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Addressing Injuries in Vulnerable Populations: Research Collaborations and Partnerships

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Injury-related morbidity and mortality disproportionately impact vulnerable groups, including children under the age of 5, older adults, racial and ethnic minority populations, and people of low socioeconomic status.[1–4] The Emory Center for Injury Control (ECIC) is a Centers for Disease Control and Prevention (CDC) Injury Control Research Center[5] charged with reducing the health and economic impact of injuries in Atlanta, Georgia and worldwide. The ECIC seeks to achieve its mission by focusing specifically on translation research and vulnerable populations.

Moreover, the ECIC is committed to encouraging innovative, interdisciplinary collaborations in the realms of research, training, and outreach. Examples of successful interdisciplinary activities include outreach to local emergency departments (ED) to screen patients for mental health symptoms and exposure to intimate partner violence and collaboration with the Georgia Child Fatality Review Panel to evaluate its processes and identify risk factors for death among children in state custody. At the grassroots level, the ECIC serves as the research/scientific arm of the Metropolitan Atlanta Violence Prevention Partnership, providing scientific support and technical assistance to this community-level organization of partners working in inner city, disadvantaged settings.

In order to disseminate the research findings generated by faculty and researchers associated with the ECIC, a partnership with the *Western Journal of Emergency Medicine* editorial team was formed to dedicate special thematic journal issues featuring research underway by the ECIC. We are delighted to report that this is the third special issue from this partnership, and we are very excited to present the injury prevention community with new research findings to inform programs, policy, and future research.

The current special issue presents findings on a range of topics that highlight injury-related health disparities and vulnerable populations. More specifically, there is a commentary regarding the healthcare disparities in trauma care as well as a manuscript addressing the benefit of a tiered trauma activation system.[6,7] Another manuscript examines the predictors of post-traumatic stress disorder among trauma victims and yet another manuscript assesses ED visits for traumatic brain injuries among older adults.[8,9] Two other manuscripts examine poisonings.[10,11] In addition, there are several manuscripts on intimate partner violence and unwanted sexual intercourse. For example, 1 study examines the latent trajectories of intimate partner violence and seeks to determine if childhood experiences impact these trajectories.[12] Three other studies examine intimate partner violence victimization and health behaviors among women, the racial and ethnic differences in unwanted sexual intercourse among girls, and the feasibility of using social media to study intimate partner violence among gay men. [13–15]

Another manuscript related to youth examines bystander motivation in bullying incidents.[16] Moreover, one manuscript examines the associations between temperature and violent crime.[17] International research included in this special issue examines intimate partner violence and social pressure among gay men across 6 countries and violence victimization and perpetration among youth in the slums of Kampala, Uganda. [18,19]

The range of manuscripts and professional affiliations reflected among the authors of the manuscripts included in this special issue underscore the strength and breadth of the ECIC – a 'center without walls or silos.' The ECIC links numerous professionals and disciplines at Emory University with counterparts at Atlanta-area public universities, private colleges, government agencies, and community-based organizations. In addition to its academic partners, the ECIC is closely aligned with local hospitals (particularly Grady Memorial Hospital, Atlanta's largest Level I trauma and burn center), and stakeholder groups directly affected by violence and unintentional injuries. Our consortium includes individuals with national and international reputations in the fields of

neuroscience, injury epidemiology, criminology, poison control, health policy, rehabilitation, prevention science, acute care, disaster preparedness, public health training, and translation research. It is through these partnerships we can build the momentum to truly reduce injuries in vulnerable populations and to strengthen our capacity to reach underserved populations.

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Healthcare Outcome Disparities in Trauma Care

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A recent article by Dr. Haider et al[1], "Association between Hospitals Caring for a Disproportionately High Percentage of Minority Trauma Patients and Increased Mortality: A Nationwide Analysis of 434 Hospitals," raised the question of whether there was an increased mortality risk among trauma patients treated at hospitals with higher proportions of minority patients (i.e., black and Hispanic patients combined). They categorized 434 hospitals included in the National Trauma Data Bank between 2007 and 2008 on the basis of the percentage of minority patients admitted and treated due to acute traumatic injury. In their analysis they compared the adjusted odds of in-hospital mortality between hospitals with less than 25% of patients who were minorities as the reference group (majority) versus hospitals with 25% to 50% of patients who were minorities (mixed) and hospitals with more than 50% of patients who were minorities.[1]

In the study, they examined over 311,500 trauma victims with an Injury Severity Score (ISS) of 9 or greater and who were white, black, or Hispanic patients. Of note, hospitals that had a 50% or higher percentage of minority patients were more likely to have additional patients with penetrating trauma, younger patients overall, fewer female patients, and the highest crude mortality, which is a typical profile of hospitals in the urban setting. What is the implication for trauma care outcomes in at-risk populations? In a recent study Hsai and Shen[2] identified certain groups to be at higher risk for worse access to trauma centers than others. Although the subject of proper access to trauma care remains an issue of significant concern, a more compelling question is whether trauma centers across the nation are providing the appropriate quality and level of service to their seriously injured patients.

For the past several decades, the field of injury control has grown and adopted several methods to decrease injury and save lives. Led by the Centers for Disease Control and Prevention's (CDC) National Center for Injury Prevention and Control, a national focus on the burden of injury and the enormous cost and impact on society has emerged. Despite the decline in homicide rates during the 1990s, disparities in outcome have not been eliminated.[3] In fact; intentional injury disparities such as homicide remained highest among black children across all study age groups in the CDC study.[3] The differences in mortality outcomes among these patients treated at trauma facilities serving higher proportions of minority patients may contribute significantly to the known racial disparities. The real question is why? Our belief is that greater resources and focus should be placed on total system improvement as the best opportunity to make a difference in improving care for ALL trauma patients and eliminating healthcare disparities in all populations across the nation, regardless of the mixture of the patient base.

Although the causes for these injury outcome disparities have been attributed to lack of education, inadequate laws, lack of resources and cultural factors that may affect delivery of healthcare, we believe the contribution of healthcare system-related factors has not been thoroughly investigated or fully explored. Whereas targeted educational efforts can be relatively easy to implement, promote the development of strategist partners in the community, and also serve to inform the public, education alone is simply not enough to solve this societal challenge.[4] This realization creates a huge opportunity for the field of injury prevention. While an informed and activist public, along with subsequent legislative efforts and law enforcement are important, proper trauma system and hospital staffing and resources must be made readily available if parity of trauma-related healthcare outcomes are our collective goals. If the findings of Dr. Haider's study[5] are indeed true, injury prevention may be a plausible strategy to help address the trauma-related outcome disparities in at-risk populations treated at predominantly minority-based hospitals. However, greater amounts of economic resources will be needed to achieve equal outcomes for trauma care regardless of the patient population or payor mix of the treating trauma facility.

In Haider's study[1], crude mortality was significantly lower at hospitals with less than 25% of patients who were minorities. After adjusting for age, sex, insurance status, injury severity, the presence of severe head and/or extremity injury, the presence of hypotension on arrival to the emergency department (ED), and the type and mechanism of injury, the odds of mortality continued to increase with an increasing proportion of minority patients. When compared with the reference group of predominantly majority hospitals, patients treated at mixed hospitals had a 16% higher adjusted risk of death. This further increased to a 37% increased odds of death among patients treated at predominantly minority hospitals.[1] These differences in mortality outcomes among trauma facilities serving higher proportions of minority patients may contribute significantly to the known racial disparities experienced by trauma patients in the United States (U.S.).[1,5]

After adjusting for potential confounders, an increased chance of death was noted for patients treated at hospitals that treated a higher percentage of minority patients when compared with the reference group hospitals. Although this study is intriguing in nature, it raises several questions and concerns. First, is there actually a difference in quality of the care being provided at hospitals that treat a higher percentage of minority patients? And how does the race and ethnicity of some patients affect the outcome and care of all patients admitted to U.S. trauma centers? It is a commonly-held belief that minority populations as a whole tend to be more economically disadvantaged, which means hospitals serving these populations often have greater economic constraints and staffing challenges.[5] The question is whether the observed effect is due to the minority status of the patient population, or rather the economic status of the hospitals, the quality and availability of subspecialty care providers, and the physiologic status of patients being treated at the facilities included in this study. Interestingly, there was no difference in adjusted mortality between whites and minorities within the same type of hospital.[1] In addition, a 3% greater concentration (21% vs. 18%) or volume of patients with an ISS $>$ 25 treated at the minority-based hospital versus those hospitals which treated $<$25% of minority trauma patients was present. This overall mortality difference could possibly be due to a slightly higher percentage of more critically injured individuals being triaged at these inner-city or minority-based medical centers.

Second, higher level trauma centers in the U.S. tend to be located at academic institutions in highly populated inner-city areas, where many minorities typically reside and work.[6] Although not explicitly stated in their study, based on the number of patients (pts) seen at each hospital type, the predominantly minority and mixed hospitals saw a greater concentration or volume of higher acuity patients per week (19.2 pts/week and 17.1 pts/week-mixed versus 11 pts/week-majority) . Furthermore, it is worth noting that the number of patients with an ISS $\geq$ 25 and hypotensive on arrival to the ED were slightly higher in the minority-based hospitals.[1] As the overall crude mortality difference is only 1 to 2 percent, these small disparities may have significant clinical implication in determining the chances for an unfavorable outcome after severe trauma for ALL patients presenting to the predominantly minority and mixed hospitals.

Multiple studies have demonstrated racial disparities in mortality and functional outcomes after traumatic injury in the U.S.[5,7,8] Patients treated at hospitals with higher proportions of minority trauma patients tend to have higher volumes of trauma patients, higher acuity of patients, and greater economic restraints, which could potentially lead to increased chances of morbidity and death, even after adjusting for potential confounders. Although differences in outcomes between trauma hospitals may be theoretically explained by racial disparities, the ethnic status or race of one patient probably does not contribute significantly to the care or outcome of the next patient. More plausibly, the staffing, economic status of the hospital system, the quality of care provided and the physiologic status of the injured patient more than likely play a greater role in the ultimate outcome of each individual patient. In Haider's study[1], hospitals serving higher proportions of minority patients with trauma have a significantly disadvantaged payor mix, with nearly double the percentage of uninsured patients compared with hospitals with less than 25% of patients being minorities. This payor mix disparity may adversely influence the structure and process of care a hospital system can deliver to critically injured patients. Consequently, it may be advantageous to change the definition of vulnerability from those of minority status to anyone who presents to trauma hospitals that treat a higher percentage of minorities and underrepresented individuals, which is a very powerful argument for improving trauma care for all.

Institutional and health system-related factors of many hospitals, especially those located in economically depressed urban neighborhoods, serve a substantially higher proportion of minority patients.[2,5] Such hospitals have been shown to have worse outcomes and suboptimal quality of care for a variety of diseases and surgical interventions.[9–13] Baicker et al[9] suggested that differences in the quality of care observed between hospitals may originate from variations in practice patterns, technological capabilities, hospital capacity and supply of specialists, or patient characteristics. Although Level I trauma centers have been shown to have lower mortality rates for severely injured trauma patients overall.[14,15] not all similarly designated trauma centers achieve the same risk-adjusted outcomes.[16–18] The reasons for these variations in outcome are unclear, but they may also be related to the heterogeneity of patient populations by payor mix, ,injury mechanism, or inconsistent practice patterns. Additional issues at public hospitals include nurse staffing shortages, constrained budgets, and lack of capital and technical support.[19,20]

It has been suggested by Hosking et al [21] and Green et al [22]

that improving cultural competency, addressing health literacy, and implementing quality-of-care improvement initiatives focused on equity and educating the public may reduce disparities in healthcare. Healthcare policies focused on improving cultural competency and directing resources to trauma centers serving a high proportion of minority patients could have a beneficial effect on the worse outcomes related to disparities in quality of care within and between hospitals among non-majority patients with severe injury. Nevertheless, the care provided by trauma personnel in the acute phase of the trauma care at Level I trauma centers around the country, in many clinicians' opinion, remains exceptional. In the end, we applaud Dr. Haider and his colleagues for their study, and believe this paper lays the foundation for more in-depth analysis of ways trauma centers can improve the care and outcome for ALL patients, regardless of race, ethnicity, patient mix, insurance status, geographic location or socioeconomic class.

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The Contributions of Prior Trauma and Peritraumatic Dissociation to Predicting Post-Traumatic Stress Disorder Outcome in Individuals Assessed in the Immediate Aftermath of a Trauma

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Objective: This study analyzed predictors of post-traumatic stress disorder (PTSD) in civilian trauma victims to assess how peritraumatic dissociation (PD) relates to PTSD symptom development. We examined PD and PTSD symptoms from a prior trauma simultaneously to better understand the extent to which past and current reactions to a trauma can predict the development of PTSD for a current trauma.

Methods: Participants (N=48) were recruited from the emergency department (ED) of a large, southeastern hospital and assessed immediately after a trauma and again at 4 weeks and 12 weeks post-trauma. We used both self-report and interviewer-based questionnaires to assess PD and PTSD symptoms for prior and current trauma.

Results: A hierarchical linear regression revealed that at 4-week follow up, when controlling for several demographic variables and trauma type, a model including both PD and PTSD symptoms from a prior trauma significantly predicted PTSD outcome ($F(47)= 3.70$, $p=0.00$), with PD and prior PTSD symptoms significantly contributing 17% and 9% of variance respectively. At 12 weeks, PTSD symptoms from prior trauma ($\beta=0.094$, $p=0.538$) and PD ($\beta=-0.017$, $p=0.909$) did not account for a significant proportion of the variance in PTSD for the enrolling trauma.

Conclusion: Prior and current reactions to trauma are both important factors in predicting the development of PTSD symptoms to a current trauma. The more immediate measurement of PD during presentation to the ED may explain the strength of its relationship to PTSD symptom development. Furthermore, our findings support the use of PTSD symptoms of a past trauma, as opposed to trauma frequency, as a predictor of PTSD from a subsequent trauma. Methodological limitations and future directions are discussed. [West J Emerg Med. 2012;13(3):220–224.]

INTRODUCTION

In 2010 nearly 2 million adults experienced nonfatal injuries requiring hospitalization, while millions more with traumatic injuries were treated in emergency departments (ED).[1] The potential development of posttraumatic stress disorder (PTSD), characterized by core symptoms of re-experiencing, avoidance/numbing, and hyperarousal, exacerbates trauma's aftermath. Approximately 6.8% of United States (U.S.) adults currently have PTSD, and 40% of them reported suicidal thoughts, while 19% attempted suicide.[2,3]

People with PTSD often experience significant health conditions, such as hypertension, asthma, peptic ulcers, gastrointestinal problems, and increased use of medical services.[4] Thus, trauma and PTSD patients are vulnerable to future health problems and are in need of more preventive efforts.

Due to equivocal research findings, one of the most highly debated PTSD risk factors is peritraumatic dissociation (PD). PD is an experience of change in cognitive functioning and perception during or immediately after a trauma, characterized by derealization, numbing or detachment, depersonalization, reduced awareness of surroundings, and dissociative amnesia.[5,6] PD was the strongest predictor of subsequent PTSD symptoms in 2 meta-analyses of PTSD risk factors.[7,8] However, confounding variables were not properly accounted for, and a causal relationship could not be established. [9–12] Other studies found that PD did not significantly predict PTSD over persistent dissociation, subjective accident-related vulnerability, sociodemographic characteristics, and initial mental health problems.[13–15]

Some researchers suggest that incorporating trauma history improves understanding of the relationship between PD and PTSD and identified a link between the 2, but others found that PD was unrelated to prior trauma.[7,13,16–18] Most prior studies assessed dissociation several weeks or months post trauma, making these data susceptible to recall bias.[11,15] Thus, there is a need to clarify the relationships between PD, prior trauma, and current PTSD symptoms by examining these 3 variables simultaneously and measuring PD more immediately post trauma. The present study examined the association between PD and PTSD with an improved methodology by assessing participants in an emergency setting. Specifically, PD was assessed within hours of a traumatic event, and PTSD symptoms were monitored over the course of 12 weeks. Furthermore, trauma history was obtained at the time of presentation in the ED, which should help to differentiate between current trauma exposure and past trauma experiences. We hypothesize that both PD and prior PTSD symptoms will predict PTSD symptoms at 4 and 12 weeks post-trauma.

