforcement of the concepts introduced in the IMPACT course. IPV training should be held several times through a trainee's training period to reinforce knowledge. Additionally, trainees may benefit from multi-focal

knowledge reinforcement using more than just in-class lectures. For example, research suggests that posters and brochures in clinics[26,27], clinical mentors who routinely ask about IPV[15], and mobile phone/tablet applications with critical resources[28] may be helpful to aid health care professionals in asking about IPV routinely.

Limitations of this study include the small-scale nature of the study. We were able to reach orthopaedic trainees at a single institution. Future studies should be larger in scale and target more orthopaedic training programs, and should extend to practicing orthopaedic surgeons. The high level of knowledge at baseline that the trainees had is another limitation. The study was conducted in a population that had heard of the issue of IPV for several years during rounds, conferences, and other academic events. The effectiveness of this course may be different in populations that have had less exposure to IPV content previously. One of the most difficult methodological issues encountered during this study was the high rate of loss to follow up. We were unable to reach 8 course participants immediately following the course, primarily because they needed to leave early to complete clinical duties. These 8 participants that decided to leave early and not complete the immediate post-test could have been systematically different from those who completed the test. They may have been less interested in the topic than their colleagues. We attempted to reduce loss to follow up by contacting the participants multiple times by email, by phone, and while they were in clinic or grand rounds if necessary. We also offered a choice of paper or electronic surveys for convenience.

The IMPACT study is the first educational curriculum-based intervention study focusing on orthopaedic health care professionals, and it has the potential to pave the way for more large-scale studies. Based on the evidence provided by this study, a course in IPV education can improve surgeon knowledge, which is sustained up to three months after taking the course. Given the high occurrences of intimate partner violence, this knowledge can aid surgeons in recognizing and thereby working towards reducing the prevalence of IPV. We recommend that IPV education be incorporated into medical school education, or compulsory IPV seminars be given to those in the medical field. IPV training should be conducted several times throughout the training program and should focus not only on lecture-style learning, but also hands-on learning and reinforcing knowledge. With the correct knowledge on how to handle IPV victims, surgeons and other physicians can start an open discussion about IPV and hope to decrease the incidences of IPV.

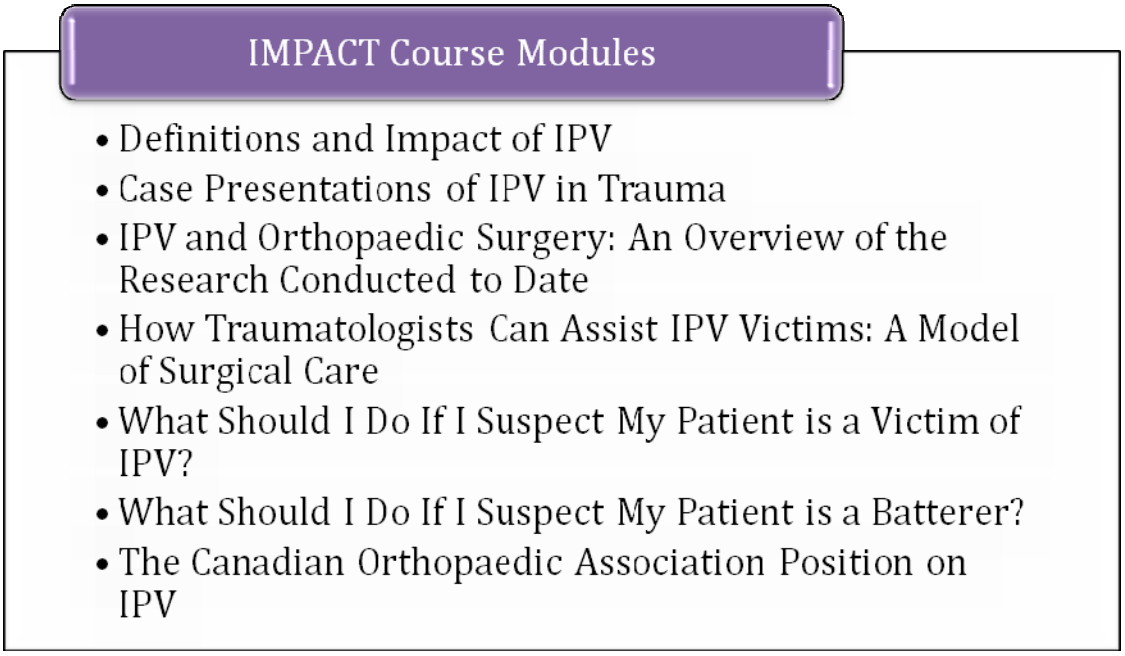



Figure 1 - IPV Modules Covered in IMPACT

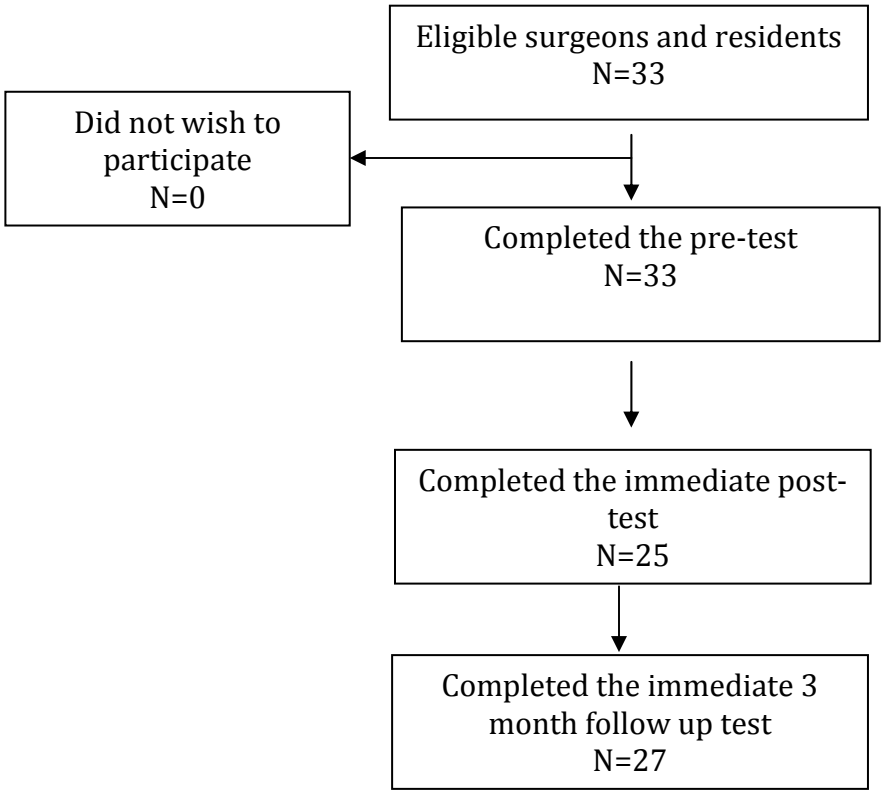
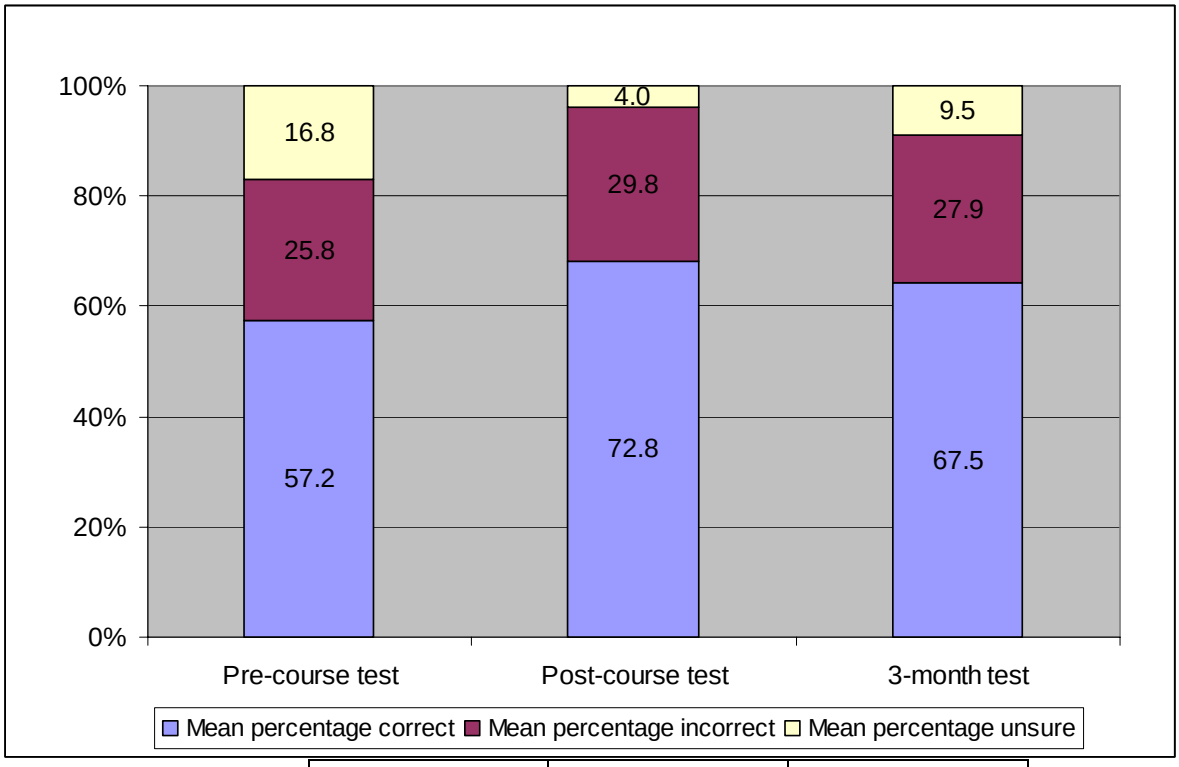



Figure 2 - Study Flow Diagram




| | Mean correct (% and standard deviation) | Mean incorrect (% and standard deviation) | Mean unsure (% and standard deviation) |
|---|---|---|---|
| Pre-course test | 57.2 (16.5) | 25.8 (14.0) | 16.8 (19.1) |
| Post-course test | 72.8 (8.8) | 29.8 (10.3) | 4.0 (5.6) |
| 3-month test | 67.5 (13.5) | 27.9 (10.6) | 9.5 (19.1) |

Figure 3 - Knowledge Test Scores

Table 1 - Participant Demographics

| | |
|---|---|
| **Age** | |
| Mean (SD) | 30.4 years (5.17 years) |
| Range | 24-46 years |
| **Gender** | |
| Male | 30/33 (90.9%) |
| Female | 3/33 (9.1%) |
| **Ethnicity/Race** | |
| Caucasian | 15/33 (45.5%) |
| South Asian | 7/33 (21.2%) |
| Middle Eastern | 5/33 (15.2%) |
| Asian | 5/33 (15.2%) |
| Native Canadian | 1/33 (3.0%) |
| **Occupation** | |
| Surgical Resident | 29 (87.9%) |
| Surgeon | 2 (6.1%) |
| Medical Student | 2 (6.1%) |
| **Previous IPV Training** | |
| None | 18/33 (54.5%) |
| Some | 15/33 (45.5%) |
| Extensive | 0/33 (0%) |

Table 2 - Participants' Perceived Knowledge and Attitudes

| **Question** | **Pre-Course** | **Post-Course** | **3 Months** |
|---|---|---|---|
| IPV is a serious issue | | | |
| Disagree | 0 (0%) | 0 (0%) | 4 (14.8%) |
| Unsure | 2 (6.2%)30 | 0 (0%)25 | 0 (0%)23 |
| Agree | (93.8%) | (100%) | (85.2%) |
| IPV is a private issue that should be settled only by the couple involved. | | | |
| Disagree | 30 (93.8%) | 25 (100%) | 26 (96.3%) |
| Unsure | 1 (3.1%) | 0 (0%) | 0 (0%) |
| Agree | 1 (3.1%) | 0 (0%) | 1 (3.7%) |
| It is important for health care professionals in trauma settings to talk to patients about IPV. | | | |
| Disagree | 1 (3.1%) | 0 (0%) | 0 (0%) |
| Unsure | 2 (6.2%) | 0 (0%) | 1 (3.7%) |
| Agree | 29 (90.6%) | 25 (100%) | 26 (96.3%) |
| I am skeptical that the health care system has the resources to screen for IPV. | | | |
| Disagree | 10 (31.3%) | 16 (64.0%) | 14 (51.9%) |
| Unsure | 5 (15.6%) | 0 (0%) | 4 (14.8%) |
| Agree | 17 (53.1%) | 9 (36.0%) | 9 (33.3%) |
| If a health care professional asks a patient about IPV it will put the patient in more danger. | | | |
| Disagree | 25 (80.6%) | 14 (56.0%) | 20 (74.1%) |
| Unsure | 4 (12.9%) | 3 (12.0%) | 3 (11.1%) |
| Agree | 2 (6.5%) | 8 (32.0%) | 4 (14.8%) |
| I don't know how to screen for IPV. | | | |
| Disagree | 10 (31.3%) | 23 (92.0%) | 20 (74.1%) |
| Unsure | 5 (15.6%) | 0 (0%) | 0 (0%) |
| Agree | 17 (53.1%) | 2 (8.0%) | 7 (25.9%) |
| If a patient told me she was a victim of IPV, I wouldn't know what to do. | | | |
| Disagree | 18 (56.3%) | 23 (92.0%) | 20 (74.1%) |
| Unsure | 3 (9.4%) | 0 (0%) | 0 (0%) |
| Agree | 11 (34.4%) | 2 (8.0%) | 7 (25.9%) |
| Most patients wouldn't mind if a health care professional asked them about IPV. | | | |
| Disagree | 5 (16.1%) | 2 (8.0%) | 6 (22.2%) |
| Unsure | 9 (29.0%) | 5 (20.0%) | 1 (3.7%) |
| Agree | 17 (54.8%) | 18 (72.0%) | 20 (74.1%) |

Table 3 - Bonferroni post-hoc test comparing difference between the three mean knowledge test scores

| | Pre-course Scores | Post-course Scores |
|---|---|---|
| Pre-course Scores | | |
| Post-course Scores | mean difference = -12.8%*<br>p <0.001<br>CI (95%) = -24.7% to -6.6% | |
| 3-month Scores | mean difference = -10.4%*<br>p = .018<br>CI (95%) = -19.3% to -1.4% | mean difference = 5.3%<br>p = .530<br>CI (95%) = -0.4% to 12.7% |

* the mean difference is significant at the .05 level.