METHODS

Participants

Participants (N=48) completed procedures as part of a randomized controlled study comparing early intervention for PTSD to an assessment-only control group in traumatized individuals presenting to the emergency department (ED).[19] Eligible participants met DSM IV criteria A for PTSD, exposure to a traumatic event involving actual or threatened death and intense fear, helplessness, or horror, within the past 72 hours. Exclusion criteria included current or past psychosis, suicidal ideation, substance dependence, and a loss of consciousness for more than 5 minutes due to the trauma. We included only those participants randomly assigned to assessment in the current analyses.

Measures

PTSD Diagnostic Scale (PDS)[20]. This self-report measure assesses prior trauma exposure and yields a DSM-IV PTSD diagnosis for a previous trauma and demonstrated excellent internal consistency in the present study (0.92). Our analyses used a continuous measure of total PTSD symptoms.

Immediate Stress Reaction Checklist (ISRC)[21]. The ISRC is a 27-item questionnaire designed to examine individuals' acute stress responses in the immediate aftermath of a traumatic event. For our analyses, a total score was calculated for PD based on the peritraumatic dissociation questions: numbing/detachment, reduced awareness, derealization, depersonalization. Internal consistency was acceptable (0.72).

PTSD Symptom Scale, Interview Version (PSS-I)[22]. The PSS-I corresponds to the 17 DSM-IV PTSD symptoms and showed excellent internal consistency (0.90) in the present study. We used a continuous measure of total PTSD symptoms for our analyses.

Procedure

Participants were ED patients of a southeastern Level I trauma hospital. This inner-city ED is the largest trauma center in the state, sees over 100,000 patients annually, and serves a largely African-American and medically indigent population at risk for trauma. ED patients were randomized to receive either 3 sessions of exposure therapy or assessment only. At baseline, participants received interviewer-administered and self-report questionnaires, which included the PDS and the ISRC.[20,21] Patients were assessed again at 4-week and 12-week follow ups, with PTSD symptom levels measured using the PSS-I.[22] This study was approved by the university institutional review board and the hospital research oversight committee.

Data Analysis

We used hierarchical linear regression to evaluate the association of PD and prior PTSD symptoms to PTSD symptoms at 4-week and 12-week follow up. We included covariates of gender, race, age, relationship status, and trauma type in the first step and controlled for in all models. In the second step, PD measured by the ISRC was included as a predictor of PTSD, as assessed by the PSS-I. Prior PTSD symptoms on the PDS were included in the third step.

RESULTS

Demographic variables are described in Table 1. Of the 48 participants, most were female (n=30, 62.5%) and African American (n =40, 82%). The remaining participants self identified as "white" (n=7, 16%) or "other" (n=1, 2%). 55% were single, 7% were married and 15% were cohabitating. Mean age was 34 years (SD=12). Trauma types included motor vehicle collisions (n=22, 46%), sexual assaults (n=11, 23%), nonsexual assaults (n=11, 23%) and other (n=4, 8%). Mean scores for symptom measures were as follows: 10.38 for PD (SD=4.81), 17.94 for PDS (SD=12.26), 24.69 for PSS 4-week

Table 1. Correlations among key variables in analyzing development of symptoms of post traumatic stress disorder (PTSD).

	Age	Race	Relationship Status	Trauma Type	ISRC-PD	PDS	PSS 4-Week	PSS 12-Week
Gender	−0.07	−0.23	0.09	0.37*	0.21	0.07	0.20	−0.04
Age		0.13	0.05	−0.2	−0.01	0.0	−0.21	−0.12
Race			−0.16	−0.19	−0.19	−0.29*	−0.045	−0.18
Relationship Status				0.12	0.08	0.16	0.23	0.30
Trauma Type					0.09	0.14	0.16	0.18
ISRC-PD						0.43**	0.45**	0.33*
PDS							0.45**	0.43**
PSS 4-Week								0.69**
PSS 12-Week								

Notes: Gender, Race, Relationship Status, and Trauma Type coded as dichotomous 0–1 variables
For analyses Trauma Type coded as assault (n=22, 46%) or non-assault (n=26, 54%)
N = 68 for baseline but changed at 4-week to 48 and at 12-week to 42 due to attrition
* $p<0.05$ (two-tailed), ** $p<0.01$ (two-tailed)
ISRC-PD, Immediate Stress Reaction Checklist-Peritraumatic Dissociation; *PDS*, PTSD Diagnostic Scale; *PSS*, PTSD Symptom Scale

(SD=11.14), and 21.83 for PSS 12-week (SD=12.31). Using PTSD symptoms from a prior trauma on the PDS, 19 (39.6%) of patients met criteria for chronic PTSD. At 4 week follow up, 25 (52.1%) patients met diagnostic criteria for current PTSD from the presenting trauma, while at 12-week follow up, 19 (45.25%) patients met diagnostic criteria for PTSD from the presenting trauma. The linear regression models (Table 2) indicate that PD was positively associated with PTSD symptoms at 4 weeks (β=0.29, p=0.04) , accounting for 17% of the overall variance. Prior PTSD symptoms were also significantly associated with PTSD symptoms at 4 weeks (β=0.35, p=0.02), accounting for 9% of the variance in PTSD symptoms above and beyond that of PD and demographics (R^2 change = 0.09, p = .019). At 12 weeks, prior PTSD symptoms (β=0.09, p=0.54) and PD (β=–0.02, p=0.91) were not significant. The overall variance accounted for in the final 4-week and 12-week models can be found in Table 2.

DISCUSSION

This study sought to parse the effect of past and current trauma reactions on PTSD symptom development. Because most people experience PTSD symptoms immediately following a traumatic event, while only a minority will develop PTSD, predictors, such as negative emotional reactions, are essential to understanding the disorder. We hypothesized that PD coupled with a history of PTSD symptoms would best represent this negative reaction, predicting later development of PTSD. The findings suggested that PD measured immediately after the trauma was associated with increased PTSD symptoms 1 month post-trauma. Past support for the association between PD and subsequent PTSD has been mixed, perhaps due to the often retrospective assessment of PD.[15] Retrospective reports are prone to bias, especially when assessing unawareness or disengagement.[23] The current study overcame this limitation by assessing PD immediately after trauma (mean time from trauma to assessment = 11.06 hours). This improved methodology may help clarify the conflicting findings of prior studies.

Second, as hypothesized, prior PTSD symptoms influenced the development of PTSD 4 weeks post trauma (54% met criteria for PTSD from a prior trauma). This finding is consistent with research showing that both child and adult trauma experiences significantly increase the likelihood of developing PTSD upon exposure to an adult traumatic event.[7] Research also indicates that maladaptive reactions to previous trauma are a greater predictor of subsequent PTSD outcome than trauma exposure frequency.[24] In line with this research, our measure of past PTSD pathology used DSM-IV symptom severity, not simply trauma exposure.

Table 2. Linear regression models demonstrating association between peritraumatic dissociation (PD) and development of post traumatic stress disorder (PTSD).

	df	F	Sig. F Change	R^2	R^2 Change	p
4-Week						
Model 1	47	0.30	1.27	0.13	0.13	0.30
Model 2	47	0.00**	2.97	0.30	0.17	0.02*
Model 3	47	0.02*	3.70	0.39	0.09	0.00**
12-Week						
Model 1	39	0.00**	6.81	0.55	0.55	0.00**
Model 2	39	0.92	5.66	0.55	0.00	0.00**
Model 3	39	0.54	4.91	0.56	0.00	0.00**

* $p<0.05$, ** $p<0.01$
ISRC-PD, Immediate Stress Reaction Checklist-Peritraumatic Dissociation; *PDS*, PTSD Diagnostic Scale

Our findings indicate that evaluating trauma victims for PD and past PTSD symptoms can help identify individuals likely to develop PTSD. This has implications for preventative care and can be used by first responders and emergency care clinicians. Although our findings cannot fully suggest that dissociative symptoms alone warrant an intervention, if this dissociation occurred during or immediately following a trauma and is coupled with a history of PTSD symptoms, early intervention, screening, and referrals to mental health resources may still be helpful. At the very least, these individuals should be monitored more closely.

LIMITATIONS

There were methodological limitations of this study. First, because individuals self reported PTSD symptoms from a past trauma immediately following a current trauma, their reports may be skewed by their reaction to the current trauma, perhaps explaining the large correlation between our past trauma variable and 4-week and 12-week PTSD symptoms. Notably, however, PD remained significantly associated with PTSD symptom outcome above and beyond the variance accounted for by symptoms related to a past trauma experience. Second, we assessed past PTSD symptoms retrospectively. Long-term prospective studies could more accurately assess symptoms from multiple traumas. Third, we lacked a control group in the initial analyses and therefore decided to conduct post-hoc case control analyses comparing patients who did and did not meet diagnostic criteria for PTSD at 4 weeks and 12 weeks. Results from an independent samples t-test indicated that at the 12-week time point, those patients who had PTSD did not differ on their past PTSD symptoms ($t(42)=-2.00$, $p=0.051$) or PD scores ($t(47)=-1.69$, $p=0.10$) from patients without PTSD. The only significant difference that emerged was their PTSD symptom scores at 4 weeks from the PSS-I ($t(47)=-4.28$, $p=0.0$), such that those who met diagnostic criteria for PTSD at 12 weeks reported greater PTSD symptoms at 4 weeks. To further investigate this, we conducted another independent samples t-test comparing patients with and without PTSD at the 4-week time point, when we could first diagnose PTSD. Results indicated significant differences on both prior PTSD symptoms and PD scores between groups. Specifically, patients with PTSD at 4 weeks reported significantly greater PD ($t(53)=-3.49$, $p=0.0$) and prior PTSD symptoms ($t(48)=-3.18$, $p=0.0$). Finally, while our immediate measure of PD is likely more accurate than those taken weeks or months post-trauma, self reporting a lack of awareness is intrinsically flawed. Future studies should develop and include objective measures of PD such as cognitive tasks or physiological reactions.

CONCLUSION

To our knowledge this is the first study to measure PD and other symptoms within hours of a trauma. We believe that the benefits of obtaining this data at such a crucial time point for the development of PTSD make a significant contribution to understanding the onset and course of PTSD. This study was conducted in an inner city ED that specializes in indigent care. Beyond continued exposure to trauma, this population is at risk for legal issues, injury, and inadequate social support. Our results indicate that PD and trauma history have a large impact on PTSD development for this vulnerable population.

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Benefit of a Tiered-Trauma Activation System to Triage Dead-on-Arrival Patients

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Introduction: Although national guidelines have been published for the management of critically injured traumatic cardiopulmonary arrest (TCPA) patients, many hospital systems have not implemented in-hospital triage guidelines. The objective of this study was to determine if hospital resources could be preserved by implementation of an in-hospital tiered triage system for patients in TCPA with prolonged resuscitation who would likely be declared dead on arrival (DOA).

Method: We conducted a retrospective analysis of 4,618 severely injured patients, admitted to our Level I trauma center from December 2000 to December 2008 for evaluation. All of the identified patients had sustained life-threatening penetrating and blunt injuries with pre-hospital TCPA. Patients who received cardiopulmonary resuscitation (CPR) for 10 minutes were assessed for survival rate, neurologic outcome, and charge-for-activation (COA) for our hospital trauma system.

Results: We evaluated 4,618 charts, which consisted of patients seen by the MSM trauma service from December 2001 through December 2008. We identified 140 patients with severe, life-threatening traumatic injuries, who sustained pre-hospital TCPA requiring prolonged CPR in the field and were brought to the emergency department (ED). Group I was comprised of 108 patients sustaining TCPA (53 blunt, 55 penetrating), who died after receiving < 45 minutes of ACLS after arrival. Group II, which consisted of 32 patients (25 blunt, 7 penetrating), had resuscitative efforts in the ED lasting > 45 minutes, but all ultimately died prior to discharge. Estimated hospital charge-for-activation for Group I was approximately $540,000, based on standard charges of $5000 per full-scale trauma system activation (TSA).

Conclusion: Full-scale trauma system activation for patients sustaining greater than 10 minutes of prehospital TCPA in the field is futile and economically depleting. [West J Emerg Med. 2012;13(3):225–229.]

INTRODUCTION

Injury and trauma-related disease remains the leading cause of death of individuals under 45 years of age in the United States.[1,2] The overall cost of managing these critically injured trauma patients continues to place a significant burden upon modern trauma systems.[2] Multiple reviews have demonstrated pre-hospital resuscitation efforts lasting more than 10 minutes in the field without re-establishment of adequate perfusion portend a dismal prognosis.[3–7]

Although national guidelines for triaging the pre-hospital

Table 1. Trauma activation criteria.

	Trauma system activation criteria
Level I and II highest priority • Trauma page sent out • All available trauma team member respond • Hospital trauma system activated	• Glascow Coma Scale $\leq$ 8 • Systolic Blood Pressure $\leq$ 90 • Patient requiring prehospital airway management, bagging or needle decompression • Heart rate >120 – 140 • External hemorrhage being treated with direct pressure, or tourniquet • All penetrating injuries to the head, neck or torso • Crushed, degloved, mangled or pulseless extremity • Critically injured children (age $\leq$ 15 years), if diverted because of patient condition • Open or depressed skull fracture (Level II) • Chest wall instability or deformity (e.g., flail chest) (Level II)
Level III	• Traumatic Cardiopulmonary Arrest with > 10 minutes of Unsuccessful Resuscitation in the field, after both blunt and penetrating trauma, with asystole or PEA with agonal rhythm of less or equal to 40

Traumatic Cardiac Arrest (TCPA) patients have been established by the National Association of EMS Physicians and the American College of Surgeons Committee on Trauma (see Tables 1 and 2 for guidelines)[1], not all centers have implemented out-of-hospital or in-hospital triage management protocols for termination of resuscitation (TOR). Reasons include concern regarding accuracy of history obtained at the scene, and reliability of physiologic data during transport.[8–10]

However, the decision to terminate resuscitation attempts in the field or to withhold resuscitation upon arrival to the emergency department (ED) remains a difficult one. A number of strategic adjustments could help to reduce the required human and material resources without significantly impairing appropriate level of trauma care.[11] Moreover, some of the higher trauma care costs in the U.S. may be reduced through improvements in triaged-related practices in trauma centers.[2] Improving the efficiency of trauma care delivery is particularly important as we teach the next generation of physicians the ACGME core competence of system-based practice.[12] Our hypothesis is that changing to a tiered system for trauma activation, and limiting futile resuscitation practices for unquestionably moribund patients in prolonged TCPA, would decrease costs and improve the efficiency of trauma care.

Table 2. Baseline characteristics of study patients.

Variable	N	Percent
Male	116	83.5
Female	23	16.5
Age 15 to 55	115	82.7
Age>55	23	16.5
Blunt Trauma	77	55.4
Penetrating Trauma	61	43.9
IS score >15	97	69.8
IS score < 15	42	30.2
Blood Alcohol >80	10	7.2
Blood Alcohol <80 or not tested	129	92.8

METHOD

Study Design

We conducted a retrospective analysis of 4,618 critically injured patients, admitted to Grady Memorial Hospital (GMH), Atlanta, GA, a Level I trauma center, from December 2001 to December 2008. The Morehouse School of Medicine (MSM) Institutional Review Board and the Grady Research Outcome Committee approved this study. We retrospectively queried the Grady trauma registry (GTR) for the patients presenting in cardiopulmonary arrest (TCPA).

Setting

In our major metropolitan region of over approximately 5 million citizens, GMH was the only Level I trauma center during the study period, which saw 108,000 ED patients annually. Approximately 3,500 major trauma activations occur annually, of which over 2,800 are entered into the GTR annually.