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# Chapter 3: Factors Associated with Perpetrating Intimate Partner Violence: A Systematic Review

**ABSTRACT**

**Background:** Intimate partner violence (IPV) is associated with a wide range of negative physical and psychological health outcomes. Developing an understanding of the societal and individual factors associated with IPV may help to inform the planning of intervention and treatment programs for IPV perpetrators. We conducted a systematic review of the literature to identify factors that are associated with male perpetration of IPV.

**Methods:** We conducted a search of Medline and EMBASE for relevant studies, published before December 2013 in all languages, reporting on factors associated with IPV perpetration and/or characteristics of IPV perpetrators. Two reviewers independently assessed methodological quality and extracted relevant data. We summarized data qualitatively.

**Results:** We included 18 articles (49,867 individuals and 1820 couples) in this review. We identified eight domains of factors associated with IPV perpetration: substance use, history of abuse, demographic characteristics, psychological factors, physiological factors, attitudes, community & social factors, and criminal history & weapons. The most commonly reported domain was substance use. Using alcohol or drugs, experiencing child abuse, witnessing interparental aggression, low socioeconomic status, and psychological conditions like depression and anxiety were most commonly

associated with IPV perpetration. Studies reported inconsistent findings for younger age and being a visual monitory.

**Conclusions:** Our review indicates a number of demographic, socioeconomic, and substance use-related factors associated with an increased risk of IPV perpetration. In addition to providing appropriate psychological counseling and peer support, perpetrator intervention programs may benefit from examining the influence of environmental factors and socioeconomic distresses in order to effectively treat the perpetrator.

## INTRODUCTION

The World Health Organization (WHO) defines intimate partner violence (IPV) as "any behaviour within an intimate relationship that causes physical, psychological or sexual harm to those in the relationship," including "acts of physical aggression, sexual coercion, psychological abuse and controlling behaviour"[1]. These behaviors are perpetrated by the victim's current or former spouse, common-law partner, sexual partner, or dating partner. In the 1960s and 1970s, IPV received public and political attention as a pressing social concern, especially for female victims of abuse[2]. To date, the majority of research and resources have been aimed at IPV victims to help improve their physical, mental, and social well-being[3].

Despite the growth in victim support services, perpetrator intervention and treatment programs received comparatively little attention until recently[1]. During the past two decades, there has been a surge in prediction and prevention research in the field of IPV[4]. As a result, the programmatic and policy focus has also shifted towards understanding perpetrator typologies and intervening directly with the perpetrator[4]. This includes the identification of factors that contribute to or are associated with perpetrating abuse in intimate relationships[4]. Developing an understanding of the societal and individual factors associated with IPV may help to inform the planning of intervention and treatment programs for perpetrators. It is important for intervention program personnel to understand their client base, including the factors associated with perpetration, because it may allow for better individualization of intervention programs. For example, knowing

about the association between substance abuse and perpetration may help tailor programs to include a component about substance abuse, if necessary.

While multiple studies have investigated factors that are associated with perpetration of IPV, the variables assessed vary across the studies and, consequently, the reported results are different across the studies. We completed a systematic review of the published literature to determine the factors associated with male perpetration of IPV.

## METHODS

### Eligibility Criteria

We identified articles in English that met the following eligibility criteria: 1) the study was published before December 2013 (when the literature search was performed); and 2) the study reported characteristics of males who perpetrated IPV. Studies were excluded for the following reasons: 1) the study did not contain any useful comparison between characteristics of IPV perpetrators and non-perpetrators; 2) the study discussed characteristics of IPV victims rather than IPV perpetrators; 3) the article was a review study, meeting abstract, commentary, or level V evidence (expert opinion); 4) the study data on IPV perpetration could not be separated from non-IPV data; 5) the study included only female perpetrators or male and female data could not be separated; and 6) the paper reported a duplicate study population.

**Identification of Studies**

We conducted a search of Medline and EMBASE for relevant articles published before December 2013 in all languages. The search strategy was designed to obtain results that contained at least one key word from each of the three categories: one of intimate partner violence, spouse abuse, or domestic violence; one of risk factors, causal factors, predict, or characteristics; and one of batterer, abuser, or perpetrator. The full search strategy is in **Appendix B**.

**Assessment of Study Eligibility**

Two authors (KM, ST) independently verified inclusion of all studies based on title and abstract. If either reviewer indicated that the title or abstract should be included, the study moved onto the next stage, so we did not perform an assessment of reviewer agreement for title and abstract review. The two reviewers assessed the full text of identified studies for final inclusion and resolved disagreements through discussion towards consensus. We conducted an assessment of reviewer agreement using a weighted kappa statistic.

**Assessment of Methodological Quality**

Three reviewers (KM, ST, KD) independently graded the methodological quality of each of the included studies using questions derived from the Newcastle Ottawa Scale (NOS) for non-randomized studies (**Table 4**)[5]. This is a rating system comprised of eight items that are categorized into three broad categories: selection, comparability, and depending

on the study type, outcome for cohort studies or exposure for case-control studies[5,6]. The rating system allows for the semi-quantitative assessment of study quality whereby a maximum of one point can be awarded for each of the questions, with an exception in the comparability section that allows for the maximum of two points. As the NOS is designed to assess case control and cohort studies, we modified the scale to allow for comparison across different study types including longitudinal and cross-sectional studies. Prior to initiating our quality assessment, we decided *a priori* that a score of 0-3 would be classified as a poor quality study, a score of 4-6 would be classified as moderate quality, and a score of 7-8 would be classified as high quality. Any disagreements among the reviewers were resolved by discussion or consulting a senior reviewer (MB or SS).

**Data Extraction**

A structured data extraction form was developed and relevant data was extracted from each eligible study in duplicate (KM, ST, KD, NS) to ensure accuracy. Consensus was achieved by discussion and a senior author (MB or SS) was available to resolve disagreements if necessary. Pertinent data included study characteristics (year and location), characteristics of IPV perpetrators (age), sample size, and study design.

**Data Analysis**

From the included studies, we produced a list of factors associated with perpetrating IPV based on comparisons between perpetrators and non-perpetrators. We used adjusted

values where possible. We then condensed the list by coding each factor based on themes and analyzing the themes qualitatively. We then determined how many studies reported each factor. We grouped the factors associated with IPV perpetration into eight separate categories: substance use, history of abuse, demographic characteristics, psychological factors, attitudes, physiological factors, community & social factors, and criminal history & weapons. We were unable to pool data due to a lack of reporting of precision data and/or effect sizes, and a large degree of heterogeneity.

### Evaluation of Heterogeneity

Before analyzing the data, we hypothesized that there would be a large degree of heterogeneity between the studies. Differences such as study methodology (e.g. mail survey versus in-person survey, sample size), differences in survey tools used or questions asked, variability within and between populations (e.g. socioeconomic status, age, location, how participants were recruited), or variable study quality could contribute to the heterogeneity. We decided that we would not pool data if the heterogeneity (based on $I^2$) is greater than 40%[7].

## RESULTS

### Study Identification

We identified 951 articles through our Medline and EMBASE literature search that were possibly relevant. We excluded 805 of these studies after review of titles and 76 studies after review of abstracts (**Figure 4**). We excluded 52 of the remaining 70 studies after

full-text review because they were review studies, they used a duplicate study population, they did not list factors that were associated with perpetrating IPV, they did not clearly distinguish data on IPV perpetrators from data on non-IPV perpetrators, they discussed characteristics of IPV victims rather than IPV perpetrators, and/or they did not contain comparisons between characteristics of IPV perpetrators and non-perpetrators. We did not identify any new studies from review of references of included studies. The reviewer agreement for the full text review stage was 87% (absolute agreement; weighted kappa = 0.669, 95% CI = 0.471 – 0.868). In summary, 18 articles (49,867 individuals and 1820 couples) are included in this systematic review.

**Study Characteristics**

All the studies included in this systematic review were comparative studies that compared perpetrators to non-perpetrators or low, moderate, and high severity of IPV perpetration (**Table 5**). Some of the included studies reported perpetrator characteristics that were reported by the victim rather than the perpetrator. Fourteen studies (77.8 %) took place in the United States, whereas one study took place in each of the four other locations (Canada, Philippines, China, and Bangladesh). None of the included studies were conducted in an orthopaedic trauma setting. We originally had sufficient poolable data for 6 factors, however, we chose not to pool that data due to heterogeneity (very high $I^2$ values and differences in methodology).

**Study Quality**

We used questions derived from the Newcastle-Ottawa Scale (NOS) for non-randomized studies to evaluate the quality of the included studies (**Table 4**). We assessed that nearly half of the included studies (8/18, 44.4%) were of moderate quality, 6 were high quality (33.3%), and 4 were low quality (22.2%) (**Table 5**).

**Substance Use**

Twelve of the included studies reported on this domain (12/18 66.7%). Ten studies reported that increased alcohol use by IPV perpetrators and alcohol-related problems were significantly associated with IPV perpetration. An additional two studies determined that increased alcohol use was not significantly associated with IPV perpetration (**Figure 5**).

Five studies reported on the association between drug use and IPV perpetration. Drug abuse by IPV perpetrators was associated with IPV perpetration in four studies and was determined to be unassociated with IPV perpetration in one additional study (**Figure 5**).

**History of Abuse**

Ten of the included studies (10/18, 55.5%) reported on this domain (**Figure 5**). Six studies determined that experiencing child abuse was significantly associated with perpetrating IPV and one additional study determined that the association was not significant. Four studies determined that witnessing parents' violence as a child was

significantly associated with IPV perpetration. Two additional studies determined that the association was not significant.

**Demographic Characteristics**

Twelve of the included studies (12/18, 66.7%) reported on this domain (**Figure 5**). Four studies determined that younger age of the perpetrator was significantly associated with perpetrating IPV; however, four more studies found no significant association and two additional studies found that older age was associated with IPV perpetration. Six studies determined that less education was significantly associated with perpetrating IPV; however, two more studies found no significant association. Five studies determined that lower income or financial problems was significantly associated with perpetrating IPV; however, two more studies found no significant association. Three studies determined that unemployment was significantly associated with perpetrating IPV; however, one study also found no significant association. Four studies reported on being a visual minority. Two studies found a significant association between being a minority and IPV perpetration and two studies found no association. Having a low occupational status, being unmarried, and having a large family each had one study report a significant association with IPV perpetration and one that reported no association. Additionally, the factors that were not associated with IPV perpetration in any study include being in a longer term relationship, and having low job satisfaction (**Table 6**).