Protocol

We obtained the data from the GTR, which is part of the National Trauma Registry as maintained through the American College of Surgeons. We included patients if they sustained life-threatening penetrating and blunt injuries resulting in TCPA in the field. Trauma patients who required pre-hospital advanced cardiopulmonary resuscitation (CPR) but failed to regain spontaneous perfusion after initiation of ACLS were evaluated for survival rate, neurologic outcome, and the charge-for-activation by our system. We stratified patients into two groups. Group I was comprised of 108 patients who died after 1 to 45 minutes of ACLS in the ED. Group II consisted of patients who required ACLS/CPR lasting longer than 45 minutes prior to expiration.

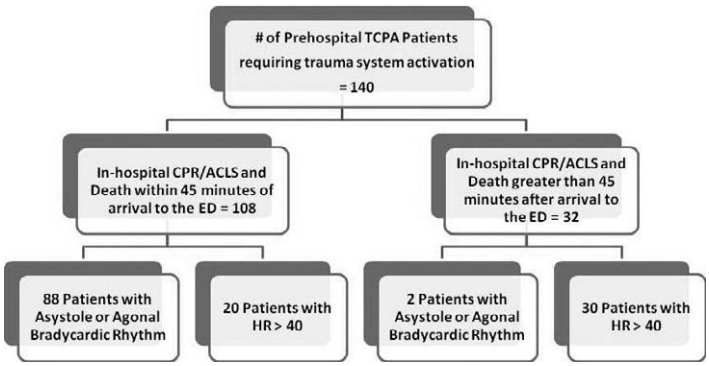

Figure 1. Breakdown of patient population based on survival time.

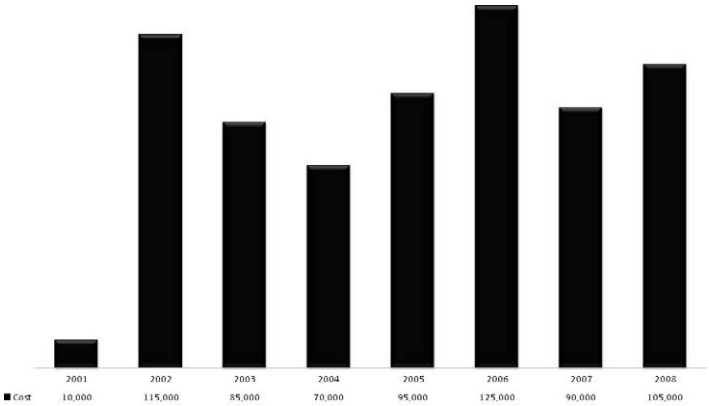

Figure 2. 2001 to 2008 estimated cost of trauma system activation.

Data Analysis

A baseline charge of $5,000 is assessed for Level I or Level II trauma activation, which covers equipment usage, and readiness of radiology, pharmacy, laboratory, and social services. The hospital trauma-service-readiness-charge does not include x-rays, computer-assisted tomography, medications, fluids, blood, procedures or physician fees, which are estimated to be $2,588 per patient. We statistically analyzed the data using PSS 16.0 software SPSS, Chicago, IL. Data was summarized as means plus or minus standard deviation and proportion (percentages) for continuous and qualitative data, respectively. We considered a p-value < 0.5 statistically significant.

RESULTS

One hundred forty patients with severe, life-threatening traumatic injuries, who sustained pre-hospital TCPA requiring prolonged CPR in the field, were brought to the emergency department (ED). Group I was comprised of 108 patients sustaining TCPA (53 blunt, 55 penetrating), who died after receiving $<$ 45 minutes [average of 10.2 minutes (range 1 to 45 minutes)] of ACLS after arrival to the ED. Eight-eight patients (81.5%) were asystolic or had bradycardic agonal rhythm upon arrival, and met criteria for the diagnosis of dead-on-arrival. Out of the 30 patients with data available to analyze the period of pre-hospital CPR, the average time was 15.0 minutes for Group 1 [range 1 to 37 minutes]. Group II, which consisted of 32 patients (25 blunt, 7 penetrating), had resuscitative efforts in the ED lasting $>$ 45 minutes (average survival 15.2 hours; range 1–58.5 hours), but all ultimately died prior to discharge. Of the 32 TCPA patients with a survival $>$ 45 minutes, 2 presented to ED in asystole. The full trauma system was activated for all patients. (Figure 1) Based on the baseline cost per activation for our Level I trauma system of $5,000 per occurrence, the estimated minimum charge by our hospital for Group I exceeded $540,000 over 8 years (Figure 2). Given that the average collection rate for ED/Trauma patients is 18%, we would expect that 82% of these charges were not reimbursed.

DISCUSSION

TCPA continues to portend a poor prognosis, particularly in the prehospital setting.[10] Several case series have been presented in the past supporting this assertion. Shimazu et al, in a series of 267 TCPA patients with blunt and penetrating trauma, reported 7 of the 267 survived long term; only 4 returned to their pre-injury level of neurologic function.[4] This series reported a 4% survival rate in patients with an arrest due to penetrating trauma and a 2.3% survival rate for blunt TCPA. Furthermore, Batistella et al in their series of 604 patients similarly revealed a mortality rate of 97.4%, with 7 out 16 survivors having severe neurologic devastation. [7] Interestingly, of the 346 patients who presented with either asystole or an agonal rhythm with heart rate less than or equal to 40, there were no survivors.

Despite years of research, controversy still remains surrounding the most plausible clinical criteria to waive initiation of or to terminate resuscitation in the pre-hospital setting, Expeditious restoration of perfusion is critical for survival, and CPR for TCPA lasting more than 10 minutes in the field is almost universally a lethal event.[1,3–8] Understandably, the complete and irreversible cessation of life is often difficult to ascertain with complete confidence in the dynamic environment of pre-hospital emergency care. As a result, resuscitation efforts often are initiated and maintained by emergency medical services providers in many futile situations.[13–18]

In our study, 88 patients were brought to the ED in asystole or PEA with a bradycardic agonal rhythm and never stabilized, similar to studies by Fulton[8], Mattox and Feliciano[19], and Durham et al.[20] Thirty-two patients responded briefly to resuscitative efforts, although they all ultimately died. Ninety-four percent of these brief responders had a heart rate $>$ 40 and most were hypotensive, but were not pulseless or asystolic upon ED arrival. Our findings suggest that patients with sustained traumatic cardiopulmonary arrest en route requiring active, ongoing CPR may be reassessed in 10-minute intervals and stratified into responders and non-responder, based on physiologic data, such as cardiac rhythm, pulses and blood

pressure. It is plausible that EM control physicians could be notified, and the trauma system activation could be downgraded to a tier-3 response. Upon reassessment by the emergency physician, ACLS could be continued or discontinued and tier-1 trauma system activation could be instituted.[1]

Extrapolating the data to the total trauma population triaged during this time, the estimated charges purely for trauma system activation approached $700,000 over this 8-year period. If similar rates and practices of futile triage of dead-on-arrival patients have been observed on other state and/or larger volume trauma services, the potential economic impact could be significant. Using this economic data may help promote the discussion for proper implementation of the national guidelines for withholding or termination of resuscitation for adults sustaining prolonged TCPA, especially in those futile situations in which patients meet criteria to be pronounced dead-on-arrival to hospital EDs. Whether a cost-effectiveness model can be effectively applied to the trauma setting is an area that needs further investigation. In this era of cost-conscious healthcare, it is reasonable to evaluate different triage methods, as well as mechanisms that will ultimately help to reduce and control state and national economic demands for provide quality trauma care.[21–25]

CONCLUSION

Adult TCPA patients who present in asystole or bradycardic agonal rhythms after 10 minutes of resuscitative efforts have a dismal prognosis. Activating the entire trauma system, as opposed to an initial assessment by the emergency medicine physician/team, in this patient subset is futile and adds significant costs to trauma and healthcare delivery. In the NAEMSP and ACS-COT position statement, "TOR may be considered when there are no signs of life and either the patient is in asystole or there is no return to spontaneous circulation after 10 minutes of CPR". A more selective or tiered system of trauma activation could potentially result in significant cost savings for the maintenance and administration of state trauma services.[26]

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Differences in Poisoning Mortality in the United States, 2003–2007: Epidemiology of Poisoning Deaths Classified as Unintentional, Suicide or Homicide

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Introduction: Poisoning, specifically unintentional poisoning, is a major public health problem in the United States (U.S.). Published literature that presents epidemiology of all forms of poisoning mortalities (i.e., unintentional, suicide, homicide) together is limited. This report presents data and summarizes the evidence on poisoning mortality by demographic and geographic characteristics to describe the burden of poisoning mortality and the differences among sub-populations in the U.S. for a 5-year period.

Methods: Using mortality data from the Center for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System, we presented the age-specific and age-adjusted unintentional and intentional (suicide, homicide) poisoning mortality rates by sex, age, race, and state of residence for the most recent years (2003–2007) of available data. Annual percentage changes in deaths and rates were calculated, and linear regression using natural log were used for time-trend analysis.

Results: There were 121,367 (rate=8.18 per 100,000) unintentional poisoning deaths. Overall, the unintentional poisoning mortality rate increased by 46.9%, from 6.7 per 100,000 in 2003 to 9.8 per100.000 in 2007, with the highest mortality rate among those aged 40–59 (rate=15.36), males (rate=11.02) and whites (rate=8.68). New Mexico (rate=18.2) had the highest rate. Unintentional poisoning mortality rate increased significantly among both sexes, and all racial groups except blacks ($p<0.05$ time-related trend for rate). Among a total of 29,469 (rate=1.97) suicidal poisoning deaths, the rate increased by 9.9%, from 1.9 per 100,000 in 2003 to 2.1 per 100,000 in 2007, with the highest rate among those aged 40–59 (rate=3.92), males (rate=2.20) and whites (rate=2.24). Nevada (rate=3.9) had the highest rate. Mortality rate increased significantly among females and whites only ($p<0.05$ time-related trend for rate). There were 463 (rate=0.03) homicidal poisoning deaths and the rate remained the same during 2003–2007. The highest rates were among aged 0–19 (rate=0.05), males (rate=0.04) and blacks (rate=0.06).

Conclusion: Prevention efforts for poisoning mortalities, especially unintentional poisoning, should be developed, implemented and strengthened. Differences exist in poisoning mortality by age, sex, location, and these findings underscore the urgency of addressing this public health burden as this epidemic continues to grow in the U.S. [West J Emerg Med. 2012;13(3):230–238.]

INTRODUCTION

Poisoning is a major public health problem worldwide and a leading cause of injury death in the United States (U.S.).[1,2] Moreover, mortality due to unintentional drug poisoning increased by 62% from 1999 to 2004 in the U.S.[3] The largest increase in unintentional poisoning mortality was observed among adults aged 20–29 years and 45–54 years, women, white, or populations living mostly in rural states.[4] Accordingly, there appears to be important differences in the population groups that are more vulnerable to poisoning mortality.

Opioid pain medications like methadone, hydrocodone or oxycodone resulted in 93% of unintentional poisoning deaths in 2007, making these substances the most common hazard for poisoning mortality.[2] There are growing concerns regarding overdoses of prescription drugs and the increase in the number of hospitalizations due to intentional or unintentional misuse of these drugs in the U.S.[5] Similarly, suicide mortality due to poisoning by drugs or alcohol resulted in 75% of all poisoning deaths in the U.S with one third of these suicides resulting from a combination of alcohol and prescription drugs.[6]

Homicidal poisoning, though rarely described in the literature, is also an important public health concern in the U.S.[7] Men, infants, and blacks were reported to be at higher risk for homicidal poisoning.[7] Drugs were the most commonly used means of homicidal poisoning, and the prevalence was higher in California, Washington, and Texas during the 1990s. [7,8]

There is a scarcity of published reports that together present all three forms of poisoning mortality (i.e., unintentional, suicide, homicide). This report presents descriptive epidemiology of poisoning mortality data for the most recent years available (2003–2007). Findings from this study could be used to inform and formulate prevention strategies targeting sub-groups of the population that may be at higher risk of poisoning deaths.

METHODS

Data Source and Management

We obtained data from the Center for Disease Control and Prevention (CDC) Web-based Injury Statistics Query and Reporting System (WISQARS).[9] The WISQARS provides mortality data on residents of the U.S., which was obtained from death certificates provided by the National Vital Statistics System. The details of WISQARS have been explained elsewhere.[10–12] We analyzed the linear trends in unintentional and intentional poisoning mortalities during 2003–2007 using deaths and age-adjusted death rates by gender, age groups, race and state, while we plotted the data by race only. The small number of cases ($n<20$) for certain population categories may produce unreliable rates.[13] Percent change in population categories with deaths ≤ 9 were not presented in the tables.[4]

In terms of classifying poisoning deaths as unintentional, or intentional, we used the following criteria: We identified decedents with *unintentional* poisoning mortalities using ICD-10 codes (International Classification of Diseases, Version 10) X40-X49 which classifies overdoses of illegal drugs and legal drugs taken for nonmedical reasons, and poisoning from legal drugs taken in error or at the wrong dose, and poisoning from other substances (e.g., alcohol, pesticides, or carbon monoxide). Similarly, we identified *intentional* poisoning mortalities, including suicide and homicide, using the following ICD-10 codes: X60-X69 involving suicide by exposure to pesticides, gases and vapors, unspecified chemicals and noxious substances, alcohol, other drugs acting on the autonomic nervous, narcotics, other sedatives and hypnotics and antidepressants; X85-X90 involving assault by drugs, corrosive substances, pesticides, gas and vapors, unspecified chemical and noxious substance, and Y35.2, which includes legal intervention involving gas. We considered all ICD-10 codes for unintentional and intentional poisoning mortalities as given in CDC's WISQARS.

We categorized the age of selected individuals (0–79+ years) into four subgroups (0–19, 20–39, 40–59 and 60–79+years). Races were categorized as whites, blacks, American Indians/ Alaska Natives, Asian/ Pacific Islanders.

Data Analysis

We used Microsoft Excel and SPSS software (version 15, SPSS Inc. Chicago, USA) for data analyses, and we selected alpha of $p<0.05$ for determining statistical significance. We used the annual percentage change in rates to measure the linear trend calculated as (the rate in the ending year – the rate in the beginning year) / (the rate in the beginning year) X 100. The same formula was used to measure the linear trend for deaths. We computed comparisons of proportions between groups (sex and race) using a Chi-square test. To normalize the distribution curve, we rescaled the deaths and rates to natural logged deaths and rates respectively. We used linear regression for time trend analysis for 2003–2007, and to examine its significance.

RESULTS

Unintentional Poisoning

During 2003–2007, there were 121,367 unintentional poisoning deaths, representing 20.8% of all unintentional injury death (n=584,091) in the U.S. (Table 1). Overall, the unintentional poisoning mortality rate increased 46.9% from 6.7 to 9.8 per 100,000 . Unintentional poisoning mortalities varied by state with the highest rate in New Mexico (rate=18.2) (Table 1).

Overall the unintentional poisoning mortality rate increased by 42.3% among males ($p=0.003$ time-related trend for rate) and 55.7% among females ($p<0.001$ time-related trend for rate) (Table 2). Except for blacks, the rate significantly increased for all racial subgroups examined ($p<0.05$ time-related trend) (Figure 1).

Sub-group analysis revealed the highest significant increase among white males aged 60–79+ years (62.8%), black males aged 60–79+ years (55.5%) and Asian/ Pacific Islanders males aged 40–59 years (71.1%) ($p<0.05$ time-related trend) (Table

Table 1. Characteristics of unintentional and intentional poisoning injury mortalities, United States, 2003–2007.