**Psychological Factors**

Thirteen (13/18, 72.2%) studies reported on this domain (**Figure 5**). Five studies reported that depression was significantly associated with IPV perpetration, while one study found no association. Four studies reported that aggression and anger is significantly associated with IPV perpetration while one study reported it is inversely associated. Two studies reported that cluster B (dramatic) personality disorders were significantly associated with IPV perpetration while three studies reported that there is no significant association. Anxiety was significantly associated with IPV perpetration in three studies. Cluster A (odd) personality disorders, cluster C (anxious) personality disorders, non-specified cluster personality disorders, and bipolar spectrum were each significantly associated with IPV perpetration in two studies and not significantly associated in one study. Dominating and controlling characteristics, jealousy, negativistic characteristics, and thought disorder were each associated with perpetration in one study and not associated in one study. Non-conformity, emotional distress, psychiatric symptoms, poor executive functioning, low verbal intelligence, and family problems were supported by one study each.

The factors that were not associated with IPV perpetration are: 1) impulsivity; 2) general violence; 3) psychopathy; 4) conduct disorder; 5) helplessness; 6) isolation; 7) submissiveness; 8) gregariousness; 9) apathy; 10) schizoid; 11) low self esteem; 12) somatoform; and 13) delusional disorder (**Table 6**).

### Attitudes

Three studies (3/18 16.7%) reported on this domain. One study found that approval of violence was significantly associated with IPV perpetration while one study found no association. One study also found that believing that IPV is justified and perpetrators are not responsible for the abuse were significantly associated with IPV perpetration.

### Physiological Factors

Three studies (3/18 16.7%) reported on this domain. Two of the included studies reported that a history of head injuries was significantly associated with IPV perpetration and one study reported that decreased cardiovascular activity during anger induction tasks (**Figure 5**). Skin conductance when angry was not significantly associated with IPV perpetration (**Table 6**).

### Community and Social Factors

Five studies (5/18 27.7%) reported on this domain. Two studies reported that living in a community with norms favourable to violence was significantly associated with IPV perpetration. One study supported each of the following factors: high neighbourhood unemployment, poor social support, living in an urban community, high neighbourhood disorganization, peers use violence, and community norms favourable to drug selling.

Additionally, the following factors were not significantly associated with IPV perpetration in any study assessing the factor: 1) having a female friend; 2) community

norms favourable to marijuana use; 3) high residential mobility; and 4) reduced crime responsiveness in the community.

### Criminal History and Weapons

Four studies (4/18 22.2%) reported on this domain. One study found a significant association between prior arrests or jail time and IPV perpetration while two studies reported no significant association. Access to weapons was significantly associated with IPV perpetration in one study (**Figure 5**).

## DISCUSSION

Our systematic review reveals a number of factors that are associated with male IPV perpetration which we grouped into eight domains; substance use, history of abuse, demographic characteristics, attitudes, psychological factors, physiological factors, community & social factors, and criminal history & weapons.

Our findings reveal similar factors as those published by the WHO in their 2003 report on intervening with IPV perpetrators with some key differences[8]. The WHO found that the factors that were most consistently associated with increased risk of physical assault in intimate relationships were high levels of alcohol and drug consumption, poverty, witnessing IPV of a parent, experiencing child abuse, upbringing in patriarchal families, belief in patriarchal values, and social norms of male dominance[8]. Our review found that alcohol consumption was associated with IPV perpetration in 10 out of 12 studies

reporting on alcohol use. The current review improves upon the findings reported in the WHO publication by including more recent studies and by considering a greater number of studies, and presenting a more comprehensive list of factors associated with IPV perpetration.

Our review found that a number of factors that are associated with IPV perpetration are modifiable or preventable in some cases. Modifiable and preventable factors include drug and alcohol use, child abuse experiences, smoking status, negative attitudes about violence, history of head injury, poor social support, peer use of violence, and access to weapons. The results of this review highlight the need for education and prevention and intervention initiatives regarding these factors among young men and women. Specifically prevention and intervention programs for substance abuse, head injuries, and smoking as well as education on appropriate gun use and ensuring adequate social support among young people may lead to decreased IPV perpetration. Although this review is unable to establish causation regarding these modifiable and preventable factors, further study may be warranted to explore these concepts.

Although a number of the factors identified in this review suggest that IPV perpetrators are likely to be of low socioeconomic status (low income, low educational attainment, unemployed etc.), it is important to note that not all persons who are of low socioeconomic status are IPV perpetrators and not all persons of higher socioeconomic status refrain from IPV perpetration. This is true for many, if not all, of the factors

identified in this review. The results of this review demonstrate that there is often conflicting evidence on which factors are associated with IPV perpetration. For this reason we strongly recommend against attempting to identify perpetrators based on stereotyping. Stereotyping in this manner could lead to incorrectly identifying non-perpetrators as perpetrators and failure to identify those who truly are perpetrators.

The results of this review are limited by several factors, one of which is the lack of prospective studies found in the available literature, which limits our ability to determine causation for IPV. One of the most challenging methodological limitations was the large degree of heterogeneity (very high $I^2$ values and differences in methodology) across the included studies. Since heterogeneity limits the direct comparison of studies, we determined that we would not pool data. Heterogeneity was likely a product of many factors including variations in study design, methodology, and varying population characteristics. Furthermore, there was considerable variety across the included studies in terms of how they defined the reported factors, thus making it challenging to define and classify these factors into subcategories for the purposes of this review. Another limitation is the inclusion of articles that were only published in English. A number of the included studies reported characteristics of perpetrators that were reported by the victim, which could introduce bias into the included studies, and therefore, our results. Finally, there is a lack of data that can be pooled across studies. Many of the included studies reported quantitative data but included only p values with no effect sizes, or did

not report precision data such as confidence intervals. Further research could focus on generating poolable data.

Despite these limitations, the review has several strengths including a thorough and systematic search of the literature, followed by thorough and systematic screening of the studies for inclusion. Eligibility assessment, quality assessment, and the completion of data abstraction from the included studies were all done by two independent reviewers to ensure accuracy. Only comparative studies were included in this review, adding to its strengths, and many studies of general high quality are included in the review.

The results of this review indicate that there are numerous factors that are associated with IPV perpetration. This review serves to advocate for a better understanding among social workers, legal justice departments, and public health professionals about the different factors associated with IPV perpetration. There are a number of modifiable and preventable factors that need to be addressed in order to design appropriate IPV prevention strategies and effective perpetrator treatment programs. For example, it may be of value to integrate substance abuse treatment into perpetrator treatment programs, or to screen all people who present for services related to IPV perpetration for alcohol abuse problems in order to provide comprehensive treatment and minimize the risk of subsequent incidents of IPV perpetration. Furthermore, the findings of this review indicate that a number of demographic, socioeconomic, and substance use-related factors are associated with increased risk of IPV perpetration. This suggests that in addition to

providing appropriate psychological counseling and peer support, perpetrator intervention programs also need to be aware of the influence of environmental factors and socioeconomic distresses in order to effectively treat the perpetrator. Future research should explore optimal methods for early identification of modifiable and preventable factors associated with IPV perpetration and developing effective methods of intervening at both preventative and perpetrator treatment stages of IPV using the knowledge of factors that are associated with IPV perpetration.

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Table 4 - Assessment of study quality

| **Question** | **Equivalent Newcastle-Ottawa Item** |
|---|---|
| How did they determine who is a perpetrator? | Is the case definition adequate? |
| How representative is the sample compared to the population? | Representativeness of the cases. |
| How did they select the people who are not perpetrators? | Selection of controls. |
| Is the data analysis appropriate? | Comparability of cases and controls based on design and analysis. |
| Are any other biases present? | Comparability of cases and controls based on design and analysis. |
| How did they determine the factors? | Ascertainment of exposure/outcome. |
| Was the non-response rate the same for both groups? | Non-response rate |
| Overall impression of reporting quality. | *New item* |

Table 5 - Characteristics of included studies

| Study | Year | Location | Mean Age of Perpetrators (years) | Sample Size | Population | Quality Score* |
|---|---|---|---|---|---|---|
| Ansara | 2009 | Philippines | NR | 1861 | IPV-affected women (some victims and some perpetrators) | Moderate |
| Babcock | 2005 | United States | Severely violent men: 29.26 ± 10.83<br>Low-level violent men: 28.19 ± 7.12<br>Nonviolent men: 33.87 ± 9.95 | 102 couples | 35 Severely violent male perpetrators<br>37 Low-level violent male perpetrators<br>30 Nonviolent men | Moderate |
| Bell | 2006 | United States | NR | 24328 | Male perpetrators: 6507<br>Male controls: 17821 | High |
| Chan | 2008 | China | Males: 43.5 ± 9.48 | 210 | Female victims reporting on husbands' violence | Low |
| Chase | 2003 | United States | NR | 103 couples | Violent couples: 80<br>Severely violent couples: 54<br>Male and female perpetrators | High |
| Cunradi | 2002 | United States | 45.9 | 1615 couples | Married and cohabiting couples.<br>Male perpetrators. | High |
| Dalal | 2009 | Bangladesh | NR | 4411 | Community sample of women reporting on husbands' violence | Low |
| Graham | 2012 | Canada | Range: 18-76 | 14,063 | Male and female community sample (43% male). | High |
| Hastings | 1988 | United States | Nonviolent control$_1$: 36.6<br>Nonviolent control$_2$: 34.9<br>Nonalcohol perpetrators: 36.3<br>Alcohol perpetrators: 34.3 | 107 | Nonviolent male control: 43<br>Nonalcoholic male perpetrators: 35<br>Alcoholic male perpetrators: 29 | Moderate |
| Herrenkohl | 2007 | United States | 24 | 644 | Community sample of men and women (48% male) | Low |
| Kunitz | 1998 | United States | NR | 1086 | 352 cases (57% male)<br>434 alcohol dependent controls (86% male)<br>300 non-alcohol dependent controls (52% male) | Moderate |

| | | | | | | |
|---|---|---|---|---|---|---|
| McFarlane | 1998 | United States | NR | 199 | Pregnant abused women | Moderate |
| Murphy | 1993 | United States | Martially violent: 34.4 ± 8.1<br>Discordant nonviolent: 38.8 ± 8.2<br>Happily married nonviolent: 35.8 ± 7.2 | 72 | Martially violent men: 24<br>Discordant nonviolent men: 24<br>Happily married nonviolent men: 24 | Moderate |
| Rosenbaum | 1994 | United States | Perpetrator group: 31.7<br>Discord group: 39.6<br>Martially satisfied: 34 | 130 | Male perpetrators: 53;<br>Marital discord males: 32;<br>Martially satisfied males: 45 | High |
| Silverman | 1997 | United States | 20.5 ± 2.1 | 193 | Male undergraduate students | Low |
| Tyler | 2009 | United States | 21.45 | 166 | Male and female young adults; homeless or with history of running away (60% male) | Moderate |
| Walling | 2012 | United States | NR | 164 | Male perpetrators and non aggressive males | Moderate |
| White | 2002 | United States | NR | 230 | Male inmates: 115<br>Male non-perpetrators: 77<br>Identified male perpetrators: 38 | High |

*The quality score is based on the Newcastle-Ottawa Scale score for case-control and cohort studies and is adapted for cross-sectional survey studies. NR = not reported

Table 6 - Factors found to be not statistically significant in any included study

| **Domain** | **Factor** |
|---|---|
| Demographic characteristics | Long relationship (two studies) |
| | Low job satisfaction |
| Psychological factors | Impulsivity |
| | General violence |
| | Psychopathy |
| | Conduct disorder |
| | Helplessness |
| | Isolation |
| | Submissiveness |
| | Gregariousness |
| | Apathy |
| | Schizoid (three studies) |
| | Low self esteem |
| | Somatoform (two studies) |
| | Delusional disorder (two studies) |
| Physiological factors | Skin conductance when angry |
| Community and social factors | Female friend |
| | Community norms favourable to marijuana use |
| | High residential mobility |
| | Reduced crime responsiveness in community |

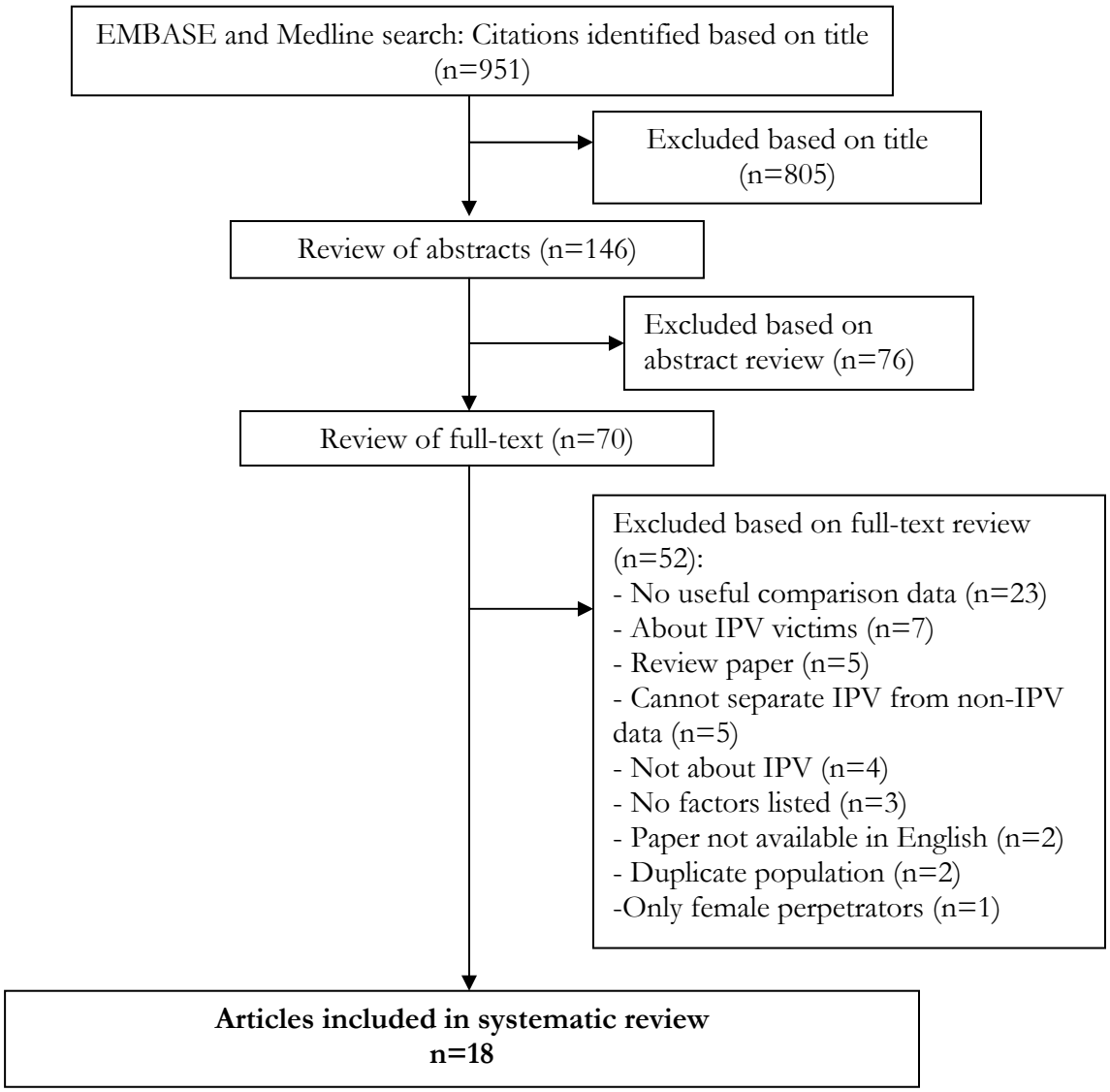


Figure 4 - Flow chart of study process

| Domain | Factor | Number of studies |
|---|---|---|
| **Alcohol and drug use** | Perpetrator use of alcohol | + + + + + + + + + + = = |
| | Drug use | + + + + = |
| **History of abuse** | Experienced abuse as a child | + + + + + + = |
| | Witnessed IPV of a parent | + + + + = = |
| **Demographic characteristics** | Younger age | + + + + = = = = − − |
| | Less education | + + + + + + = = |
| | Low income/financial trouble | + + + + + = = |
| | Unemployment | + + + = |
| | Visual minority | + + = = |
| | Low occupational status | + = |
| | Not married | + = |
| | Large family | + = |
| | Low relationship satisfaction | + |
| | Extramarital affair | + |
| | Remarriage | + |
| | Received dowry for marriage | + |
| | Smoker | + |
| | Attends church regularly | − |
| **Psychological factors** | Depression | + + + + + = |
| | Aggression/anger | + + + + − |
| | Cluster B personality disorder (dramatic) | + + = = = |

| | | | | |
|---|---|---|---|---|
| | Anxiety | + | + | + |
| | Cluster A personality disorder (odd) | + | + | = |
| | Cluster C personality disorder (anxious) | + | + | = |
| | Non-specified cluster personality disorder | + | + | = |
| | Bipolar spectrum | + | + | = |
| | Negativistic | + | + | |
| | Jealousy | + | = | |
| | Dominating/controlling | + | = | |
| | Thought disorder | + | = | |
| | High nonconformity | + | | |
| | Emotional distress | + | | |
| | Psychiatric symptoms | + | | |
| | Poor executive functioning | + | | |
| | Low verbal intelligence | + | | |
| | Family problems | + | | |
| **Attitudes** | Approval of violence | + | = | |
| | Battering is justified | + | | |
| | Batterers are not responsible | + | | |
| **Physiological factors** | History of head injury | + | + | |
| | Decreased cardiovascular activity when angry | + | | |
| **Community and social factors** | Community norms favourable to violence | + | + | |

| | | | | |
|---|---|---|---|---|
| | Poor social support | + | | |
| | Urban community | + | | |
| | Peers use violence | + | | |
| | Neighbourhood disorganization | + | | |
| | Community norms favourable to drug selling | + | | |
| **Criminal history and weapons** | Prior arrests/jail | + | = | = |
| | Access to weapons | + | | |

+ = Positively associated with IPV perpetration − = Negatively associated with IPV perpetration = = Not significantly associated with IPV perpetration

Figure 5 - Factors associated with IPV perpetration

# Chapter 4: Prospective Abuse and Intimate Partner Violence Surgical Evaluation (PRAISE-2): Rationale and Design for A Multicentre Pilot Prospective Cohort Study

**ABSTRACT**

**Background**: The World Health Organization reports that 1 in 3 women globally will experience physical or sexual IPV or domestic abuse in their lives. Orthopaedic health care professionals are in a good position to identify women experiencing escalating physical violence (with resultant musculoskeletal injuries) and act to promote their immediate safety, connect them to IPV resources, and reduce the risk of further harm. However, there have been no studies that explore whether personal and/or professional circumstances associated with musculoskeletal injuries can trigger or worsen IPV, and there have been no studies on how experiences of IPV affect specific injury outcomes such as injury-related complications. Knowledge gained will inform a broad spectrum of health care professionals who treat women with injuries, including family physicians, emergency physicians, nurses, chiropractors, physiotherapists, general trauma surgeons, orthopaedic surgeons, medical social workers, and radiology technicians.

**Objectives:** The primary outcome of the pilot study will be a composite measure of feasibility. The secondary objectives of the PRAISE-2 pilot study include determining: 1) How a history of IPV affects injury-related complications; 2) How a history of IPV affects return to pre-injury function. 3) Incident cases of IPV after a musculoskeletal injury, if the injury was not the result of IPV; 4) How a history of IPV affects health care and support service use after a musculoskeletal injury; 5) How a history of IPV affects health-related quality of life after a musculoskeletal injury; and 6) How patterns of IPV change over time after a musculoskeletal injury.

**Methods**: We plan to complete a multi-centre pilot prospective cohort study of 200 women with musculoskeletal injuries to determine how IPV experiences affect outcomes following a musculoskeletal injury and how patterns of IPV change over 12 months following a musculoskeletal injury. This study will evaluate the feasibility of a larger multi-national prospective cohort study of women presenting to fracture clinics with musculoskeletal injuries. Important design and organizational aspects of the proposed PRAISE-2 study include: 1) leveraging the international interest in IPV in orthopaedics from the PRAISE-1 study to strengthen buy-in for this pilot cohort study; 2) broad eligibility criteria (all adult females with musculoskeletal injuries who are able to provide informed consent in a private location) ensures wide applicability of our findings beyond the centres involved; 3) a comprehensive plan to minimize loss to follow up; and 4) plans to complete a large, multi-centre, international definitive study which will allow us to address fundamental questions about how IPV affects women with injuries, which has the potential to improve women's health.

**Discussion**: The PRAISE-2 pilot study is the first step toward determining how experiences of IPV affect orthopaedic outcomes such as injury-related complications. This study will determine feasibility and assist in the development a larger-scale multinational prospective cohort study that will engage health care professionals from around the world to increase awareness of how IPV affects patients' musculoskeletal and injury outcomes.

## BACKGROUND

The World Health Organization (WHO) reports that 1 in 3 women globally will experience physical or sexual IPV or domestic abuse in their lives[1]. Every 6 days a woman in Canada is killed by her intimate partner[2]. IPV is a prevalent social issue which poses significant health concerns. IPV disproportionately affects women and is a leading cause of non-fatal injury in females in North America[3,4]. The cost of IPV in Canada is estimated at $5 billion annually[5]. IPV victims experience more physical and mental health problems[6,7], including musculoskeletal injuries[8,9], and use health care resources more frequently than non-abused women[10,11]. A recent systematic review of 37 IPV prevalence studies reported the lifetime prevalence of IPV in emergency and family medicine is 40% and 38% respectively[12].

Recently, attention has started to focus on orthopaedic fracture clinics as an environment in which IPV is important to patient care. In fact, orthopaedic surgeons and fracture clinics have a unique opportunity to identify and assist women experiencing IPV. We believe that orthopaedic health care professionals are well-positioned to discuss IPV with women, as they often develop long-term interactions with patients over repeated follow-up clinic visits for injury compared to emergency physicians who tend to see patients once for an injury[13]. Our PRAISE-1 study[14], which included 2,945 women globally, found that 1 in 6 women in fracture clinics experienced IPV in the year prior to completing the survey. Additionally, we found that 1 in 3 injured women have experienced IPV in her lifetime[14]. Our previous research has found that IPV is more

prevalent in orthopaedic fracture clinics within Ontario Level I Trauma Centres than in many other medical specialties[15] and the lifetime prevalence globally is similar in orthopaedics, emergency and family medicine[12,14] (**Figure 6**). Major orthopaedic associations, such as the Canadian Orthopaedic Association (COA)[13], are advocating strongly for increased awareness of IPV among health care professionals who care for women with injuries.

Orthopaedic health care professionals are in a good position to identify women experiencing escalating physical violence (with resultant musculoskeletal injuries) and act to promote their immediate safety, connect them to IPV resources, and reduce the risk of further harm. It has been hypothesized that the severity of physical abuse among women presenting to orthopaedic fracture clinics may be higher than in other specialties[14]. Escalation of physical violence remains a key risk factor for intimate partner homicide[16]. More than one third of female homicides globally are perpetrated by an intimate partner[17] and 45% of women who are killed by their intimate partner present to a hospital for treatment of IPV-related injuries in the 2 years before their death[18]. Based on the above evidence, we argue that fracture clinics are instrumental to identifying women with more severe cases of IPV who are at greater risk of severe injury and homicide. However, more information is needed on how experiencing IPV affects musculoskeletal outcomes.

Knowledge gained from the PRAISE-2 study (i.e. how a history of IPV affects injury-related complications, function, health care utilization, and quality of life) will inform a broad spectrum of health care professionals who treat women with injuries, including family physicians, emergency physicians, nurses, chiropractors, physiotherapists, general trauma surgeons, orthopaedic surgeons, medical social workers, and radiology technicians..

**Rationale for the PRAISE-2 Study**

The PRAISE-1 study was able to inform us of the cross-sectional prevalence of IPV and that IPV can directly result in injuries; however, it was unable to inform us of longitudinal outcomes (e.g. how IPV affects injury-related outcomes; whether musculoskeletal injuries impact IPV victims differently than non-victims). There are currently no longitudinal IPV studies following women with injuries to evaluate both health and psychological outcomes.

Although there is an abundance of information on mental health[19] and reproductive health[20] outcomes following IPV, Sanchez-Lorente and colleagues[21] note that there is very little information on how IPV experiences affect specific physical health outcomes. Most existing studies on IPV and physical health are either cross-sectional (therefore cannot assess longer-term outcomes) or report on very general self-reported psychosomatic outcomes like gastrointestinal distress and headaches[21]. The fields of mental health and reproductive/maternal health have high quality data on specific

objective outcomes such as low birth weight, miscarriage, and HIV/AIDS infection[22,23]. There is a need for studies that focus on the specifics of how IPV experiences affect physical health and objective outcomes among injured women like injury-related complications. If health care professionals have specific information about how IPV affects injury-related outcomes they will be more likely to consider how IPV is affecting their patients.

Previous research has demonstrated that in some cases patients with radiographically healed fractures still have poor clinical outcomes such as pain, reduced function, and delayed return to work or sport[24-26]. Often the reason for these poor outcomes is unclear to the treating surgeon[24-26]. It is well documented that psychosocial factors are associated with poorer physical health outcomes[24-27].We hypothesize that IPV may be one of the factors that leads to poor health outcomes. There are currently no studies that compare outcomes of IPV victims and non-victims in relation to physical health outcomes following a musculoskeletal injury.