	Unintentional Poisoning Mortality			Intentional Poisoning Mortality					
				Suicide			Homicide		
Variables	Deaths	Age-adjusted Rates[a]	Percentages	Deaths	Age-adjusted Rates[a]	Percentages	Deaths	Age-adjusted Rates[a]	Percentages
Age(years)									
0–19	3919	0.95	3.23	599	0.15	2.03	196	0.05	42.33
20–39	46626	11.39	38.42	8352	2.04	28.34	125	0.03	27.00
40–59	62969	15.36	51.88	16093	3.92	54.61	85	0.02	18.36
60–79+	7853	3.15	6.47	4425	1.77	15.02	57	0.02	12.31
Total	121,367			29,469			463		
Sex									
Male	81194	11.02	66.90	16064	2.20	54.51	273	0.04	58.96
Female	40173	5.34	33.10	13405	1.74	45.49	190	0.03	41.04
Race									
White	104316	8.68	85.95	27572	2.24	93.56	335	0.03	72.35
Black	14673	8.03	12.09	1116	0.60	3.79	112	0.06	24.19
Am Indian/Alaska Native	1480	9.64	1.22	253	1.64	0.86	-	-	-
Asian/Pac Islander	898	1.27	0.74	528	0.74	1.79	11 [b]	0.02	2.38
States									
Alabama	1444	6.42	1.19	266	1.17	0.90	-	-	-
Alaska	381	11.13	0.31	73	2.22	0.25	-	-	-
Arizona	3129	10.94	2.58	842	2.89	2.86	12 [b]	0.04	2.59
Arkansas	616	4.54	0.51	282	2.05	0.96	-	-	-
California	13904	7.76	11.46	3381	1.91	11.47	43	0.02	9.29
Colorado	2190	8.99	1.80	879	3.65	2.98	-	-	-
Connecticut	1576	9.11	1.30	302	1.66	1.02	-	-	-
Delaware	292	7.04	0.24	74	1.74	0.25	-	-	-
District of Columbia	342	11.64	0.28	36	1.19	0.12	-	-	-
Florida	10193	11.82	8.40	2482	2.69	8.42	29	0.04	6.26
Georgia	3391	7.35	2.79	598	1.30	2.03	-	-	-
Hawaii	362	5.65	0.30	89	1.31	0.30	-	-	-
Idaho	397	5.84	0.33	168	2.47	0.57	-	-	-
Illinois	4974	7.84	4.10	1013	1.59	3.44	34	0.05	7.34
Indiana	2051	6.59	1.69	696	2.21	2.36	12 [b]	0.04	2.59
Iowa	520	3.59	0.43	359	2.46	1.22	-	-	-
Kansas	853	6.39	0.70	377	2.79	1.28	-	-	-
Kentucky	2802	13.37	2.31	364	1.71	1.24	13 [b]	0.06	2.81
Louisiana	2669	12.25	2.20	259	1.18	0.88	10 [b]	0.04	2.16
Maine	648	10.18	0.53	153	2.11	0.52	-	-	-
Maryland	285	1.02	0.23	390	1.36	1.32	-	-	-
Massachusetts	2465	7.41	2.03	533	1.57	1.81	-	-	-
Michigan	3414	6.70	2.81	1097	2.14	3.72	14 [b]	0.03	3.02
Minnesota	1094	4.19	0.90	567	2.19	1.92	-	-	-
Mississippi	1125	8.07	0.93	177	1.27	0.60	-	-	-
Missouri	2583	8.99	2.13	706	2.44	2.40	15 [b]	0.05	3.24
Montana	326	7.04	0.27	183	3.90	0.62	-	-	-

Table 1. Continued.

Variables	Unintentional Poisoning Mortality			Intentional Poisoning Mortality					
				Suicide			Homicide		
	Deaths	Age-adjusted Rates[a]	Percentages	Deaths	Age-adjusted Rates[a]	Percentages	Deaths	Age-adjusted Rates[a]	Percentages
Nebraska	267	3.17	0.22	171	2.03	0.58	-	-	-
Nevada	1711	14.15	1.41	473	3.94	1.61	14 [b]	0.11	3.02
New Hampshire	591	8.97	0.49	167	2.41	0.57	-	-	-
New Jersey	3290	7.59	2.71	566	1.26	1.92	-	-	-
New Mexico	1690	18.18	1.39	322	3.38	1.09	-	-	-
New York	5252	5.30	4.33	957	0.95	3.25	15 [b]	0.02	3.24
North Carolina	4134	9.47	3.41	952	2.14	3.23	10 [b]	0.02	2.16
North Dakota	87	2.68	0.07	64	2.08	0.22	-	-	-
Ohio	5465	9.51	4.50	1223	2.09	4.15	29	0.05	6.26
Oklahoma	2223	12.98	1.83	441	2.55	1.50	-	-	-
Oregon	1409	7.59	1.16	588	3.12	2.00	-	-	-
Pennsylvania	6985	11.43	5.76	1178	1.83	4.00	28	0.05	6.05
Rhode Island	311	5.69	0.26	102	1.84	0.35	-	-	-
South Carolina	1958	9.15	1.61	354	1.62	1.20	-	-	-
South Dakota	124	3.41	0.10	94	2.54	0.32	-	-	-
Tennessee	3281	10.88	2.70	636	2.07	2.16	-	-	-
Texas	8388	7.43	6.91	1760	1.58	5.97	38	0.03	8.21
Utah	477	4.09	0.39	356	3.23	1.21	-	-	-
Vermont	231	7.47	0.19	80	2.42	0.27	-	-	-
Virginia	2501	6.50	2.06	759	1.95	2.58	-	-	-
Washington	3427	10.54	2.82	909	2.80	3.08	14 [b]	0.05	3.02
West Virginia	1364	15.60	1.12	150	1.62	0.51	-	-	-
Wisconsin	2016	7.24	1.66	738	2.62	2.50	14 [b]	0.05	3.02
Wyoming	159	6.38	0.13	83	3.20	0.28	-	-	-
Years						0.00			
2003	19451	6.69	16.03	5462	1.87	18.53	81	0.03	17.49
2004	20941	7.14	17.25	5800	1.96	19.68	103	0.04	22.25
2005	23612	7.95	19.46	5744	1.92	19.49	89	0.03	19.22
2006	27520	9.17	22.68	6107	2.01	20.72	105	0.03	22.68
2007	29843	9.83	24.59	6356	2.06	21.57	85	0.03	18.36

[a] Age-specific for age groups and age-adjusted death rates (per 100,000 persons)
[b] Percentages based on numbers ≤20 are unstable and interpreted with caution.[13]
– For cells with no data, percent change in death was not shown because deaths based on ≤9 [4]

3). Similarly among females, the highest significant increase was among whites aged 40–59 years (73.1%), and blacks aged 60–79+ years (120.0%) ($p<0.05$ time-related trend) (Table 3).

Intentional Poisoning

During 2003–2007, there were 29,469 suicide poisoning deaths and 463 homicide poisoning deaths representing 11.7% of all intentional injury deaths (n=256,478) in the U.S. (Table 1)

Among all intentional poisoning mortalities, 16,093 (54.61%) suicidal deaths were reported among aged 40–59 years, 16,064 (54.51%; rate=2.20) were males and 27,572 (93.6%; rate = 2.24) were whites (Table 1). Total suicidal poisoning mortality rate increased 9.9%, from 1.9 to 2.1 per 100,000. Suicidal poisoning mortalities varied by state with the highest rate in Nevada (rate=3.9) (Table 1). Overall suicidal poisoning mortality rate increased by 5.3% among males ($p=0.232$ time-related trend) and 15.3% among females

Table 2. Percentage changes in deaths and rates per 100,000 overall and for each year in unintentional and intentional poisoning mortality by sex—United States, 2003–2007.

Cause	Sex	Year	Deaths	Age-Adjusted Rate	Percentage change in deaths/year[a]	Percentage change in rates/year[b]	P value for trend (rates)*
Unintentional	Males	2003	13171	9.16			
		2004	13930	9.57	5.76	4.56	
		2005	15879	10.77	13.99	12.56	
		2006	18573	12.46	16.97	15.61	
		2007	19641	13.03	5.75	4.57	
		2003–2007	81194	11.02	49.12	42.28	0.003
	Females	2003	6280	4.26			
		2004	7011	4.71	11.64	10.66	
		2005	7733	5.14	10.30	9.16	
		2006	8947	5.88	15.70	14.35	
		2007	10202	6.63	14.03	12.72	
		2003–2007	40173	5.34	62.45	55.71	<0.001
Intentional							
Suicide	Males	2003	3048	2.15			
		2004	3200	2.23	4.99	3.35	
		2005	3112	2.14	−2.75	−3.80	
		2006	3292	2.22	5.78	3.67	
		2007	3412	2.27	3.65	2.15	
		2003–2007	16064	2.20	11.94	5.29	0.232
	Females	2003	2414	1.61			
		2004	2600	1.72	7.71	6.63	
		2005	2632	1.71	1.23	−0.34	
		2006	2815	1.81	6.95	5.61	
		2007	2944	1.86	4.58	2.70	
		2003–2007	13405	1.74	21.96	15.26	0.009
Homicide	Males	2003	49	0.03			
		2004	61	0.04	24.49	21.18	
		2005	51	0.03	−16.39	−16.96	
		2006	69	0.05	35.29	33.43	
		2007	43	0.03	−37.68	−37.36	
		2003–2007	273	0.04	−12.24	0.00	0.808
	Females	2003	32	0.02			
		2004	42	0.03	31.25	30.13	
		2005	38	0.03	−9.52	−9.23	
		2006	36	0.02	−5.26	−7.64	
		2007	42	0.03	16.67	15.12	
		2003–2007	190	0.03	31.25	25.59	0.638

[a] Percent change in mortalities = (the death in the ending year – the death in the beginning year)/ (the death in the beginning year) X 100.
[b] Percent change in mortality rates = (the death rate in the ending year – the death rate in the beginning year)/ (the death rate in the beginning year) X 100
* Based on natural log

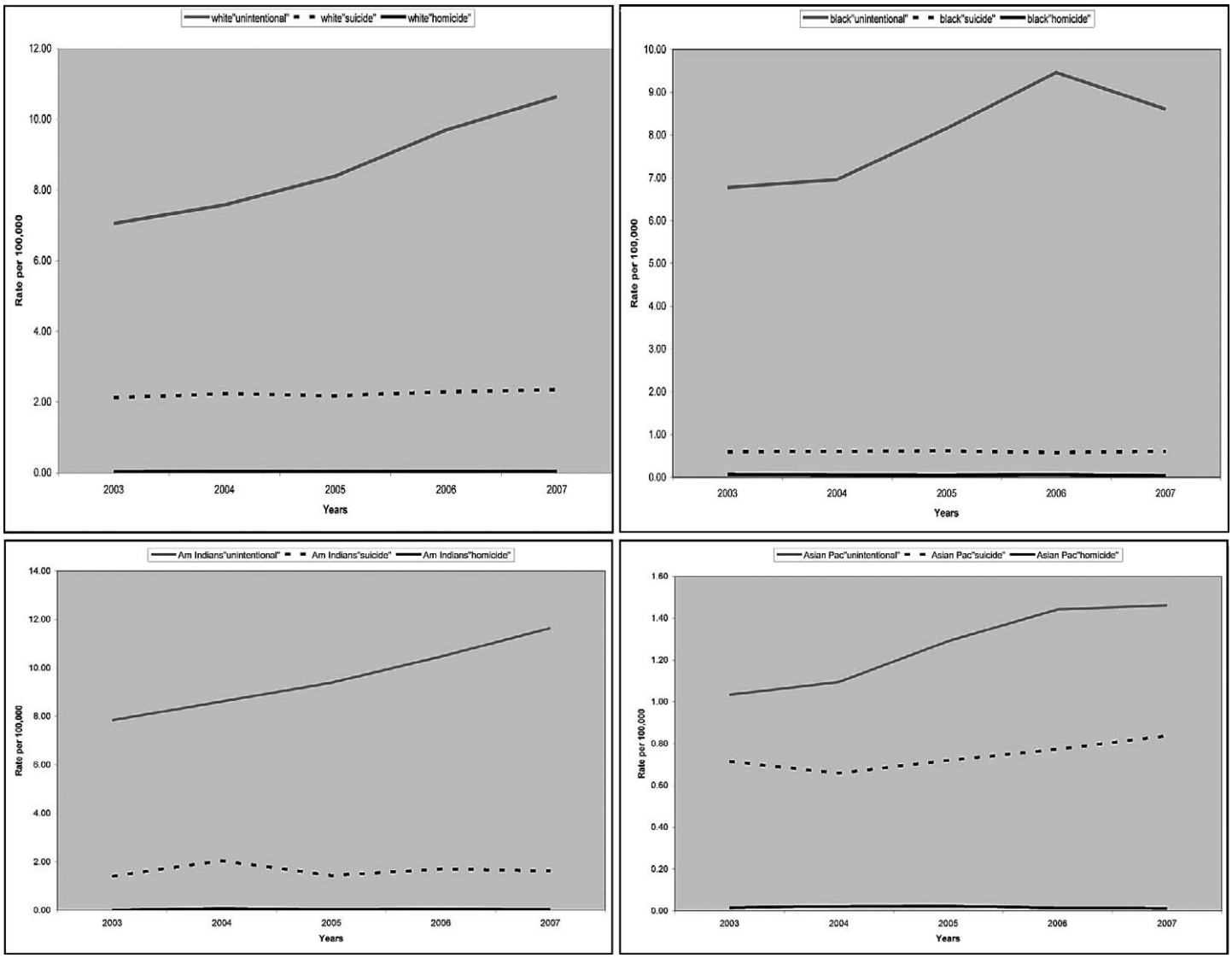

Figure 1. Trends of unintentional and intentional poisoning mortalities by racial group per 100,000 persons, United States 2003–2007.

(p=0.009 time-related trend) (Table 2). Among racial subgroups, the rate increased significantly only among whites (p=0.032 time-related trend) (Figure 1).

Among all intentional poisoning mortalities, 196 (42.33%; rate=0.05) homicidal deaths were reported among aged 0–19 years, 273 (58.96%; rate=0.04) were males and 335 (72.4%; rate= 0.03) were whites (Table 1). The rate of homicidal poisoning mortality remained the same from 2003 to 2007. The trends of homicidal poisoning rates among both sexes are shown in Table 2, and percentage changes among racial groups by sex are shown in Tables 3.

DISCUSSION

Our findings confirmed earlier reports that poisoning mortality rates increased significantly between 2003 and 2007.[14] For unintentional poisoning deaths, this was particularly noticed for both males and females, and for suicide poisonings, this was noticed for females only. There was an increasing trend among all racial groups for unintentional poisoning deaths, but for suicide poisonings the increasing trend was noticed only among whites.

Unintentional Poisoning

The primary cause of unintentional poisoning deaths in the U.S is drug overdose, more specifically, prescription and illegal drugs.[14] Several factors may be related to these findings and have been discussed in the literature. The key explanation, however, appears to be the excessive prescription of opioids analgesics, as well as the increased availability of these drugs.[3] Prescription patterns and rates may vary across geographic regions.[3] It had been suggested that medical doctors in rural areas, who are mostly primary-care physicians, may lack the experience and training in managing patients with long-term opioid use compared to specialists well trained in pain

Table 3. Percent change in unintentional and intentional poisoning mortality of males and females by cause, race, and age (United States, 2003–2007)[a].

Cause	Race	Age (years)			
		0–19	20–39	40–59	60–79+
Males					
Unintentional poisoning	White	53.66	52.71*	48.53*	62.75*
	Black	74.07	16.05	38.77	55.46*
	Am Indian/Alaska Native	–	56.25	41.94	–
	Asian/Pac Islander	–	44.68*	71.05*	–
Suicide due to poisoning	White	21.67	−7.20	18.25*	26.54*
	Black	–	20.45	41.86*	–
	Am Indian/Alaska Native	–	10.00	–	–
	Asian/Pac Islander	–	31.25	15.00	–
Homicide due to poisoning	White	−23.08	−16.67	–	–
	Black	–	–	–	–
	Am Indian/Alaska Native	–	–	–	–
	Asian/Pac Islander	–	–	–	–
Females					
Unintentional poisoning	White	44.14*	54.48*	73.13*	62.98*
	Black	−12.90	19.48*	50.21*	120.00*
	Am Indian/Alaska Native	125.00	45.95	104.76*	85.71
	Asian/Pac Islander	0.00	76.47	146.67	−30.00
Suicide due to poisoning	White	−2.27	3.83	31.45*	31.23*
	Black	33.33	−25.00	−9.52	0.00
	Am Indian/Alaska Native	−100.00	−40.00	57.14	66.67
	Asian/Pac Islander	200.00	10.71	47.37	233.33
Homicide due to poisoning	White	70.00	100.00	50.00	0.00
	Black	0.00	−100.00	0.00	0.00
	Am Indian/Alaska Native	–	–	–	–
	Asian/Pac Islander	−50.00	–	–	–

[a] Percent change in mortalities = (the death in the ending year – the death in the beginning year)/ (the death in the beginning year) X 100.
For cells with no data, percent change in death was not shown because deaths based on ≤9.
* $p<0.05$ time-related trend based on natural log.

management.[3,15] Further, the lack of uniform prescription monitoring plans in every state, as well as the increased pressure on emergency physicians to see a increasingly larger number of patients, appear to further exacerbate this issue. It is also well recognized that some patients seek prescriptions from multiple physicians at the same time, making it very difficult to monitor the actual drug intake.[16,17]

Our study also confirmed that males had higher (about double the rate) unintentional poisoning mortality rate than females in the U.S., with the highest increase among individuals aged 41–50 years.[18–21] Similar to our findings, previous research showed that individuals aged 35 through 44 years had a significantly greater mortality rate. These mortalities mostly involved a drug without a documented prescription and having received prescriptions for controlled substances from 5 or more clinicians during the year prior to death.[17] Also, easy, cost-free availability of pain relievers, tranquilizers, stimulants, and sedatives from a friend or relative has also been found to be associated with drug abuse.[22]

Our study also showed geographic variation in terms of the poisoning mortality rates. For instance, in New-Mexico, during 1990–2005, the proportion of total unintentional poisoning mortality involving heroin, prescription opioids, cocaine and alcohol/drug increased from 89% to 98%.[23] The rate of unintentional poisoning mortality was found to have doubled in 23 states with the most pronounced increase observed in rural states including West Virginia.[24] The state of West Virginia experienced the nation's highest increase of 550% from 1999 to 2004, and the majority of these deaths were from unintentional overdoses of methadone or other opioid analgesics. [24–25] These

regional patterns and differences should be examined more closely to determine if policies and laws, enforcement level, physician practices, drug trafficking routes, or other factors contribute to these variations across states.

Intentional Poisoning

In our study, the suicidal poisoning mortality rate increased from 2003 to 2007. Over the past years self-harm poisoning increased in the U.S. with an annual 1.8% increase in suicide mortality during 1999–2005.[26–28] The highest proportion of suicidal deaths were reported among those aged 40–59 years. Previous research showed that among various methods used for suicide, younger people were more likely to use poisoning, followed by firearms and suffocation.[29] Even though all suicide deaths were significantly greater among males than females, there was a significant increase in the trend among females for suicidal poisoning. Similarly to unintentional poisoning mortality, whites and American Indian/Alaska Natives had the highest suicidal rates per 100,000 population in 2007. Moreover, it was estimated that the risk of dying from suicide is more than double for the white than the black population.[30] Several factors, including history of mental health problems, alienation from family and community, having a friend who attempted suicide, weekly consumption of hard liquor, a family history of a suicide or attempt, poor self-perception of health, a history of physical abuse, and sexual abuse, were reported to be associated with suicide attempts among American Indians.[31]

Future Directions

Recognizing the growing and devastating impact of unintentional drug overdose, CDC has recommended some methods to prevent unintentional poisoning mortality. To lessen the harm associated with drug abuse, there must be strict measures in place for improving physician awareness, supporting treatment for drug dependence, appropriate prescribing practices of medications by physicians, and identifying patients through prescription-monitoring programs who are getting multiple prescriptions.[14] Further, clinicians need strategies to better adhere to chronic pain management guidelines, and counsel their patients about the risk of opioid drug overdose.[32]

To reduce the suicidal poisoning rate, the U.S. Department of Health and Human Services proposed a more targeted approach that should consider risk factors most important and appropriate for selected populations at risk.[26] Since the majority of suicides occur due to drug and alcohol overdose, limiting access to these substances, especially availability of over-the-counter drugs such as acetaminophen, antidepressants, and benzodiazepines to those under psychological or emotional stress, could be helpful measures.[6] Further, reduction in the package size of acetaminophen in Europe has shown promise in lowering the number of incidents of suicidal overdose, liver toxicity, and mortality from acetaminophen ingestions, which could be a useful alternative in reducing suicidal poisoning in the U.S. [33,34]

Although the homicidal poisoning mortality rate remains low with a stable trend from 2003 to 2007 as reported in our study, continuous surveillance of these mortality cases among high risk groups is warranted to develop targeted interventions.

LIMITATIONS

The diagnoses provided on the death certificate may be erroneous or incomplete, leading to misclassification of condition under study.[35] Lack of availability of detailed data from death certificates is influenced by varying methods of completion of death certificates. For example, details are lacking on socioeconomic factors, exposure data, individual behaviors, cultural differences, and risk factors that are extremely important for the development of effective interventions. We did not include non-fatal injuries in our analysis, which may be useful in comparative analyses between fatal and non-fatal unintentional and intentional poisoning. Finally, the small number of cases for certain population categories by age, race and state should be interpreted with caution. Despite these limitations, our study provides valuable data on current trends of unintentional and intentional poisoning mortality in the U.S. that can be used to devise interventions for high-risk groups.

CONCLUSION

In the U.S., during 2003–2007, the overall unintentional poisoning and suicidal poisoning mortality rates increased, while homicidal poisoning rates remained stable. Certain population groups such as males, individuals aged 40–59 and American Indians with substantially higher unintentional poisoning mortality rates appeared particularly vulnerable. Moreover, increase in unintentional and suicidal poisoning rates were also noted among women. Prevention efforts for poisoning mortalities and especially unintentional poisoning should be undertaken and strengthened, and close surveillance for these death data should continue to follow future trends. Targeted interventions for men and women are warranted. Overall, these findings underscore the urgency of addressing the differences in poisoning mortality more proactively and to better determine prevention strategies so that these deaths can be avoided as this epidemic continues to grow in the U.S.

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Temperature and Violent Crime in Dallas, Texas: Relationships and Implications of Climate Change

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Introduction: To investigate relationships between ambient temperatures and violent crimes to determine whether those relationships are consistent across different crime categories and whether they are best described as increasing linear functions, or as curvilinear functions that decrease beyond some temperature threshold. A secondary objective was to consider the implications of the observed relationships for injuries and deaths from violent crimes in the context of a warming climate. To address these questions, we examined the relationship between daily ambient temperatures and daily incidents of violent crime in Dallas, Texas from 1993–1999.

Methods: We analyzed the relationships between daily fluctuations in ambient temperature, other meteorological and temporal variables, and rates of daily violent crime using time series piece-wise regression and plots of daily data. Violent crimes, including aggravated assault, homicide, and sexual assault, were analyzed.

Results: We found that daily mean ambient temperature is related in a curvilinear fashion to daily rates of violent crime with a positive and increasing relationship between temperature and aggravated crime that moderates beyond temperatures of 80°F and then turns negative beyond 90°F.

Conclusion: While some have characterized the relationship between temperature and violent crime as a continually increasing linear function, leaving open the possibility that aggravated crime will increase in a warmer climate, we conclude that the relationship in Dallas is not linear, but moderates and turns negative at high ambient temperatures. We posit that higher temperatures may encourage people to seek shelter in cooler indoor spaces, and that street crime and other crimes of opportunity are subsequently decreased. This finding suggests that the higher ambient temperatures expected with climate change may result in marginal shifts in violent crime in the short term, but are not likely to be accompanied by markedly higher rates of violent crime and associated increased incidence of injury and death. Additional studies are indicated, across cities at varying latitudes that experience a range of daily ambient temperatures. [West J Emerg Med. 2012;13(3):239–246.]

INTRODUCTION

Violent crime is a leading cause of morbidity and mortality in the United States and among the leading causes of death in young people. In 2009, violent crime incidence was 429.4 per 100,000 population (1.32 million total).[1] Aggravated assaults comprise 61.2% of violent crimes reported to law enforcement; the remainder includes robbery (31.0%), forcible rape (6.7%), and murder (1.2%).[1] Approximately 21% of annual aggravated assaults result in physical injury requiring emergency treatment. Of injured victims, 49% are under the age of 19 and 75% are under the age of 35. In 2008, 542,280 violent crime victims required medical care, 56% of which was provided at a

doctor's office, hospital, emergency department or urgent care clinic.[2] In 1996, the Justice Department estimated that annual losses from homicides alone totaled $700 million in medical costs, $32.7 billion in other tangible costs, and $60 billion in quality of life losses (equivalent to $1.1 billion, $51.2 billion, and $94 billion respectively in 2011 inflation-adjusted dollars).[3]

The complex origins of violent crime have been widely documented. According to the Federal Bureau of Investigation (FBI), weather is one of many factors affecting its incidence. Others include:

- individual characteristics, e.g., psychological and physiological status and behavioral indicators
- population density, degree of urbanization, and age distribution
- population stability with respect to mobility and transience
- socio-economic conditions
- family cohesiveness and divorce rates
- effectiveness of law enforcement agencies
- citizens' attitudes toward crime and crime reporting.[4]

Among the factors that affect the incidence of violent crime, weather is of particular interest due to the observed association between crime and temperature. With climate change, regional mean temperatures in the U.S. are expected to rise between 3.6 and 7.2°F by 2100.[5] Such increases may have implications for the incidence of violent crime and associated morbidity and mortality. The likely impacts depend on the nature of the observed relationship between temperature and violent crime and how that might change in a warming climate. Laboratory studies provide evidence of a significant relationship between extreme heat, irritability, and aggressiveness.[6] The effects of weather on aggression have been analyzed using the incidence of violent crime as a proxy. Such studies report important temporal correlations with violence. For instance, aggravated assault is more common on weekends and holidays and varies with years, months, seasons, and day length.[7–9] Significant associations between violent crime and weather, especially temperature, are also reported.[6–17]

The nature of the relationship between temperature and violent crime is contested. Anderson[6] describes potential functional forms, including a linear function or an inverted-U shaped curvilinear function. The functional form of the relationship is important as it may convey the likely impacts of a warming climate on violent crime. A positive linear relationship suggests increased violence with increasing temperatures, while an inverted U-shaped function suggests moderation or a decrease in violent crime at high temperatures.

Two theories provide conceptual underpinnings for the linear hypothesis. A General Affective Aggression Model hypothesizes that a person's affect, arousal, and cognitive state are mediated by a number of factors and that the interaction between temperature and violence is a positive linear function.[18] The Routine Activity Theory also supports a linear relationship, hypothesizing that crime occurs when there is a motivated offender, a suitable target, and no one to intervene.[9,19] Routine Activity Theory suggests that in warm weather, people congregate in public places with increased social interaction leading to increased violence.

The linear relationship is supported by studies of daily assaults in Chicago and Houston, in two analyses of nationwide crime databases, in an analysis of non-violent crime in Des Moines and Indianapolis, in a daily time series study of assaults in Charlotte, and in an analysis of aggravated crimes in Cleveland.[6,10,13–14,16,20] Harries and Stadler[15] also observe a linear relationship for low income populations in Dallas.

Contrary to the linear hypothesis, other studies support a curvilinear, inverted-U shaped relationship. The Negative Affect Escape Model posits that a negative affect and associated violence increase as temperatures increase to an inflection point beyond which violence decreases as a person's "flight" motivation (i.e., aversion to heat) overrides aggressive motives.[12] Similarly, the Social Escape or Avoidance Theory hypothesizes a curvilinear relationship in which people will try to avoid conditions that are consistent with an aggressive affect.[7] This theory suggests that on very hot days, people will interact less, decreasing violent crime.

The curvilinear hypothesis was postulated by Baron[11] and later confirmed by Baron and Bell.[12] From human experiments, they found that high temperatures (above 80°F) inhibit aggression. More recent work by Bell[21] found that some of the studies that reject the curvilinear function have no or inadequate data from periods in which temperatures are high enough to suppress aggression. Cohn and Rotton's[7–9] analyses of assaults and domestic violence in Minneapolis and assaults in Dallas also supported the inverted-U relationship.

The nature of the relationship is not only of intrinsic importance, but is central to the question of how violent crime-related morbidity and mortality might change in a warming climate. If there is a positive linear relationship, substantial increases may result. Anderson[22] finds a causal relationship characterized as an increasing linear function and predicts an increase of approximately 12,000 aggravated assaults and murders in the U.S. annually (a 1.3% increase based on 2001 statistics) for every 1°F increase in mean temperature.[23] This could impact healthcare use, direct healthcare costs, and other indirect costs associated with disability, lost productivity, and decrements to quality of life. Insight into the relationship might provide opportunities for improved prediction, which could support prevention and preparedness activities. The objective of this investigation was to clarify the nature of the relationship for violent crime in Dallas and consider implications for climate change.

METHODS

To examine the relationship between temperature and violent crime, we collected daily crime data for aggravated assault, homicide, and rape and attempted rape in Dallas for 1993 to 1999, and daily meteorological data for the same period. We developed baseline regression models for each crime category that maximize and controlled for the explanatory capacity of non-weather, temporal factors. Once the "best-fitting" baseline model was specified, we added weather variables to estimate observed associations.

Crime Data

Daily crime data by offense and ZIP code were reported by the City of Dallas Police Department from January 15, 1993 through December 31, 1999. The study period is limited to those data made available by the Dallas Police Department. Service calls were coded according to the FBI's Uniform Crime Reporting categories.[24] Three crime categories were examined: aggravated assault, homicide, and rape or attempted rape.

Meteorological Data

Meteorological data were based on measurements from Dallas-Fort Worth International Airport, archived by the National Climatic Data Center. Meteorological measures included daily mean, minimum, and maximum temperatures, daily mean relative humidity and dewpoint, and daily precipitation. The effects of a variety of weather variables are examined, including a temperature-humidity index (THI). The THI or apparent temperature was derived from measures of temperature (T) and relative humidity (RH) when $T \geq 80°F$ and $RH \geq 40$.[25]

Statistical Considerations

Statistical methods used to analyze associations between temperature and violent crime addressed three features of the daily time series: data distribution; potential for serial correlation; and need to control for associations between crime categories and time-varying factors other than weather.[26] Models for small numbers of daily counts (such as assaults and murders) had to account for non-Gaussian errors. Although ordinary least squares (OLS) regression provides unbiased estimates, OLS underestimates standard errors for models with small counts, thereby overestimating the coefficient estimates' significance.[27–29] To address this issue, we converted daily crime counts to daily rates per 100,000 (using U.S. Census annualized population estimates for Dallas), then applied OLS regression. We found no significant first-order serial correlation in Durban-Watson tests of regression residuals.[26]

Modeling

For each crime category, a baseline regression model was fit that maximizes the explanatory capacity (based on adjusted R^2) of non-weather, time-varying factors. The time series itself controls potential confounders that are unlikely to vary substantially from day to day (e.g., population, socioeconomic status, etc.). The non-weather covariates selected for the baseline model were similar, if not identical, to variables used in other studies. To control for temporal variation in the dependent variable, we entered dummy variables for years, day of week, holidays, and first day of the month in the model, along with linear and quadratic trends, and measures of daylight and seasons (as these variables may serve as proxies to control for variation in outdoor activity and social interaction).