The IPV literature has traditionally focused on pregnancy as a unique life situation that changes patterns of IPV. Although pregnancy can be a protective factor for IPV, 13-50% (depending on the country) of women report that their IPV began during pregnancy[28]. In addition, up to 34% of women reported that the abuse became more severe during pregnancy[28]. Similar to pregnancy, injuring oneself can be a stressful time for both partners. Since an increase in cortisol and stress levels has been linked with IPV

perpetration[29], this increased stress may lead to changes in relationship dynamics such that patterns of IPV change. For example, traumatic injury is arguably a major stressor and leads to a sudden and often dramatic change in functional capacity. The inability to carry out activities of daily living (e.g. work, family, personal care) may further strain relationships and escalate to an act of IPV in previously non-violent relationships, or increased severity and frequency of IPV when abuse has previously occurred. There have been no studies that explore whether the stress caused by having a musculoskeletal injury can trigger or worsen IPV.

Evidence that IPV directly affects patient outcomes in necessary in order to change practice patterns of orthopaedic surgeons and other health care professionals who treat injured women. . Health care professionals routinely inquire about smoking history when they are evaluating injured patients as there is strong evidence that smoking is associated with poor fracture healing[30]. If we have similar direct evidence that IPV affects patients' injury outcomes, health care professionals who treat women with injuries may be more inclined to inquire about IPV routinely.

**Research Objectives**

*Primary Objective*

The primary objective of the PRAISE-2 pilot study is to determine the feasibility of a multi-national prospective cohort study. Specifically, we will: 1) assess our ability to recruit women across clinical sites in Canada and compare actual recruitment rates to our

current estimates; 2) evaluate adherence to the study protocol, including application of eligibility criteria; 3) assess our ability to follow and collect data for 12 months; 4) identify and resolve any problems with data quality; 5) examine adherence to questionnaire completion; and 6) obtain preliminary estimates of increasing severity of IPV and cases of new abuse (incident cases) among injured women.

*Secondary Objectives*

The secondary objectives of the PRAISE-2 pilot study include determining: 1) How a history of IPV affects injury-related complications; 2) How a history of IPV affects return to pre-injury function. 3) Incident cases of IPV after a musculoskeletal injury, if the injury was not the result of IPV; 4) How a history of IPV affects health care and support service use after a musculoskeletal injury; 5) How a history of IPV affects health-related quality of life after a musculoskeletal injury; and 6) How patterns of IPV change over time after a musculoskeletal injury.

## METHODS

### Overview of the Design

We plan to complete a multi-centre pilot prospective cohort study of 200 women with musculoskeletal injuries to determine how IPV experiences affect injury-related outcomes, and how patterns of IPV change over a 12 month period of time following a musculoskeletal injury. This study will evaluate the feasibility of a larger multi-national

prospective cohort study of women presenting to fracture clinics with musculoskeletal injuries.

Important design and organizational aspects of the proposed PRAISE-2 study include: 1) leveraging the international interest in IPV in orthopaedics from the PRAISE-1 study to strengthen buy-in for this pilot cohort study; 2) broad eligibility criteria (all adult females with musculoskeletal injuries who are able to provide informed consent in a private location) ensures wide applicability of our findings beyond the centres involved; 3) a comprehensive plan to minimize loss to follow up; and 4) plans to complete a large, multi-centre, international definitive study which will allow us to address fundamental questions about how IPV affects trauma patients.

## Patient Selection

### *Eligibility Criteria*

We will use broad eligibility criteria to increase the generalizability of the study. The inclusion criteria are: 1) adult females (at least 16 or 18 years of age depending on local ethics requirements); 2) patients presenting to participating fracture clinics within 12 weeks of their musculoskeletal injury; and 3) patients presenting with a musculoskeletal injury including a fracture, strain, sprain, or dislocation which is being managed with either surgical or non-surgical treatment.

The exclusion criteria are: 1) unwilling to or unable to provide consent; 2) unable to complete the study questionnaires in a private location, due to safety and confidentiality; 3) unwilling or unable to follow the study protocol or their attending surgeon has concerns about their ability or willingness to follow study protocols; and 4) does not speak and write in English or the dominant language of the local clinic. Due to the sensitive nature of the topic, only patients who can consent for themselves will be considered for participation.

*Patient Screening and Enrolment*

All new female patients (within 12 weeks of injury) presenting to the orthopaedic fracture clinics of participating surgeons will be screened for participation in this study. A female research coordinator will approach each potentially eligible female patient and screen each patient for eligibility. The female research coordinator will obtain informed consent from each eligible patient who wishes to participate. Since this study will record change in IPV status over time, we will follow all eligible and consenting patients regardless of whether they report experiencing IPV at baseline. We will record numbers of excluded and missed patients, and reasons for exclusion.

**Study Outcomes**

*Primary (Feasibility) Outcomes and Criteria*

The primary outcome of the pilot study will be a composite measure of feasibility. This will include: 1) Recruitment (number of patients recruited at each site during a 12 month

period); 2) Protocol adherence (application of eligibility criteria); 3) Follow-up (proportion of included patients followed at 12 months); and 4) Data quality (the proportion of case report forms, including patient questionnaires completed at 12 months). We will further obtain preliminary estimates of increasing severity of IPV and cases of new abuse (incident cases) among injured women.

*Secondary Outcomes*

Since this is a pilot study, one of our secondary objectives will be to collect data on the objectives of the PRAISE-2 definitive study. These objectives are: 1) To compare injury-related complications among women presenting at a fracture clinic who disclose a history of IPV versus those who do not disclose IPV over 12 months following a musculoskeletal injury; 2) To determine how a history of IPV affects return to pre-injury function; 3) To determine the extent to which new episodes of IPV (incident cases) occur after a musculoskeletal injury in women with no prior history of abuse over a 12 month period; 4) Among women who disclose a history of IPV versus those who do not disclose IPV, what are the relative utilization and associated costs of health, legal, and social support services; and 5) Among women with musculoskeletal injuries who self-report a history of IPV, we aim to describe changes in abuse severity and type of abuse (physical, emotional, and/or sexual IPV) over a 12 month period; and 6) Among women with musculoskeletal injuries who self-report a history of IPV we aim to determine how a history of IPV affects health-related quality of life after a musculoskeletal injury.

**Measurement of Outcomes**

*Measurement of Primary (Feasibility) Outcomes*

The success of our pilot study will relate directly to our objectives and measures of outcomes. We will record and report: 1) Number of patients recruited at each site during a 12 month period; 2) proportion of missed and out of window visits; 3) proportion of included patients followed at 12 months for the primary and secondary outcomes; and 4) the proportion of case report forms, including patient questionnaires, completed at 12 months.

*Measurement of Secondary Outcomes*

Secondary outcomes will be measured as summarized below:

Injury-Related Complications – We will compare proportion of patients experiencing a composite of injury-related complications between patients who self-report a history of IPV and those who do not. Injury-related complications include non-union, malunion, infection, unplanned secondary procedure, mortality, hardware failure, etc. An independent, blinded adjudicator will determine whether the event is injury-related.

Return to Pre-Injury Function - We will use the Return to Function Questionnaire (RTF) to compare the mean time to return to pre-injury function among women who disclose a history of IPV versus those who do not disclose IPV. The RTF is a 4 question tool that was used in a recently completed large FDA-regulated fracture trial.

Incidence of IPV - Women's self-reported experience of IPV will be measured using a direct method of screening used by the PRAISE Investigators[14,15] in 2 previous studies conducted in trauma populations. The tool comprises 3 questions with 3 response options (**Table 7**). This tool has proven feasible to administer in a trauma population and has been shown to have greater sensitivity to identify IPV compared to the Partner Violence Screen (PVS)[31]. It is important to maximize sensitivity when screening IPV victims because not identifying victims can have many negative health and social consequences[32]. The direct method of screening can also distinguish between types of IPV (i.e. physical, sexual, and emotional abuse). A participant will be considered to have disclosed IPV if she answers positively to at least 1 of the 3 direct screening questions. We will identify the proportion of patients who experience abuse after their musculoskeletal injury from those at baseline who report that they had never experienced abuse (incidence).

Health-Related Quality of Life - Participants' quality of life will be measured using the EuroQol-5 Dimensions (EQ-5D), a widely used and well-validated quality of life tool[33]. The EQ-5D is a comprehensive, 5-item compact health status classification and health state preference questionnaire.

Use and Associated Costs of Health, Legal, and Social Support Services - Women's access to and use of health and support services will be measured by directly asking

participants to self-report if they have accessed health care services, a social worker, mental health professional, women's shelter, helpline, violence against women website, or legal assistance. We will further ask participants about indirect costs, including whether they missed work or needed someone else to miss work in order to take care of them. We will assign costs to each support system utilized so that we can estimate the economic costs associated with IPV.

Changes in Abuse Type and Severity - Participants will complete a direct Likert-type question about IPV severity at each visit to measure change in severity, as well as direct questions on the frequency of abuse to measure change in IPV frequency over time. Using the direct method of screening, which categorizes types of violence as physical, emotional, and/or sexual abuse, we will record and analyze changes in type of IPV experienced over time.

**Study Follow Up**

Participants will complete the questionnaires in the fracture clinic (baseline), and at 1, 3, 6, and 12 months after the baseline assessment. Participants will be provided with the option of completing the study questionnaire in the fracture clinic or over the telephone (**Figure 7**). **Table 8** lists the assessments at each study time point. We chose a 12 month follow up period because most fractures and musculoskeletal injuries are healed by that time. We have used this follow up length in other multicentre trauma studies, including the largest orthopaedic trauma trial to date (the FLOW trial)[34].

## Study Location and Clinical Sites

The PRAISE-2 Methods Centre will be located at McMaster University's Centre for Evidence-Based Orthopaedics. The Centre for Evidence-Based Orthopaedics is a well-established research group specializing in large-scale multi-centre trauma trials. The Centre has also conducted several

Clinical sites that will enroll patients for the PRAISE-2 pilot study include (but are not limited to): 1) Hamilton Health Sciences – Hamilton General Hospital, Hamilton ON, 2) St. Michael's Hospital, Toronto ON, 3) Queen Elizabeth II Health Sciences Centre, Halifax NS, and 4) Foothills Medical Centre, Calgary AB. We chose to include these sites because the Methods Centre has worked with these sites on several large-scale multinational trauma trials and these sites were consistently top performers. Each site participated in the PRAISE-1 study and successfully met their enrollment targets. These four sites represent Level I Trauma Centres in three Canadian provinces (**Figure 8**).

## Protecting Against Sources of Bias

*Ensuring Protocol Adherence*

Prior to starting the study, site investigators and study personnel will attend an investigators meeting, either in person or by teleconference, to review the study protocol and discuss enrollment and adherence strategies. The Methods Centre will send out a monthly study newsletter to each clinical site updating them on the overall study

progress, summarizing their clinical site's progress, and thanking them for their continued support. The Principal Investigator will send out emails congratulating sites for their enrollment after every ten patients enrolled to keep sites engaged in enrollment efforts. Study personnel will keep daily records of all patients that were eligible but not enrolled in the study (missed) and the reason why. Study personnel will record this information on the case report forms and submit them to the McMaster University based Methods Centre on a regular basis. Methods Centre personnel will contact any centres with high rates of missed patients to discuss procedures and to establish solutions to any problems. Site investigators and research coordinators will receive regular quality control reports from the Methods Centre.

*Ensuring Data Quality*

All study personnel will participate in a training session prior to study commencement to ensure consistency in study procedures, including data collection and reporting. All centres will have a detailed study operations manual that will outline each step of the protocol. Site investigators can contact the Methods Centre 24-hours per day to resolve any problems or questions that arise. We will use an electronic data collection system with quality and logic checks. Study personnel at the Methods Centre will review data for completeness and quality from clinical sites daily. The Methods Centre personnel will follow up with weekly quality control reports submitted to each clinical site.

*Maximizing Patient Follow-Up*

As previous studies have reported high loss to follow-up rates with IPV victims[35], we will implement a strategy designed to minimize loss to follow-up adapted from Logan et al.[36] (**Figure 9**) to reduce bias associated with loss to follow up. Logan et al. were able to achieve nearly a 75% recruitment rate and a 94% follow-up rate after one year in a population of severely abused women[36]. We have previously used the majority of these strategies to maximize follow-up in multi-centre studies. Main features of this strategy include: 1) Excluding individuals who are likely to present problems with follow-up; 2) Prior to leaving the fracture clinic, as well as their own telephone number, each patient will provide the name and address of alternate contacts who are likely to be aware of the patient's whereabouts; 3) Patients will receive a reminder card for their next follow up visit from the clinical research coordinator; and 4) Follow-up visits will coincide with standard fracture clinic visits. Alternatively, patients can complete the major study questionnaires over the phone.