Once the best-fitting baseline model was specified, we introduced weather variables. Mean ambient temperature was specified as a continuous term; as a 2-day moving average; as 1, 2, and 3-day lagged effects; and by indicators for 10-degree increments to allow for non-linearity in the response surface. We evaluated a piece-wise regression of the effects of mean temperature, using two slope segments with inflection points at 80°F, 85°F, and 90°F. We also evaluated the effects of maximum temperature, RH, and THI.

RESULTS

General Crime and Weather Data

Aggravated assault is the most common violent crime in Dallas. During the study period, an average of 112 daily assault calls were logged (283,916 calls from 1993–1999), plus 0.68 daily calls for murder (1731 total), and 2.46 daily calls for rape and attempted rape (5294 total). Aggravated assaults, murders, and rapes declined significantly from 1993–1999. Daily aggravated assault rates decreased from 11.49 per 100,000 in 1993 to 8.79 in 1999. The daily murder rate per 100,000 was 0.087 in 1993 and fell by half to 0.043 in 1999. The daily rape and attempted rape rate per 100,000 was 0.26 in 1993 and decreased to 0.19 by 1999.

Annual mean temperatures rise during the study period, from 66.6°F in 1993 to 68.9°F in 1999. Overall, daily mean temperatures range from 19°F to 97°F. Annual maximum temperatures also rise during the study period, from 76.4°F to 79.4°F. Daily maximum temperatures range from 23°F to 110°F. Daily precipitation averages 0.10 inches during the study period with a range from no precipitation to as high as 3.9 inches in 1 day. Daily daylight varies from 10.21 to 14.04 hours. As expected, daylight and temperature are highly correlated ($r=0.774$).

Daily Aggravated Assaults

Aggravated assaults account for an average of 111.7 daily calls from 1993–1999. Assaults are most frequent in summer (120.0 per day) and least frequent in winter (100.4) (Table 1). Significantly more assaults occur on the weekend ($t=17.09$) and on holidays ($t=9.22$). The first-order correlation of mean temperature and daily assaults is significantly positive ($r=0.38$, $p<0.001$) (Table 2). A plot of mean temperature (divided into eight 10-degree increments from $<30°F$ to $>90°F$) and daily counts of aggravated assaults support a curvilinear hypothesis

Table 1. Mean daily counts of aggravated crime categories and mean temperatures (standard deviation) [range] by time-varying factors for Dallas, Texas, 1993–1999.

	Aggravated Assault	Murder	Rape	Mean Temp °F
1993–1999	111.7 (27.1) [35-222]	0.68 (0.91) [0–6]	2.46 (1.44) [1–11]	66.8 (16.1) [19–97]
Winter*	100.4 (24.8)	0.69 (0.90)	2.24 (1.37)	48.9 (9.9)
Spring	115.8 (26.5)	0.65 (0.88)	2.43 (1.42)	65.1 (10.8)
Summer	120.0 (26.5)	0.72 (0.96)	2.68 (1.46)	85.0 (4.7)
Fall	110.0 (26.4)	0.67 (0.91)	2.45 (1.46)	67.4 (12.0)
Weekend†	125.4 (26.6)	0.76 (0.93)	2.66 (1.50)	66.5 (16.3)
Weekday	106.2 (25.3)	0.65 (0.91)	2.37 (1.40)	66.9 (16.0)
Holiday‡	133.1 (30.5)	0.90 (1.01)	2.99 (1.94)	67.3 (17.7)
Non-holiday	110.6 (26.4)	0.67 (0.91)	2.43 (1.40)	66.8 (16.0)

* Winter is defined as December, January, and February and other seasons as similar 3 month intervals.
† Weekend includes Saturday and Sunday.
‡ Holidays include New Year's Eve and New Year's Day, Cinco de Mayo, Memorial Day weekend, Independence Day and closest weekend, Labor Day weekend, the 4-day Thanksgiving break, and Christmas Eve and Christmas Day.

(Figure 1) with an increasing relationship that moderates beyond 80°F and turns negative beyond 90°F.

The best-fitting non-weather or baseline model for the daily aggravated assault rate used 19 degrees of freedom and explains 64% of the variation in assaults, based on adjusted R^2 (Table 3). Once the baseline model was specified, we assessed the effects of weather covariates (Table 4). Mean ambient temperature had the greatest explanatory capacity, explaining an additional 6.5% of the variation in the daily aggravated assault rate. RH was not significant nor was THI, when in the presence of mean temperature.

A piecewise linear regression, with 2 slope segments, defined with a mean temperature inflection point at 90°F, estimates a positive slope segment at temperatures less than 90°F as β=0.0744 ($p<0.001$) while at 90°F and higher the slope becomes negative: β=–0.14151 ($p<0.001$). These estimates supported a curvilinear relationship consistent with the inverted-U which was also evident in the plot of temperature and aggravated assault (Figure 1). Effect estimates for inflection points at 80°F and 85°F were not significant, a finding that supports the 90°F threshold.

Table 2. Pearson First-Order Correlation Coefficients for aggravated assault rate and for homicide rate (Prob>|r|), Dallas, Texas 1993–1999.

	Aggravated Assault Rate per 100,000 (Prob>|r|)	Homicide Rate per 100,000 (Prob>|r|)
Daily mean temp	0.358 (<0.0001)	0.046 (0.020)
Daily max temp	0.361 (<0.0001)	0.051 (0.011)
Daylight hours	0.319 (<0.0001)	0.024 (0.227)
Holiday	0.173 (<0.0001)	0.053 (0.008)
Weekend	0.311 (<0.0001)	0.055 (0.005)

Daily Homicides

Daily homicides average less than 1 per day and vary by season, with a maximum of 0.72 in summer and a minimum of 0.65 in spring. Homicide counts also vary across years, from 0.92 in 1993 to 0.50 in 1999. Murders occur relatively more often on weekends (t=2.73) and holidays (t=2.70). The first-order correlation between temperature and homicide was small (r=0.05) and not statistically significant. The plot of temperature and homicides did suggest a non-linear function. But, unlike the robust explanatory capacity of the baseline model for aggravated assaults, the baseline model for homicides explained only 6.7% of the variation in the daily homicide rate, with day of week and day length exhibiting the greatest explanatory capacity. When added to the baseline model, mean temperature explained only 0.1% of the variation in the dependent variable, and though the parameter estimate

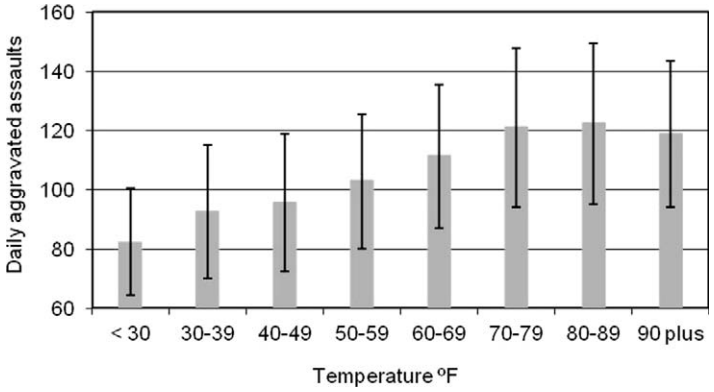

Figure 1. Mean daily aggravated assaults (+/- 1 standard deviation) by mean temperature, Dallas Texas, 1993–1999.

Table 3. Ordinary least squares regression estimates for the baseline model of temporal (non-weather) factors on the daily aggravated assault rate per 100,000 in Dallas, Texas, 1993–1999. Adjusted R^2=0.644.

Variable	Parameter Estimate	Standard Error	t-value	Pr>|t|
Intercept	2.70	0.71	3.80	0.0001
Holiday	0.979	0.140	6.97	<0.0001
First of month	0.633	0.169	3.75	0.0002
Day length	0.863	0.051	16.83	<0.0001
Tuesday	−3.228	0.112	−28.79	<0.0001
Wednesday	−3.678	0.113	−32.68	<0.0001
Thursday	−3.789	0.112	−33.68	<0.0001
Friday	−3.452	0.112	−30.75	<0.0001
Saturday	−2.407	0.112	−21.47	<0.0001
Sunday	0.180	0.112	1.61	0.1079
Fall	1.007	0.144	7.01	<0.0001
Winter	0.881	0.178	4.94	<0.0001
Spring	0.317	0.094	3.38	0.0007
Year 1994	−0.861	0.113	−7.63	<0.0001
Year 1995	−0.832	0.113	−7.38	<0.0001
Year 1996	−1.249	0.113	−11.07	<0.0001
Year 1997	−2.001	0.113	−17.73	<0.0001
Year 1998	−2.250	0.113	−19.94	<0.0001
Year 1999	−2..650	0.113	−23.49	<0.0001

was statistically significant (t=3.03), the effect was quite small: a 0.00056 increase in the homicide rate for every 1°F increase in mean temperature. Piece-wise regression with mean temperature and an inflection point at 90°F yielded a result similar to that for aggravated assaults. The slope estimate through 89°F was positive and significant (β=0.00056). At 90°F and higher, the coefficient estimate was negative and significant (β=−0.00769).

Daily Rapes and Attempted Rapes

In Dallas, rape and attempted rape correlate with both temporal factors and temperature. The daily rate per 100,000 decreased from 0.26 in 1993 to 0.18 in 1999. Rape also varies by day of the week, occurs more often on weekends (t=4.26), and is significantly higher on holidays (t=3.92). The first-order correlation between temperature and rape was 0.12, which while significant ($p<0.01$), was several orders of magnitude smaller than that observed for temperature and assaults. The plot of temperature and rape was similar to that for temperature and assaults. Yet, the non-weather baseline model accounted for only 10% of the variation in the daily sexual assault rate. When added to the baseline model, mean temperature was significant and positive. A 1°F increase in mean temperature accounted for an increase of 0.0013 in the mean daily rate of sexual assault (Table 4). As before, piece-wise regression suggested a decrease of the response function beyond 90°F.

Table 4. Coefficient estimates for weather-related variables regressed on crime categories characterized as daily rates per 100,000 population in Dallas, Texas, 1993–1999.

Variable	Assaults†	Murder†	Rape†
Mean temp‡	0.073*	0.00059*	0.0013*
Mean temp in winter‡	0.072*	0.00055	0.00095
Mean temp in spring‡	0.102*	0.0012*	0.0014
Mean temp in summer‡	0.069*	−0.00021	−0.0003
Mean temp in fall†	0.084*	0.00097	0.002*
RH‡	−0.0047	−0.00014	−0.00009
RH§	−0.0050	−0.00014	−0.00009
THI‡	0.0155*	0.00004	−0.00083
THI§	−0.0077	−0.00089	−0.0014

† Mean daily rates per 100,000 are 10.03 for aggravated assault, 0.06 for homicide, and 0.22 for rape and attempted rape.
‡ Variable entered singly into baseline model.
§ Variable entered into baseline model along with mean temperature.
* $p\leq0.01$
RH, relative humidity; *THI*, temperature-humidity index

Summary

Temporal trends, including weather, contributed to the variation in violent crimes with the magnitudes of the observed associations varying by crime category. The relationship with temperature was strongest for aggravated assault and was consistent with an inverted-U shaped curve with an inflection point at 90°F. We observed similar relationships for sexual assaults and homicides, but the regression models for those variables have limited explanatory capacity.

DISCUSSION

In Dallas from 1993–1999, increases in daily temperature in the low to moderate range were associated with increased aggravated assault, homicide, and rape. A temperature threshold appeared to exist (at approximately 90°F) where the positive relationship between mean temperature and violent crimes became negative. This finding was supported both by data plots and by piece-wise regression and was consistent with the curvilinear hypothesis. While we were unable to draw conclusions about the functional form in other locales, the literature suggests key clues that allowed us to speculate. First, the curvilinear hypothesis was supported in studies that adequately control for temporal factors, while the linear hypothesis was favored in studies that do not.[7–10,14–16,20–21] Second, studies in northern latitudes found linear temperature-violence relationships, apparently owing to the limited upward range of daily temperatures.[17,30] Given these findings, it is

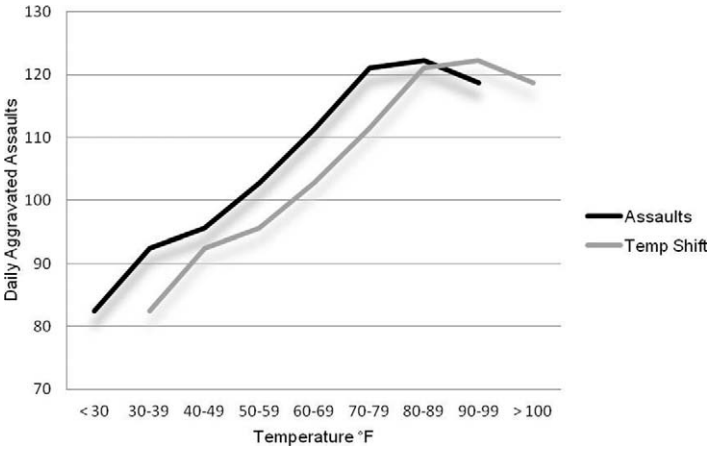

Figure 2. Interaction of mean daily temperature and daily counts of aggravated assaults: Potential shift of the response function with increasing temperatures.

reasonable to conclude that the true relationship is likely non-linear, but that daily temperatures in northern locales rarely reach and sustain the threshold at which the incidence of violent crime would decline.

An important question is whether the threshold for a moderating or negative effect is relatively fixed across locales or more locally determined and whether the range of thresholds is bounded by physiologic or behavioral acclimatization. If the threshold is fixed (suggesting a largely physiological determination), then climate change may initially result in a net increase in crime incidence as temperatures climb the response curve, but then ultimately a net decrease as temperatures pass the threshold. Such a point is likely relatively far off; there would have to be substantial temperature increases for the total area under the curve to decrease. Alternatively, if the threshold is not fixed but determined in part by acclimatization, there may be little observed effect, as the curve will shift to the right as the temperature climbs with the area under the curve remaining unchanged (Figure 2). We concluded that the potential exists for different functional forms and different thresholds across different locales.

There is clearly a statistically significant relationship between temperature and violent crime. Over the next several decades, during which any physiologic or behavioral adaptations will be constrained, climate change may result in increased violent crime. If this is the case, there may be viable public health and public safety adaptations that could reduce violent crime and the associated direct and indirect costs to human health and welfare. Understanding the nature of the temperature-crime relationship may allow for improved prevention and preparedness. Public safety measures may include increasing police presence, instructing first responders to expect upturns in violent crime and associated medical emergencies, and advising local hospitals and healthcare providers to expect spikes in admissions. Neighborhood-level analyses of violent crime using Geographic Information Systems can visualize spatial variations in violence within a community to target interventions and can be overlaid with thermal imaging to assess correlations with neighborhood microclimates. Other simple but effective adaptations might include neighborhood cooling centers, extended hours at public swimming pools and opening fire hydrants to create a community "oasis." Finally, media outlets can be used to communicate the risks associated with extreme heat and telephone hotlines can be set up to provide answers to frequently asked questions and to direct needed resources.[31]

LIMITATIONS

There were threats to both internal and external validity in our analyses. The internal threats related to limitations in the exposure data and the difficulty in interpreting individual estimates in multivariate models. First, airport temperatures were only approximate measures of individual exposures. Individuals who engage in violence may not be exposed to the ambient air. What is more, a daily measure for mean temperature aggregates across a range of temperatures that may be as wide as 30–40°F. Such aggregate measures may mask important aspects of the statistical relationship.[21] Rotton and Cohn[8] examined shorter time periods (every 3 hours) and found non-linear effect estimates in Dallas. Bushman et al[32] re-examined Minneapolis data using time of day of the report and the temperature at that time. Their findings supported a positive linear relationship. Certainly, when available, more frequent data are preferred. Second, interpreting parameter estimates for individual variables is tricky. A complex mix of factors contribute to aggressive behaviors.[4] Accurate interpretation of effect estimates from multivariate models is difficult when explanatory variables are highly correlated, measurement error is present, and important covariates are not measured or controlled.