*Identifying IPV Victims*

A bias towards under-reporting IPV is possible with the self-reporting nature of identifying IPV; however, we were able to elicit a positive disclosure from 1 in 6 women in the PRAISE-1 study which is similar to estimates of IPV in other specialties. Our previous studies show that our method of identifying IPV victims is more sensitive than other common methods of identifying IPV[31]. Because of this, we are confident in our ability to correctly identify the majority of IPV victims. Considerations with respect to confidentiality will be addressed during data collection to reduce bias when participants

are completing the questionnaire. Participants will be approached by a female clinical research coordinator, and the consent process and the completion of the questionnaires will take place alone in a private location so as to reduce influence from others. A female clinical research coordinator is used to make the participant feel safer and more comfortable with disclosure. In our POSITIVE study,[37] we found that 82% of female fracture clinic patients would prefer to speak to a female about IPV.

*Independent Blinded Adjudication*

An independent adjudicator blinded to patients' IPV status will review all patients' radiographs and clinic notes to confirm injury-related complications.

**Statistical Plan**

*Sample Size Determination*

The sample size for the pilot study is primarily based on feasibility considerations. Feasibility objectives in our pilot study do not lend themselves to traditional quantitative sample size calculations. One of the objectives of the pilot study is to obtain preliminary outcome data in our study population to use in a sample size calculation for the larger definitive study. Based on data from PRAISE-1, 1 in 3 women presenting to fracture clinics have a lifetime history of IPV, 1 in 6 have a history of IPV in the past year, and 1 in 50 women report to fracture clinics because of an IPV-related injury[14]. For the pilot study, we aim to recruit 200 women (50 women at each of 4 sites) to potentially capture approximately 67 women with a lifetime history of IPV, 33 women who experienced IPV

within last 12 months, and at least one woman from each site who presents to the fracture clinic due to IPV.

**Primary Analysis**

A full description of the measures, variables, and methods of analysis are shown in **Table 9.** We will record the total number of patients enrolled on a monthly basis. Each centre will keep a screening log of included, missed, and excluded patients. We will also keep a record of patients who miss visits, and those who are withdrawn or lost to follow up. These will be reported as descriptive statistics—reported as counts (percent) for categorical variables and mean (standard deviation) for continuous variables with 95% confidence intervals (CI). We will report the proportion of complete case report forms as descriptive data. Using the data from the primary analyses below, we will complete a sample size calculation for a definitive study.

**Secondary Analyses**

These analyses will be exploratory in nature since the primary focus is on assessing feasibility.

*Injury-Related Complications* - We will compare rates of injury-related complications (non-union, malunion, infection, unplanned secondary procedure, mortality, hardware failure) between women who report a history of IPV and those that do not using a logistic regression analysis. A composite endpoint is justified because it will limit multiple

testing, increase the event rate and improve power, and we hypothesize that experiencing IPV will be associated with an increase in each of these complications (i.e. the effect will be in the same direction). We will present the proportions of each individual type of complication per group, arranged by level of patient importance, to allow the exploration of issues related to combining complications that are of varying patient importance.

*Return to Function* - Time to return to pre-injury level of function, as compared between self-report IPV and no self-report history of IPV groups, will be evaluated using Kaplan-Meier survival analysis.

*Incidence* - New episodes of IPV will be reported as an incidence rate with 95% CI.

*Utilization and costs of health, legal, and social support services* - Will be reported descriptively as proportions and estimated costs per patient with 95% CI. We will compare utilization of health services and mean costs between those who self-report a history of IPV and those who do not.

*Changes in IPV type and severity* - Will be analyzed descriptively—reported as counts (percent) for categorical variables and mean (standard deviation) for continuous variables and graphically.

## Ethical Considerations

*Informed Consent and Ethics Approval*

We will seek approval from the Hamilton Integrated Research Ethics Board (REB) for the Methods Centre and each participating clinical site will obtain approval from their local REB before initiating this study. Each participant will sign an informed consent form (ICF) before participating in the study according to local ethics protocols and the ICF will be worded in lay terms. To maximize the opportunity for free and informed consent while respecting privacy and confidentiality, the informed consent process will only take place privately. Potential participants will not be invited to join the study if the clinical research coordinator is not able to secure an opportunity when the individual is alone long enough to adequately explain the study and obtain informed consent. By approaching the potential participant in private, she also has the opportunity to provide free consent in the absence of significant others that may affect her decision to participate.

*Privacy and Confidentiality*

At every step of the PRAISE-2 study, privacy and confidentially will be paramount. Due to the sensitive nature of the research topic, we will be certain to exercise caution when recruiting individuals to participate in the study. Women are often fearful of disclosing that they are a victim of IPV for fear of retaliation from the offender, stigmatization by the individuals that she discloses to, embarrassment, and police involvement[38]. For safety reasons, women will only be allowed to participate in the study if they are able to

complete the questionnaires in a private location. Research Coordinators will not mention words “abuse” or “violence” at any point unless they are in a private location. This approach has been successfully used in other IPV studies[35,37,39]. Paper case report forms will be stored in a secure location at each clinical site and will be destroyed per local regulations after the study’s completion. Privacy and confidentiality will further be secured by assuring that research numbers will be used in place of personal identifiers when communicating with the PRAISE-2 Methods Centre.

*IPV Disclosure*

For ethical reasons, if a woman discloses that she has experienced IPV and wishes to speak to her surgeon about it, research personnel will notify the attending surgeon and the surgeon will offer support if needed using his/her clinical judgment. The Research Coordinator at the Methods Centre, who has over 4 years of experience coordinating IPV studies, and a social worker with experience working with abused women, will conduct training calls or in-person training sessions with surgeons and research personnel before the study begins and over the course of the study so they are able to effectively respond to IPV disclosures. Surgeons will be provided with training slides that they can refer back to if needed, as well as a set of instructions on how best to assist IPV victims if they require assistance to be posted in the fracture clinic surgeon area. Information provided to surgeons will include contact information for a community-based and a hospital-based social worker, and tips on what to say to women who disclose IPV. This set of

instructions was developed in partnership with a community social worker and a hospital-based social worker and has been used in previous and ongoing IPV research.

## DISCUSSION

Previous studies have assessed physical health outcomes of IPV victims, but they are limited by their cross-sectional design and only assessing very general physical health outcomes. Based on the recent international attention earned by the PRAISE-1 study[14], we believe that orthopaedic surgeons and others who treat injured women are interested in discovering the truth about how IPV affects their patients' injury-related outcomes. The PRAISE-2 study aims to fill some of the gaps in the literature faced by health care professionals who treat injured women regarding IPV. This information will have important clinical and policy implications for fracture clinics, emergency departments, family practices and a broad range of specialties that treat women with injuries, potentially including development of an identification and support program in the future.

Several social and medical paradigm shifts have occurred in the field of orthopaedic surgery in the past several decades that have saved lives and reduced the burden of musculoskeletal injury. Before the 1970's, orthopaedic surgeons would treat children's fractures with little attention to how the fractures occurred. During the 1970's in North America, orthopaedic surgeons became aware that child abuse played a major role in treatment of fractures and orthopaedic surgeons became very closely involved in protecting abused children. Currently surgical trainees are required to demonstrate

competency in identifying and managing child abuse before they can become board certified. Until recently, orthopaedic surgeons did not typically screen fracture patients for osteoporosis.). Due to research-generated data on the importance of fracture prevention, there is now an Osteoporosis Coordinator screening for people at high risk for osteoporosis in many fracture clinics in Ontario[39]. Osteoporosis Coordinators reduce the economic burden of fragility fractures and improve the diagnosis and management of post-fracture osteoporosis[40-42]. We are using these models as a guide to elicit a paradigm shift in orthopaedics regarding IPV and the PRAISE-2 study is the next vital step in moving towards this paradigm shift. If the PRAISE-2 study demonstrates that IPV victims have different orthopaedic outcomes compared to non-victims, this data will encourage orthopaedic surgeons to seriously consider how IPV may be affecting their patients. We also have the opportunity to reduce or even eliminate the homicide risk of 42% for intimate partner victims that present to hospitals with IPV injuries before they are murdered by their partners.

A key limitation of the PRAISE-2 study is the reliance on self-reporting of IPV status. We have attempted to limited bias by centrally adjudicating all primary outcome events by an independent blinded orthopaedic surgeon, however, IPV status cannot be centrally adjudicated. Despite this limitation, we are confident that women are comfortable answering the three direct questions that we propose to use, based on previous studies in a similar population.

**Potential Impact of the PRAISE-2 Study**

We believe a pilot study is a critical step to ensure feasibility of the larger, definitive PRAISE-2 study. Point estimates obtained from this pilot study will inform sample size estimates in future IPV research among injured women. In previous studies of IPV victims, patient follow up has typically been difficult, with one large high-quality trial losing almost 40% of their study sample over 18 months. We propose a plan to minimize loss to follow up (**Figure 8**) based on the strategies developed by Logan et al.[36], and we will take this opportunity to test and refine this strategy. We will use the information gained in the pilot study to develop a strong protocol for the definitive study. In addition, we will refine the outcome measures and case report forms that will be used in the definitive study. The lessons learned about recruitment and follow-up strategies, data collection, and data analysis will be invaluable for improving the protocol for a larger definitive study.

The ultimate goal of our research program in IPV is to reduce further violence and injuries. We aim to accomplish this by implementing an identification and support program for victims of IPV in fracture clinics. Health care professionals, researchers, and health policy makers require high quality, evidence-based information to guide their decisions. The current prospective cohort study aims to fill many of these gaps in knowledge. Specifically, if an increased risk of injury-related complications is associated with experiencing IPV, health care professionals who treat women with injuries can further target their treatments based on the results of IPV screening. If the proposed

study identifies that injuries lead to increased frequency or severity of IPV, or puts patients at risk of delayed healing or loss of function, it will provide rationale for implementing targeted identification and support programs in fracture clinics. In order for a screening and support program to be successful, health care professionals need to understand whether having a musculoskeletal injury can lead to new or worsening IPV, how patterns and types of IPV can change over time, and the types of services victims utilize, have access to, and need. The economic data obtained from this study will be invaluable in helping policymakers and hospitals to make financially-driven decisions on implementing an IPV support program.

**Conclusion**

The PRAISE-2 pilot study is the first step toward determining how experiences of IPV affect orthopaedic injury outcomes such as injury-related complications. This study will lead to the development and conduct of a large-scale multinational prospective cohort study that will engage physicians, surgeons, nurses, social workers, physiotherapists, and chiropractors from around the world to increase awareness of how IPV affects their patients' injury outcomes.

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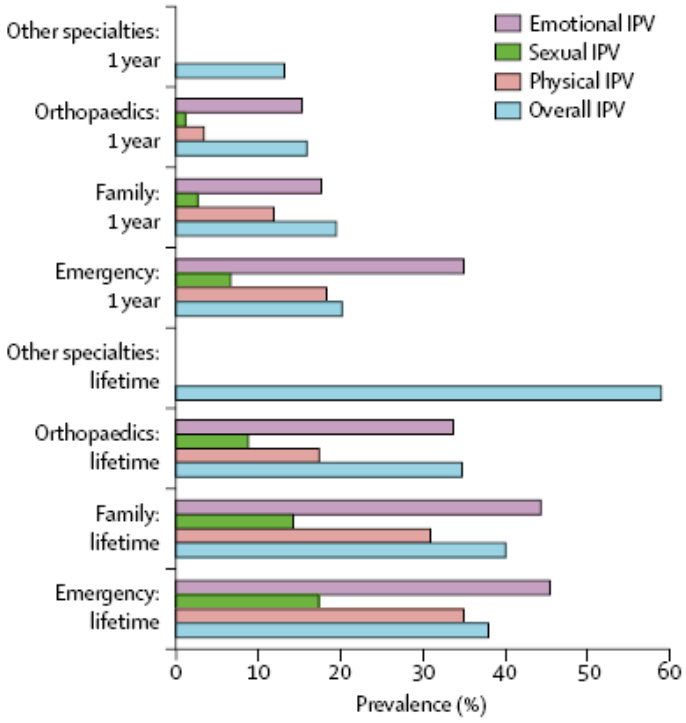


Figure 6 -IPV Prevalence in Orthopaedics and Other Specialties[1]