External limitations related to generalizing from one locale. Caution should be used in extending results to other cities, particularly those in other latitudes or those with markedly different demographic profiles. This caution extends to interpreting the implications in a changing climate. Ultimately, we need to analyze data from cities at different latitudes under different climate regimes.

CONCLUSION

While the incidence of violent crime depends on many factors, weather, particularly temperature, appears to significantly influence aggravated crime. In Dallas, this relationship is nonlinear and most consistent with an inverted-U shaped curve with a threshold at approximately 90°F. These findings have implications for the incidence of morbidity and mortality associated with violent crime as the climate warms, depending on whether the curvilinear hypothesis prevails in other locales, whether the temperature

threshold is fixed, and whether the curve will shift as people acclimate. Additional research across various locales and time periods is likely to allow us to draw more confident conclusions. Our findings suggest that investigations should include multi-city studies that distinguish locales by their climate regimes and incorporate robust controls for the effects of temporal variables, of other key demographic and socioeconomic factors, of acclimatization, and of potential adaptation. Regardless of the implications of a warming climate, the associations between temperature and violent crime offer opportunities for enhanced prevention and preparedness.

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Bystander Motivation in Bullying Incidents: To Intervene or Not to Intervene?

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Introduction: This research sought to extend knowledge about bystanders in bullying situations with a focus on the motivations that lead them to different responses. The 2 primary goals of this study were to investigate the reasons for children's decisions to help or not to help a victim when witnessing bullying, and to generate a grounded theory (or conceptual framework) of bystander motivation in bullying situations.

Methods: Thirty students ranging in age from 9 to 15 years ($M = 11.9$; $SD = 1.7$) from an elementary and middle school in the southeastern United States participated in this study. Open- ended, semi-structured interviews were used, and sessions ranged from 30 to 45 minutes. We conducted qualitative methodology and analyses to gain an in-depth understanding of children's perspectives and concerns when witnessing bullying.

Results: A key finding was a *conceptual framework of bystander motivation to intervene in bullying situations* suggesting that deciding whether to help or not help the victim in a bullying situation depends on how bystanders define and evaluate the situation, the social context, and their own agency. Qualitative analysis revealed 5 themes related to bystander motives and included: interpretation of harm in the bullying situation, emotional reactions, social evaluating, moral evaluating, and intervention self-efficacy.

Conclusion: Given the themes that emerged surrounding bystanders' motives to intervene or abstain from intervening, respondents reported 3 key elements that need to be confirmed in future research and that may have implications for future work on bullying prevention. These included: first, the potential importance of clear communication to children that adults expect bystanders to intervene when witnessing bullying; second, the potential of direct education about how bystanders can intervene to increase children's self-efficacy as defenders of those who are victims of bullying; and third, the assumption that it may be effective to encourage children's belief that bullying is morally wrong. [West J Emerg Med. 2012;13(3):247–252.]

INTRODUCTION

Bullying involves repetitive aggression or harassment directed at victims who have less power than bullies.[1] Bullying also includes bystanders who observe bullying and can assume a range of roles that include "reinforcers" (provide support to bullies), "outsiders" (remain uninvolved with bullying), and "defenders" (help or support the victim).[2] The behaviors of bystanders can have important effects on their peers. Bullying

has been found to be more frequent in schools where bystanders displayed behaviors that reinforce bullying, rather than engaging in behaviors that defend the victims, and observational studies have shown that bystanders more often act in ways that do not support victims.[3–5]

The motivational bases for bystanders' helping a victim of bullying have not attracted much research. Students with high empathy have been found to be more likely to take the defender role.[6,7] Moral disengagement, defined as a set of socio-cognitive processes, such as moral justification of harassments/aggression, diffusion of responsibility, blaming the victim and dehumanization, through which people can disengage from humane acts and instead commit inhumane actions against other people, has been negatively associated with defending or helping the victim.[8–10]

Bandura's socio-cognitive theory[11] of agency argues that self-efficacy for a particular activity or action (ie, their beliefs in their capacity to act successfully) is related to their motivation and behavior. In accordance with this theory, researchers have found that bystanders' beliefs in their social self-efficacy (ie self-efficacy for defending and perceived collective efficacy to stop peer aggression) were positively associated with defending behavior and negatively associated with passive behavior from bystanders.[12–13] In addition, peer relations also appeared to matter. Bystanders were less likely to act as defenders when they had closer relationships with bullies and were more likely to act as defenders if they had closer relationships with victims.[14]While researchers have found that bystanders' behavior might be influenced by different motivations, research in this area is rare and has relied on quantitative methods.

Rationale for Study

Although prior research has added to the current knowledge of bystander behaviors and reactions to bullying, the quantitative methods used in these studies do "...not give children an opportunity to discuss their own understanding of bullying in their own voices".[15] A qualitative investigation of children's perspectives about bullying designed to have students discussing their experiences, thoughts and motives in their own words may enable discovery and development of relevant motivational concepts and hypotheses about their inter-relationships.[16,17] Therefore, the aims of this study were to use qualitative methodology to investigate the motives reported by children for helping or not helping a victim when witnessing bullying and to generate a conceptual framework of bystander motivation in bullying situations.

METHODS

Participants

Participants were selected from 2 schools serving students from fourth through eighth grade in a southeastern urban school district in the United States (U.S.). The racial breakdown of the fourth and fifth grade school students was 39.9% African American, 54.8% Caucasian, and 5.2% Other. The racial composition of the middle school was 50.4% African American, 44.2% Caucasian, 3.4% Multiracial, and 2% Other. We identified 30 participants through school personnel recommendation, based on convenience and targeted sampling methods.[17] School personnel were asked to identify students who represented various roles in bullying incidents, including bullies, victims, and/or bystanders. Parents were sent a consent form to sign if they agreed to have their child volunteer for the study. Students ranged in age from 9 to 15 years ($M = 11.9$; $SD = 1.7$). The participant sample was primarily Caucasian (73.3%), with 23.3% African American, and 3.3% identified as Other. The gender breakdown of students was 56.7% male and 43.3% female. Thirty percent of the participants were enrolled in the eighth grade, with 10% in seventh grade, 27% in sixth grade, 20% in fifth grade, and 13% in fourth grade.

Procedures and Instrumentation

All students signed assent forms prior to participation. The study procedures and instrumentation were approved by the university's institutional review board and the district's research office. Open-ended, semi-structured interviews were used and sessions ranged from 30 to 45 minutes. Interview questions addressed broad categories related to bullying with opportunities to query for additional information. All interviews were recorded, transcribed verbatim, and then imported into the ATLAS.ti v4.1software program (ATLAS.ti Scientific Software Development GmbH, Berlin Germany) for the purpose of data analysis.

Data Analysis

We used a deductive-inductive process to develop and refine the original coding scheme, establish inter-rater reliability, and analyze the data, consistent with established qualitative analysis procedures and grounded theory methods.[16,18–20] We conducted further data analysis of the original code "bystander" in this study to develop a more in-depth coding scheme to examine bystander motivations. First, 2 research team members used a deductive coding process by analyzing data through the lens of existing literature. Second, inductive codes were developed in an attempt to represent codes from the students' perspectives that may not be represented in the literature. Third, the entire research team provided feedback on the codes and definitions. Fourth, based on the resulting coding scheme, all data were independently coded by 2 of the authors and disagreements were discussed until 100% consensus was reached. Finally, we employed a grounded theory approach to generate a conceptual framework to best represent the data.[16]

RESULTS

The qualitative analysis of the interview data generated a *conceptual framework of bystander motivation to intervene in bullying situations*. According to this framework, deciding whether to help or not help the victim in a bullying situation

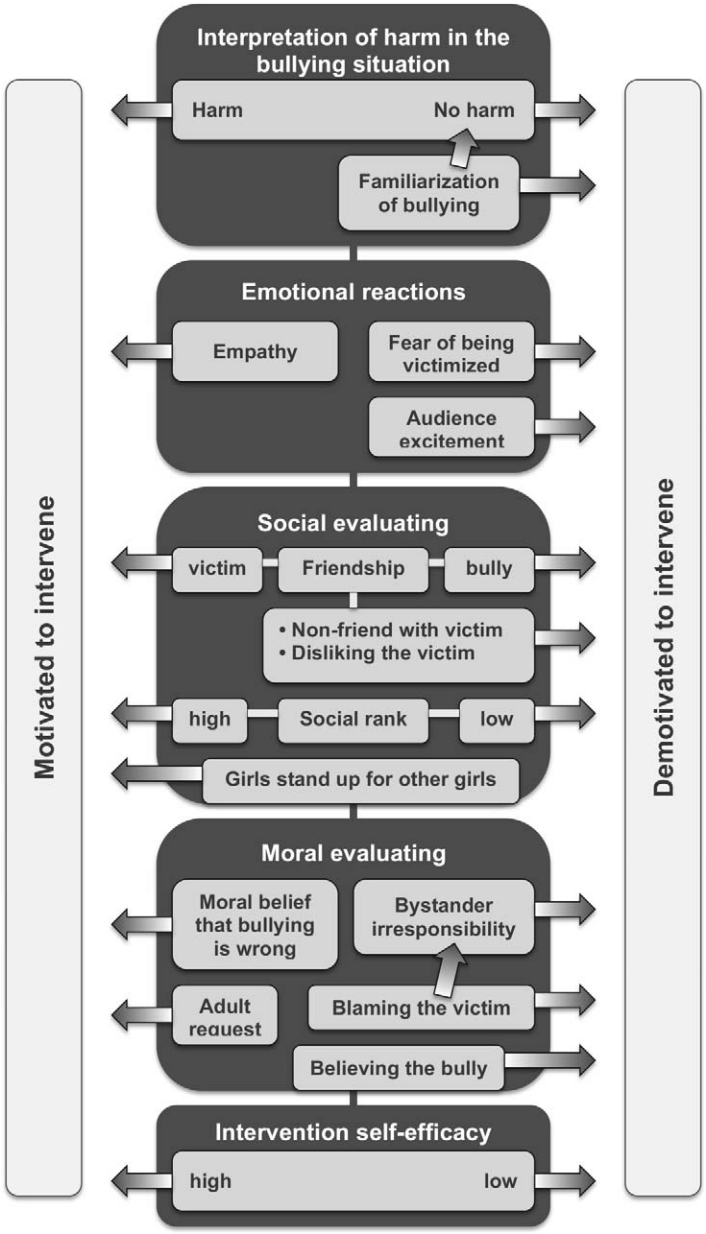

Figure 1. Conceptual framework of bystander motivation to intervene in bullying situations.

depends on how bystanders define and evaluate the situation, the social context, and their own agency (Figure 1). A set of motive domains emerged that may influence student motivation to intervene or not intervene in bullying situations: (a) interpretation of harm in the bullying situation, (b) emotional reactions, (c) social evaluating, (d) moral evaluating, and (e) intervention self-efficacy.

Interpretation of Harm in the Bullying Situation

The degree to which bystanders perceived the bullying situation as harmful influenced their motivation to intervene. Situations in which bullying was seen as causing significant harm to the victim required intervention. For example, one student stated, "I mean, like, if it's out of hand, somebody might go and tell the teacher, but if it's something like really nothing, then nobody will tell on nobody. Nobody will be a snitch over something little, but if it's something big, you will tell." In parallel, some students described times when bystanders chose not to intervene because the bullying was believed to cause limited harm and did not require action. One student explained, "So, if it's not something that's dangerous or just really mean, probably I would just leave it alone."

A sub-construct of interpretation of harm in bullying situations was *habituation to bullying,* which is defined as a bystander's failure to intervene because bullying takes place often and students view it as a routine phenomenon. One student stated "The kid just did something embarrassing and the whole class just laughs at him. It's nothing big because you know it's not like they're being spiteful or anything, they're just kind of laughing. That could be something that everyone just thinks is normal . . . because everyone does it."

Emotional Reactions

According to some students, bullying could evoke different *emotional reactions* from bystanders, and these *emotional reactions* (empathy, fear of being victimized, audience excitement) appeared to influence their decision-making process of intervening or non-intervening. For example, a bystander experiencing *empathy* may decide to intervene as a result of feeling badly for the victim. One student expressed this sentiment by saying, "My friends and I usually just stand up for that person even if we don't like them very much . . . because I feel really bad for them."

Fear of being victimized was defined as not intervening due to fear of being a future target of the bully. One student stated that his peers ". . .usually don't tell anybody because they think the other person might beat them up or something or start picking on them." *Audience excitement* referred to the joy, excitement, and desire to watch the bullying and included times when bystanders did not intervene and encouraged the bullying due to an interest in watching the bullying incident. One student described an example, "Two boys did get into a severe fight, and . . . one of them got a black eye, and one of them just got beat down, and they pretty much beat each other up pretty well, and there was this circle around them that was actually saying, 'Fight! Fight! Fight! Fight!"

Social Evaluating

Social evaluating was coded when bystanders considered and evaluated social relationships and social positions (friendship, social rank, and gender differences) when witnessing bullying and before deciding whether or not to help. *Friendship* referred to the impact of the relationship between the bystander and the victim or bully on the bystander's decision about intervening. Whereas a close relationship with the victim was associated as a motive to help, a close relationship with the bully and no relationship with the victim

were discussed as motives for not helping the victim. In addition, *disliking the victim* was identified as a reason not to intervene. One student said, "It kinda depends on the person [the victim]. Like, if they don't like the person, they might laugh. But if they're friends with them, then they try to, like, help them out or whatever." Another student stated, "Most kids either will if their friend is bullying someone they'll either join in or not tell anybody, like pretend it's not there." When asked what he would do when he saw someone being bullied, 1 student said, "If it's someone I don't know, I mean, I just sort of keep to myself."

Considering and evaluating *social rank* described times when the bystander's motivation to help was influenced by a bully's position in the social hierarchy among peers. If the bully was a person whom others respected, then bystanders might be less motivated to intervene. A participant stated, "If someone who people respect and feel like they're higher than them or something is picking on someone, everyone's going to go on. But if it's someone who people think are lower than themselves [then they] are going to be like, 'quit you don't really have room to talk.' I mean, and that's bad because nobody, none of these people who are higher, better, or whatever, should be bullying people who are lower or whatever." However, if a bystander considered the bully as a person with a lower social rank, the social hierarchy would not inhibit intervention.

Some of the girls argued that *girls stand up for other girls* in bystander behavior. For example, certain girls chose to stand up for other girls when the bullying was perpetrated by a boy. One female student shared, "The girls are nice and they tell the boys to stop . . . like some of them are really strong and fast so they'll start chasing them and then I just start laughing my head off because the boys are running away from the girls." Another student discussed how girls were more likely to come to her aid when she was being victimized, while boys more frequently joined in on the bullying, "A lot of the girls will come around and help me, but most of the boys will just make fun of me. I don't have many friends with the boys . . ."

Moral Evaluating

Moral evaluating refers to judging or evaluating the observed bullying act in terms of right or wrong, as well as evaluating and attributing responsibility. This concept included situations in which the bystander expressed a *moral belief that bullying is wrong* and should not occur. One bystander shared, ". . . the kid was looking all scared and everything because he thought he was going to get in trouble about what he said, and so I went and told the teacher because, I mean, it just really messed me up because he is a really smart kid, and he really didn't deserve getting picked on like that because he was helping most of the kids that were making fun of him." A sub-construct of this concept is *adult request* where a child's motivation for intervening was due to an adult's request that they take action when they see bullying. One participant discussed this motivation, stating, "I know because I'm on the basketball team, our coaches like, ask us to like, try and help people and stop stuff like that because some people look up to us."