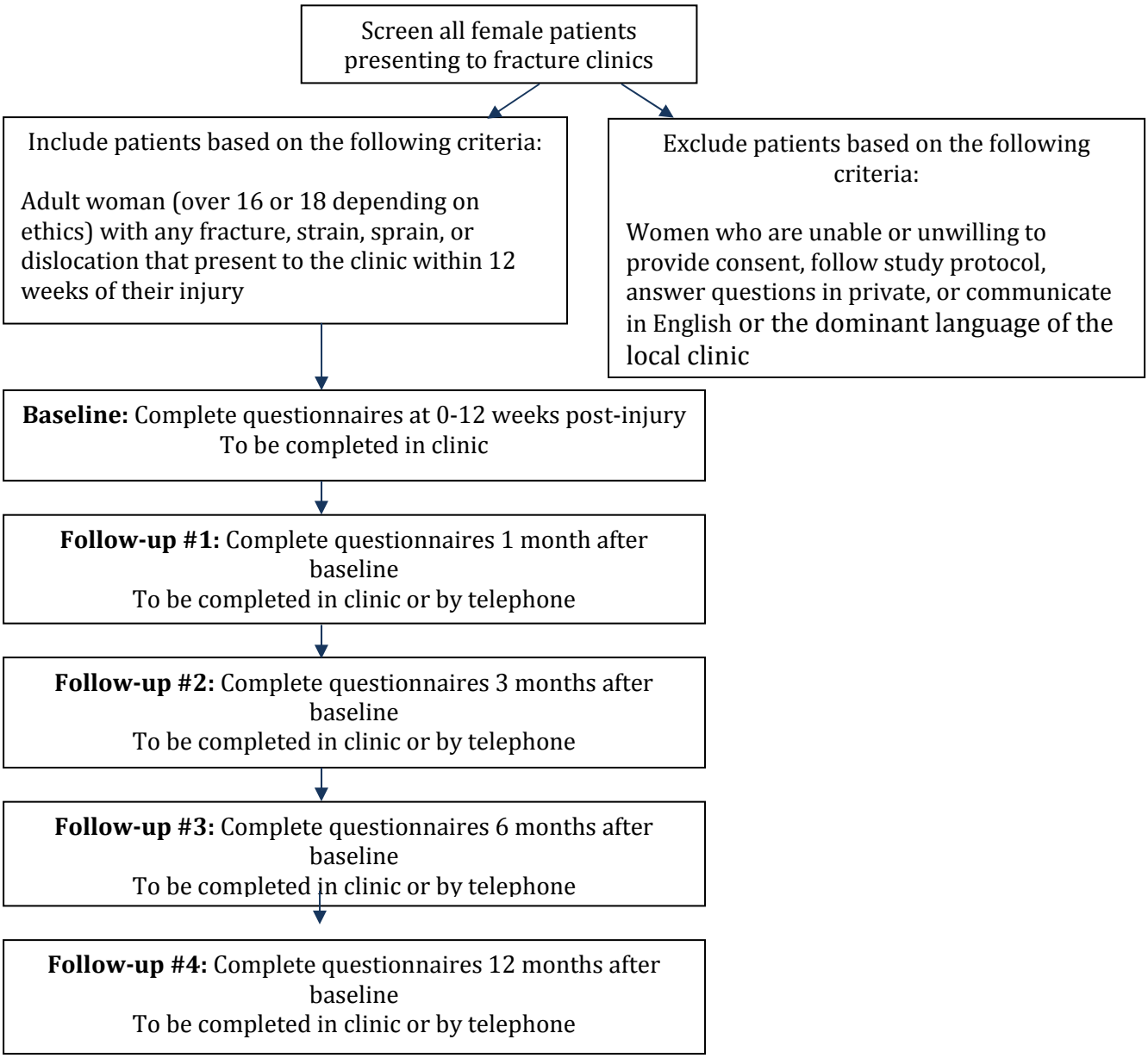


Figure 7 - PRAISE-2 Study Process Overview

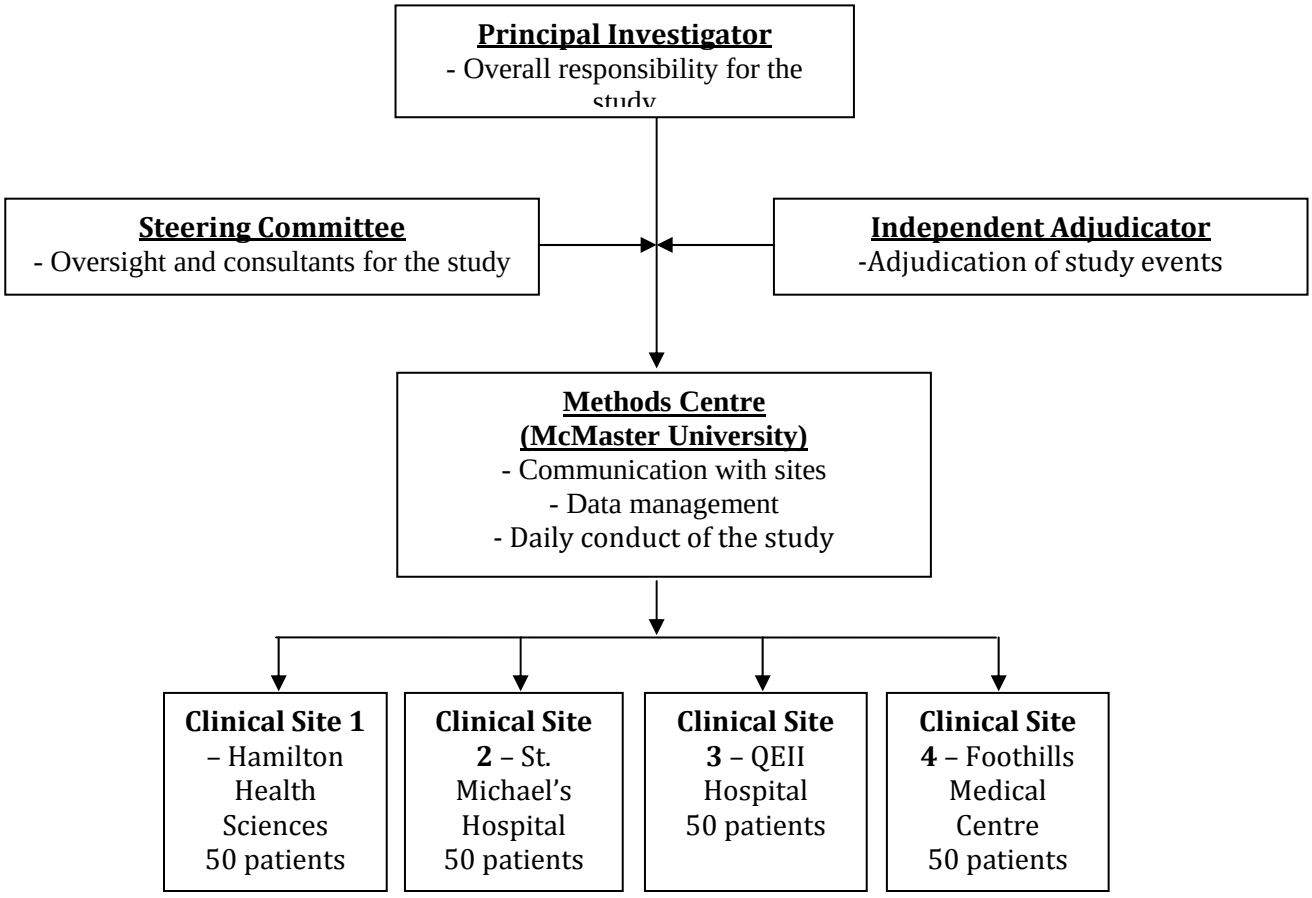


Figure 8 - Overall Organization of the PRAISE-2 Study

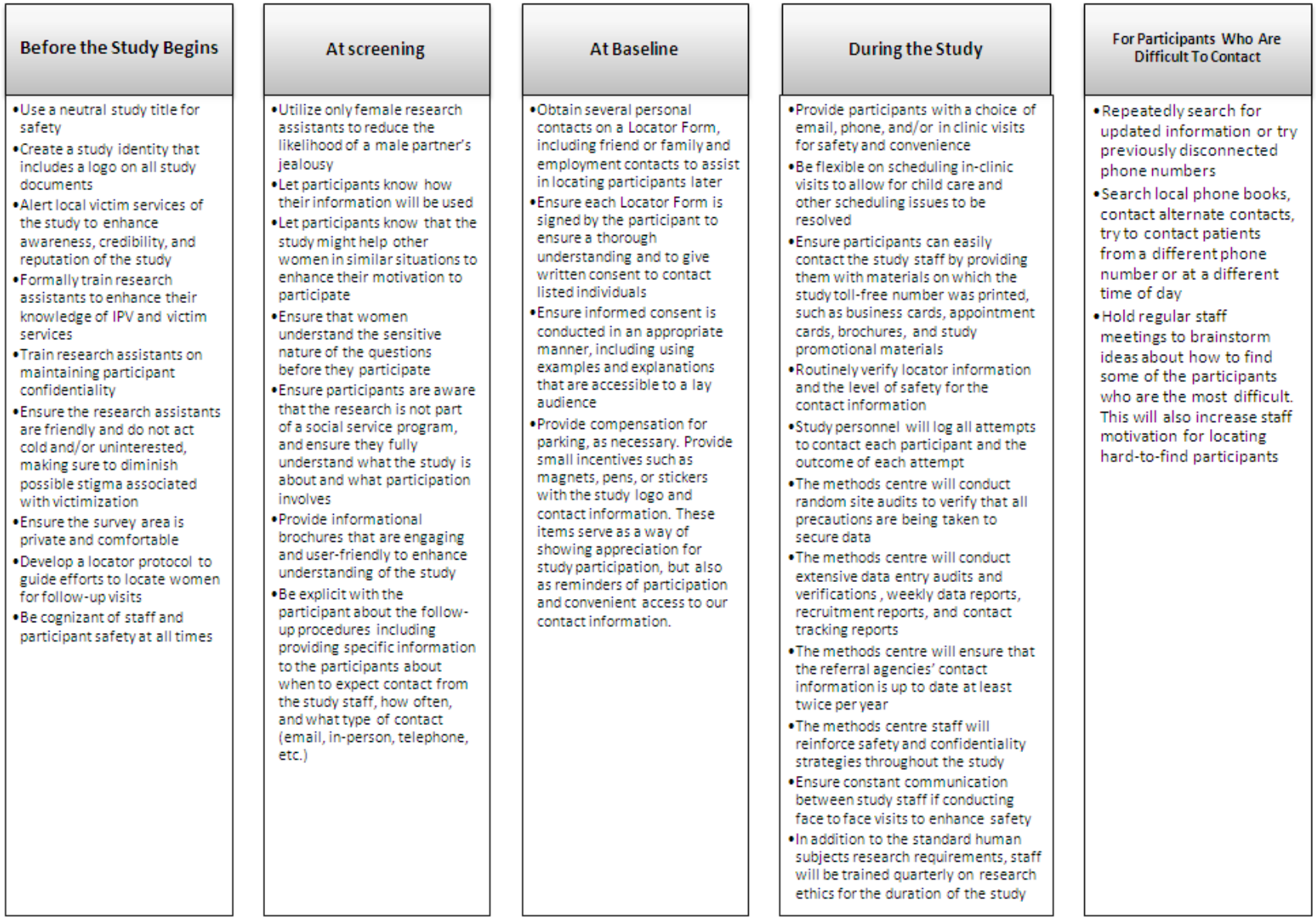


Figure 9 - PRAISE-2 Enrolment and Follow up Enhancement Strategies

Table 7 - Questions on the Direct Method of IPV Screening Questionnaire

| Question | Response Options | | |
|---|---|---|---|
| *In the past year…* | | | |
| Have you been physically abused by your intimate partner? | Often | Sometimes | Never |
| Have you been emotionally abused by your intimate partner? | Often | Sometimes | Never |
| Have you been sexually abused by your intimate partner? | Often | Sometimes | Never |
| *In your lifetime…* | | | |
| Have you been physically abused by your intimate partner? | Often | Sometimes | Never |
| Have you been emotionally abused by your intimate partner? | Often | Sometimes | Never |
| Have you been sexually abused by your intimate partner? | Often | Sometimes | Never |

Table 8 - PRAISE-2 Schedule of Events

| Assessment | Enrollment (Baseline) | 1 month | 3 Months | 6 Months | 12 months |
|---|---|---|---|---|---|
| Screening form | **X** | | | | |
| Informed consent | **X** | | | | |
| Demographic characteristics form | **X** | | | | |
| Injury characteristics form | **X** | | | | |
| Treatment information form | **X** | | | | |
| IPV status (type, frequency, severity) | **X** | **X** | **X** | **X** | **X** |
| Assessment for adverse events | | **X** | **X** | **X** | **X** |
| Support service utilization | **X** | **X** | **X** | **X** | **X** |
| Return to function | **X** | **X** | **X** | **X** | **X** |
| EQ-5D | **X** | **X** | **X** | **X** | **X** |

Table 9 - Variables, Measures and Methods of Analysis

| Objective | Outcome Measure | Method of Analysis |
|---|---|---|
| **Primary (Feasibility) Objective** | | |
| Determine the feasibility of a multinational prospective cohort study. | We will assess our ability to recruit women across clinical sites and compare actual recruitment rates to our current estimates. | Descriptive statistics—reported as counts (percent) for categorical variables and mean (standard deviation) for continuous variables with 95% CI |
| | We will evaluate adherence to the study protocol including application of eligibility criteria. | |
| | We will assess our ability to follow and collect data for 12 months. | |
| | We will identify and resolve any problems with data quality and questionnaire completion. | |
| **Secondary Objectives** | | |
| Determine how a history of IPV affects injury-related complications. *Primary outcome of the definitive study. | Fracture-Related Adverse Outcomes - We will collect information on all fracture-related adverse events (unplanned re-operations, infections, nonunions, malunions, mortality, wound healing problems, hardware failure, etc.) experienced by all patients and compare the number of injury-related complications experienced by women who disclose a history of IPV versus those who do not disclose IPV. | Logistic regression |
| Determine how a history of IPV affects return to pre-injury function | Return to Pre-Injury Function - We will use the Return to Function Questionnaire (RTF) to compare the mean time to return to pre-injury function among women who disclose a history of IPV versus those who do not disclose IPV. | Kaplan-Meier survival analysis |
| Determine the incidence of new IPV after a fracture. | We will determine the extent to which new episodes of IPV (incident cases) occur after a fracture in women with no prior history of abuse over a 12 month period. 4) Women's self-reported experience of IPV will be measured using a direct method of screening used by the PRAISE Investigators. A participant will be considered to have disclosed IPV if she answers positively to at least 1 of the 3 direct screening questions. We will identify the proportion of patients who experienced abuse after their fracture | Incidence statistic and 95% CI |

| Objective | Outcome Measure | Method of Analysis |
|---|---|---|
| | from those at baseline who report that they had never experienced abuse (incidence). | |
| Determine how a history of IPV affects health care and support service use after a fracture. | Among women who disclose a history of IPV versus those who do not disclose IPV, determine the relative utilization of health, legal, and social support services. Women's access to and use of health and support services will be measured by directly asking participants to self-report if they have accessed health care services, a social worker, mental health professional, women's shelter, helpline, violence against women website, or legal assistance. | Descriptive statistics—reported as counts (percent) for categorical variables and mean (standard deviation) for continuous variables with 95% CI |
| | Among women who disclose a history of IPV versus those who do not disclose IPV, determine the relative associated costs of using health, legal, and social support services. We will assign costs to each support system utilized so that we can estimate the economic costs associated with IPV. | |
| Determine how patterns of IPV change over time after a fracture. | Among women with fractures who self-report a history of IPV, we aim to describe changes in abuse severity and type of abuse (physical, emotional, and/or sexual IPV) over a 12 month period. Participants will complete a direct Likert-type question about IPV severity at each visit to measure change in severity, as well as direct questions on the frequency of abuse to measure change in IPV frequency over time. Using the direct method of screening, which categorizes types of violence as physical, emotional, and/or sexual abuse, we will record changes in type of IPV experienced over time. | Descriptive statistics—reported as counts (percent) for categorical variables and mean (standard deviation) for continuous variables with 95% CI and graphically |

***** All analyses will be exploratory in nature since the primary focus is on assessing feasibility.

# Chapter 5: Discussion and Conclusions

## KEY FINDINGS OF THIS THESIS

### Chapter 1: Intimate Partner Violence in Orthopaedics: Looking Back on a Decade of Research

IPV is a relatively new issue for orthopaedic surgeons, despite being a popular topic among emergency medicine physicians, family physicians and women's health specialists for some time. Some landmark research has been conducted to date that identifies that IPV is an issue in orthopaedic surgery which warrants further study and attention. Major findings of the previous literature include 1) 1 in 6 women attending fracture clinics have experienced IPV in the past year; 2) Lack of knowledge, lack of time, lack of privacy, misperceptions, and fear of offending patients are major barriers to implementing IPV identification and support programs in orthopaedic clinics; 3) Patients support screening for IPV in orthopaedic clinics; and 4) Orthopaedic clinics may be the ideal environment to ask patients about IPV, given that patients usually attend orthopaedic clinics multiple times, build trust with their surgeon, and are not in acute pain and distress like in the emergency department. Future avenues for research include education for orthopaedic surgeons and residents, exploring issues related to IPV perpetrators in fracture clinics, and orthopaedic outcomes for IPV victims.

### Chapter 2: Prospective Evaluation of a Short Partner Abuse Course for Orthopaedic Surgery Trainees (IMPACT)

The IMPACT study is the first educational curriculum-based intervention study focusing on orthopaedic health care professionals. A brief course in IPV education improved

orthopaedic trainees' knowledge about IPV, which was sustained for three months after taking the course. Although this study was limited by a small sample size and some attrition, we recommend that IPV education be incorporated into residency training for orthopaedic surgeons. Since lack of knowledge about IPV is a major barrier for health care professionals, including orthopaedic surgeons, the aim is to improve IPV screening by reducing this barrier. With the correct knowledge on how to correctly support IPV victims, surgeons and other physicians can start an open discussion about IPV and hope to improve support for IPV victims.

**Chapter 3: Factors Associated with Perpetrating Intimate Partner Violence: A Systematic Review**

There have been no studies to date exploring IPV perpetrators in fracture clinic settings. In order to fully understand the issue of IPV and IPV victims, we need to understand the issue of IPV perpetration. In Chapter 3, a systematic review of 19 articles identified eight domains of potential factors associated with IPV perpetration. The domains are substance use, history of abuse, demographic characteristics, psychological factors, physiological factors, attitudes, community & social factors, and criminal history & weapons. The most commonly reported domain was substance use. Although stereotyping should be avoided, this systematic review provides guidance on what factors may be associated with IPV perpetration, so we can more fully understand causes and influencing factors related to IPV perpetration. Although this review is limited by the heterogeneity of the included studies as well as the lack of poolable data, the study

identified a number of modifiable and preventable factors that need to be addressed in order to design appropriate IPV prevention strategies and effective perpetrator treatment programs. Although none of the included studies were conducted in an orthopaedic trauma population, the results are likely applicable to orthopaedic trauma patients and will be of use in future research in orthopaedic trauma clinics.

## Chapter 4: Prospective Abuse and Intimate Partner Violence Surgical Evaluation (PRAISE-2): Rationale and Design for A Multicentre Pilot Prospective Cohort Study

Chapter 4 outlines a protocol for a pilot prospective cohort study following 200 injured women for 12 months. The PRAISE-2 study aims to understand outcomes for victims of IPV compared to non-victims. The PRAISE-2 study will capitalize on the well-established PRAISE "brand", a global network of interested investigators, and careful design to complete this feasibility study. The primary outcome of the pilot study will be a composite measure of feasibility. The secondary objectives of the PRAISE-2 pilot study include determining: 1) How a history of IPV affects injury-related complications. This will become the primary objective of the definitive PRAISE-2 study; 2) How a history of IPV affects return to pre-injury function. 3) Incident cases of IPV after a musculoskeletal injury, if the injury was not the result of IPV; 4) How a history of IPV affects health care and support service use after a musculoskeletal injury; 5) How a history of IPV affects health-related quality of life after a musculoskeletal injury; and 6) How patterns of IPV change over time after a musculoskeletal injury.

## CONCLUSIONS

This thesis outlines the current state of knowledge in the field of IPV and orthopaedic surgery and provides some insight into three selected "emerging issues" in the field which warrant future research. IPV education for orthopaedic surgeons and trainees is a key method to reduce some of the barriers to implementing IPV support programs in orthopaedic clinics. Exploring the concept of IPV perpetrators in orthopaedic surgery clinics may give surgeons more insight that they need to understand the issue of IPV. Finally, having an understanding of how a history of IPV affects orthopaedic outcomes may help to "bring home" the issue of IPV for surgeons. In the past decade, the field of orthopaedic surgery has become more aware of the issue of IPV in orthopaedic clinics, but there are many questions that remain to be answered. Future research into the above issues will be an excellent first step to fully understanding the issue of IPV in orthopaedic patients, and may lead to improved support of victims of IPV in the future.

**Appendix A: Questions Used to Test IPV Knowledge**

Correct answers are shown in bold and references are shown in parentheses.

| | |
|---|---|
| 1. Head and neck injuries are the most common physical manifestations of IPV. (Bhandari et al., 2008) | **True** False Unsure |
| 2. Emotional abuse often co-occurs with and precedes other forms of abuse. (Ahmad et al., 2007; Sprague et al., 2011) | **True** False Unsure |
| 3. If a woman has multiple injuries, it is suggestive of IPV. (Wu et al., 2010; Bhandari et al. 2011) | **True** False Unsure |
| 4. Batterers are found across all socioeconomic levels and in all races. (Else et al., 1993) | **True** False Unsure |
| 5. The majority of abused women support routine screening for IPV. (PRAISE Investigators, 2010; Glass et al., 2001) | **True** False Unsure |
| 6. A common barrier to screening for IPV, reported by health care providers, is a lack of training on issues related to IPV. (Glass et al., 2001; Shearer & Bhandari, 2008) | **True** False Unsure |
| 7. Males are more likely to disagree with victim blaming statements (such as "people are only victims if they choose to be") than females. (Sprague et al., 2010, Sprague et al., 2011) | True **False** Unsure |
| 8. Women who screen positive for IPV in health care settings are from all different age groups, ethnicities, income levels and educational levels (Dosanjh et al., 2008; Bhandari et al., 2011). | **True** False Unsure |
| 9. It is uncommon for medical associations to have position statements that support screening for IPV, particularly in orthopaedics. (Bhandari et al., 2006; COA, 2009) | True **False** Unsure |
| 10. Most primary care physicians routinely screen injured patients for IPV. (Shearer et al., 2006; Petersen et al., 2001) | True **False** Unsure |
| 11. In emergency department settings, IPV is often missed because presenting injury patterns resemble other types of injury. (Bhandari et al., 2011; Sims et al., 2011; Kothari & Rhodes, 2006) | **True** False Unsure |
| 12. Physical abuse is the most common type of IPV. (Cherniak et al., 2005) | True **False** Unsure |
| 13. In Canada, it is mandatory for health care providers to report IPV. (McClennan et al., 2005) | True **False** Unsure |
| 14. Less than 30% of women report being asked about IPV during health care visits. (Sprague et al., 2011) | **True** False Unsure |
| 15. The term IPV only applies if the couple was cohabiting at the time that the abuse occurred. (McCloskey et al., 2007) | True **False** Unsure |
| 16. The majority of non-abused women support routine screening for IPV. (PRAISE Investigators, 2010; Glass et al., 2001) | **True** False Unsure |
| 17. IPV occurs almost exclusively in young, short-lasting relationships (Whitaker et al., 2007) | True **False** Unsure |
| 18. Musculoskeletal injuries are the most prevalent type of IPV injury. (Bhandari et al., 2006) | True **False** Unsure |

| | |
|---|---|
| 19. There is a lack of IPV screening tools that can be used in a clinical setting (Sprague et al., 2011; Chuang & Liebshutz, 2002; Anglin & Sachs, 2003) | True **False** Unsure |
| 20. Prevalence of IPV is typically much higher in emergency medicine than in family medicine.(Ahmad et al., 2007) | True **False** Unsure |
| 21. Women are more likely than men to be victims of IPV. (Coker et al., 2002; Breidling et al., 2005) | **True** False Unsure |
| 22. Approximately one third of IPV victims have been asked about IPV by a health care provider (Glass et al., 2001; Sprague et al., 2011; Chuang & Liebshutz, 2002). | True **False** Unsure |
| 23. Estimates of IPV prevalence in orthopaedics are higher than previously reported rates of IPV in most other specialties. (Bhandari et al., 2008; Bhandari et al., 2011; Dosanjh et al., 2008) | **True** False Unsure |
| 24. Injuries are the leading cause of death for females from one to thirty four years old. (Hu et al., 2005) | **True** False Unsure |
| 25. Approximately 1 in 5 American women have reported being physically or sexually abused by a husband or boyfriend at some point in their lives. (Thompson et al., 2006; Cherniak et al., 2005) | True **False** Unsure |

**Appendix B: Search strategy**

| | |
|---|---|
| 1 | exp Spouse Abuse/ |
| 2 | intimate partner violence.mp. |
| 3 | domestic violence.mp. or exp Domestic Violence/ |
| 4 | 1 or 2 or 3 |
| 5 | risk factors.mp. or exp Risk Factors/ |
| 6 | predict*.mp. |
| 7 | characteristics.mp. |
| 8 | causal factors.mp. |
| 9 | 5 or 6 or 7 or 8 |
| 10 | batterer.mp. |
| 11 | abuser.mp. |
| 12 | perpetrator.mp. |
| 13 | 10 or 11 or 12 |
| **14** | **4 and 9 and 13** |