Another sub-construct was *bystander irresponsibility*, referring to situations in which the bystander did not intervene because the bystander did not believe it was his or her moral responsibility to take action or that intervening was important (ie moral disengagement). When asked about witnessing bullying, 1 student stated, "I've seen it, but it's not my business." Another student described her feelings when she observed bullying, saying, "I just don't mind. I just turn the other way, walk right by, don't listen." *Blaming the victim* referred to times when the bystander did not intervene because he or she believed that the bullying was in some way the victim's fault. One participant described this code, saying, "They just like stare and maybe like one or two might jump in and try to stop it, but basically they all just stare. Maybe they agree with the person that the kid who's getting picked on deserved it." Hence, blaming the victim justified bullying. Blaming the victim also was linked to the former concept *bystander irresponsibility.* According to some students, *believing or spreading rumors created by the bully* contributed to bystander lack of intervention, moral justification of the bullying, and greater likelihood that the bystander would join in on the bullying. One student shared, "They just watch the crowed and watch them bug you or tease the person, because . . . they heard the rumor about what happened, and they just tease him. They tease them because they think that the rumor that the bully said could be the truth."

Intervention Self-Efficacy

Intervention self-efficacy referred to situations in which students selected a mode of intervention based on how effective they believed their actions would be (i.e., *high* level of intervention self-efficacy). One student chose to involve an adult because she did not feel that she could effectively handle a situation. "Tell a counselor or an adult because adults are stronger and more powerful and stuff because during that I don't think a normal fifth or fourth grader could handle holding back the two children that were fighting in the cafeteria because they were like, struggling and wiggling and kicking and throwing." *Low* level or lack of intervention self-efficacy was mentioned infrequently and referred to times when a bystander was unable to intervene because he or she did not feel capable of doing so. One student described this sentiment, stating, "I really like to try, but I really couldn't do anything. I don't want to hurt anyone."

DISCUSSION

The present study contributes to the bullying literature by providing a conceptual framework for bystander motivation to intervene in bullying situations, based on a systematic analysis of children's self-reported perspectives

on bullying and bystander motives. While it is premature to reach conclusions about which elements in the framework are most important, the findings provide guidelines to conceptualize potentially influential factors in bystander motivation to defend victims that can inform future research and might enhance anti-bullying practices at school. Future research is needed to confirm the validity of this framework as depicted in Figure 1. One important component of the framework is bystanders' interpretation of harm in the bullying situation. If there is no perceived harm, there may be little motivation to help the victim. If this finding is confirmed, then there may be a need to for research to evaluate strategies designed to help children to identify and appropriately interpret harm in bullying situations, since high sensitivity in recognizing harm may be associated with the motivation to intervene.

Another important finding was the influence of emotional reactions. These findings suggested that an empathic reaction may motivate bystanders to intervene, which is congruent with previous researchers who found positive associations for empathy with helping the victim in bullying situations.[6,7] The current study revealed additional emotional reactions that were associated with the motivation to not intervene: *fear of being victimized* and *audience excitement*. Additional research is needed to confirm these negative motivations. Future researchers also may seek to determine factors that moderate and mediate the impact of these motivational factors.

According to the framework that emerged in this investigation, a particularly important motivational factor was bystanders' efforts to socially evaluate bullying. Consistent with Oh and Hazler's study[14], being a friend with the bully or a non-friend with the victim was linked to motivation not to intervene and being a friend with the victim was related to motivation to intervene. In addition, whereas having a higher social rank than the bully appeared to motivate intervening, having a lower social rank appeared to demotivate intervening. Hence, the findings indicated that peer relationships and peer social hierarchy may be important motivational factors. Research is needed to confirm and expand on these findings. In addition, future research on intervention may evaluate anti-bullying practices that are constructed based, in part, on these motivations.

Respondents indicated the potential importance of bystanders evaluating bullying on a moral basis. The belief that bullying is wrong and that teachers/adults want bystanders to intervene were reported as moral reasons that may motivate bystander intervention. Findings also revealed that moral evaluation can provide motivation not to intervene, which is consistent with Bandura's concept of moral disengagement.[8] Finally, some respondents indicated that intervention self-efficacy might provide motivation to intervene and this supports prior resesarch.[13] In sum, the findings demonstrated a complex interplay of possible motives and reasons that seem to influence children's motivation to intervene or not intervene as bystanders in bullying situations. All of these findings require future confirming research and depending on future findings, the motivational framework in Figure 1 provides suggestions that may be included in future research about efforts to promote bystander intervention.

LIMITATIONS

While the sample size compares favorably with other qualitative research, this study was limited to 1 urban school district in the southeastern U.S. which limits generalizability. Convenience and targeted sampling techniques were used and may have led to sampling bias (e.g., Caucasian students being overrepresented). However, based on the targeted criteria and exploratory nature of this study, the priority was to obtain a sample of students who had been involved in bullying incidents as bullies, victims, and/or bystanders. In addition, considering that bullying was the interview topic, social desirability bias was a possible threat in this study. To reduce this risk, the interviewers were instructed and trained to listen actively, take a non-judgmental approach, and use open follow-up questions. Future qualitative research is needed to test and validate the emergent framework to understand bystanders' motivations in bullying across various contexts and countries. Quantitative research also is necessary to test this conceptual model and to examine hypothetical interrelationships between the model's key concepts.

CONCLUSION

In order to increase the rate of intervention among bystanders, additional research is needed about 3 important components of the framework of motivations for intervention from bystanders: (1) teacher/adult expectations may add to children's motivations to help victims when bullying is witnessed; (2) bystander self-efficacy may enhance their motivation to attempt to defend victims of bullying; and (3) children's moral beliefs that bullying is wrong may increase the chances that bystanders will intervene in bullying situations. Simultaneously, motives associated with moral disengagement, such as bystander irresponsibility, blaming the victim, and uncritically believing the bully may decrease the likelihood of bystander intervention. Assuming that future research supports the importance of these motivations, subsequent research may be used to test the efficacy of preventive interventions designed to promote positive motivations while reducing negative motivations.

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Serious Violence Victimization and Perpetration among Youth Living in the Slums of Kampala, Uganda

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Introduction: Violence among youth is a major public health issue globally. Despite these concerns, youth violence surveillance and prevention research are either scarce or non-existent, particularly in developing regions, such as sub-Saharan Africa. The purpose of this study is to quantitatively determine the prevalence of violence involving weapons in a convenience sample of service-seeking youth in Kampala. Moreover, the study will seek to determine the overlap between violence victimization and perpetration among these youth and the potentially shared risk factors for these experiences.

Methods: We conducted this study of youth in May and June of 2011 to quantify and describe high-risk behaviors and exposures in a convenience sample (N=457) of urban youth, 14–24 years of age, living on the streets or in the slums and who were participating in a Uganda Youth Development Link drop-in center for disadvantaged street youth. We computed bivariate and multivariate logistic regression analyses to determine associations between psychosocial factors and violence victimization and perpetration.

Results: The overall prevalence of reporting violence victimization involving a weapon was 36%, and violence perpetration with a weapon was 19%. In terms of the overlap between victimization and perpetration, 16.6% of youth (11.6% of boys and 24.1% of girls) reported both. In multivariate analyses, parental neglect due to alcohol use (Adj.OR=2.28;95%CI: 1.12—4.62) and sadness (Adj.OR=4.36 ;95%CI: 1.81—10.53) were the statistically significant correlates of victimization only. Reporting hunger (Adj.OR=2.87 ;95%CI:1.30—6.33), any drunkenness (Adj.OR=2.35 ;95%CI:1.12—4.92) and any drug use (Adj.OR=3.02 ;95%CI:1.16—7.82) were significantly associated with both perpetration and victimization.

Conclusion: The findings underscore the differential experiences associated with victimization and perpetration of violence involving weapons among these vulnerable youth. In particular, reporting hunger, drunkenness and drug use were specifically associated with victimization and perpetration. These are all modifiable risk factors that can be prevented. It is clear that these vulnerable youth are in need of additional services and guidance to ameliorate their adverse childhood experiences, current health risk behaviors and disadvantaged living context. [West J Emerg Med. 2012;13(3):253–259.]

INTRODUCTION

Violence is a major global public health problem.[1] However, the concern is primarily for adolescents and young adults who are typically the primary perpetrators and victims of interpersonal violence.[2] Unfortunately, youth violence surveillance and prevention research are either scarce or non-existent in many countries, particularly in low- and middle-income regions, such as Africa and South America.[1,3] Limited existing data suggest that these areas are those in which youth homicide rates are the highest. [2,4] Moreover, rapid urbanization, economic instability, and civil unrest are recognized as particularly salient risk factors for violence. [2]

In sub-Saharan Africa, political and economic stability remain distant goals as the HIV/AIDS epidemic continues to disproportionately devastate the 15–24 year-old population, leaving the region without its most productive citizens, which significantly impacts its prosperity. [5–6] Estimates also indicate a growing population of orphans and unfortunately, orphans typically experience a range of adverse outcomes.[7–9] Due to the limited economic security and regional stability, youth violence is likely to remain a substantial problem in this region. Research of the relatively few data sources available also indicate that school-attending youth in five different sub-Saharan countries report relatively high levels of youth violence.[3,10]

Violence among children and adolescents living on the streets or in the slums of sub-Saharan Africa is of particular concern. Commonly referred to as "street children," these youth are typified by living or earning income on the streets and by a lack of adequate adult supervision. Although the extent to, and the reasons for, which these youth live on the streets varies, economic hardship, family conflict or disruption, and abuse or maltreatment are often predisposing situational factors.[9,11–13] Because girls are more frequently engaged in domestic work in developing countries, boys account for a disproportionate number of street children.[9,11,13]

The lives of street children are often marked by poverty, family conflict, low parental attachment, as well as alcohol and drug use, which are factors that have been established to increase risk for interpersonal violence.[2,14] Furthermore, street children are often viewed collectively as a societal nuisance and are consequently subjected to varying degrees of abuse and violence from police officers, retail business owners, and other community members.[9,15] For some street children, the effects of this physical brutality may compound the mental and emotional scars caused by the parental abuse that may have precipitated their living on the streets.[11,15] Exposure to violence such as this has been shown to increase the risk for becoming a perpetrator of violence in the future.[16] Moreover, other risk factors for violence include experiencing hunger, substance use, low academic achievement, poor school attendance, health problems, and having delinquent peers.[2,16,17]

The purpose of this study was to quantitatively determine the prevalence of violence involving weapons among a convenience sample of service-seeking youth who live in the slums of Kampala, the capital city of Uganda. Moreover, the study sought to determine the co-occurrence or overlap between violence victimization and perpetration among these youth and the potentially shared risk factors for these experiences. Recent research has called for violence prevention research to more specifically examine the perpetration and victimization of violence in order to provide additional context for prevention strategies.[19,20] Understanding the needs of street children in Uganda is particularly crucial because Uganda is expected to have the world's highest rate of population growth in coming years.[21] Furthermore, recent years of civil unrest and violence make Uganda's street children especially susceptible.[22] Therefore, the results of this study may be used to provide guidance on the development of prevention strategies to address the violence experiences this vulnerable population faces.

METHODS

Survey Participants and Recruitment

The overarching goal of the cross-sectional survey called the "Kampala Youth Survey," conducted in May and June 2011, was to quantify and describe high-risk behaviors and exposures in a convenience sample of urban youth (14 to 24 years of age) living on the streets or in the slums and who were participating in a Uganda Youth Development Link (UYDEL) drop-in center for disadvantaged street youth. [23] UYDEL is a not for profit organization that operates eight centers with a primary goal of reducing risk behaviors such as HIV acquisition and drug use. They typically serve about 650 youth per month through these drop-in centers. Face-to-face surveys, lasting approximately 30 minutes, were administered by social workers/peer educators employed by UYDEL to ensure valid survey administration and to assist with any language barriers. The study was implemented across eight drop-in centers throughout Kampala. Participating youth received snacks and transportation for completing the survey. No identifying information was collected and the surveys were completely anonymous. Surveys were administered in English or Uganda's local language Luganda, and to the extent possible, in private locations, to ensure privacy of survey questions and responses.

Each social worker/peer educator received training on the study methodology, all survey items, and, if needed, how to verbally translate the consent forms and survey questions into Luganda. After training, they initiated the recruitment of potential participants among attendants at their specific drop-in center. Recruitment took place using word-of-mouth, and each attendant was eligible for participation if they were between 14 and 24 years of age. No other exclusion criteria were used. Participants were informed about the study and read (or were read) the consent forms to indicate their willingness to take the survey. In Uganda, youth 14 to 17 years of age, who "cater for their own livelihood" are considered emancipated and are able

Table 1. Description of demographic characteristics, involvement in interpersonal violence and psychosocial variables and their prevalence among youth living in the slums of Kampala ($N = 457$).

Variable Description	Variable Wording	Percentage
Sex	Percentage of participants who were girls	68.5%
Violence victimization	Percentage of youth who reported being threatened or injured with a weapon, such as a gun, knife, or club.	35.5%
Violence perpetration	Percentage of youth who reported threatening or injuring others with a weapon, such as a gun, knife, or club.	18.7%
No apprenticeship skills	Percentage of youth who state that they have no apprenticeship skills	44.0%
Both parents dead	Percentage of youth with both parents dead	39.6%
One parent dead	Percentage of youth with mother or father dead	36.3%
Two parents living	Percentage of youth with both mother and father alive	23.0%
Self monitoring/care at night	Percentage of youth who cares for themselves at night	41.6%
Hunger	Percentage of students who reported being hungry	60.6%
Parental physical abuse of child	Percentage of youth who reported that their parents ever hit/beat them (yes versus no)	62.6%
Parental neglect of child due to alcohol use	Percentage of youth who reported their parents' alcohol use made them not able to care for them (yes versus no)	21.0%
Any drunkenness	Percentage of youth who have ever been really drunk (one or more days)	33.9%
Alcohol use initiation before age 13	Percentage of youth who initiated alcohol use prior to age 13	8.5%
Any drug use	Percentage of youth who have ever used drugs such as marijuana (njaga or bangi) or opium (njaye) or sniffed aviation fuel (one or more days)	13.8%
Drug use initiation before age 13	Percentage of youth who initiated drug use prior to age 13	1.5%
Sadness	Percentage of youth who ever felt so sad or hopeless almost every day for two weeks in a row in the past year that they stopped doing their usual activities (yes versus no)	75.1%
Expect to die early	Percentage of youth who think they will probably die before the age of thirty (sometimes/often versus never)	43.5%

to provide their own consent for participating in the survey. The same consent process was followed for youth 18 to 24 years of age.

Over the 10-day survey period, 507 youth were approached and asked to participate in the survey. Among these youth, 46 declined and 461 agreed to participate, yielding a participation rate of 90.9%. Four of the surveys were missing substantial numbers of responses and were therefore excluded, yielding 457 completed surveys for the final analytic sample of youth between the ages of 14 and 24 (31.1% boys and 68.5% girls). The mode for age was 17 years (n=81) and 67% of participants were between ages 16 and 20.

Survey Measures

The survey questionnaire was modeled from existing surveys such as the Youth Risk Behavior Survey[24] conducted by the Centers for Disease Control and Prevention (CDC) in the U.S. and the international Global School-based Student Health Survey[25] supported by the World Health Organization. Survey questions addressed demographic characteristics, family context, alcohol and drug use, injuries, violence and suicidal behaviors, sexual behaviors and sexually transmitted diseases, including HIV/AIDS.

Ethical Approvals

The study protocol was approved by the Georgia State University Institutional Review Board and by the Uganda National Council for Science and Technology. Funding to conduct the study was obtained from the Georgia State University International Strategic Initiative and also from funds leveraged through collaboration with the Emory Center for Injury Control, funded by the CDC.

Data Analysis

The measures included in the analyses and their prevalence among study participants are described in Table 1 and were selected based on previous theoretical and empirical research indicating their potential importance in violence victimization and perpetration.[2,10,14,17] We created the outcome variable by combining the measures on violence victimization and perpetration, yielding 4 mutually exclusive categories: 1) No violence; 2) Perpetration only; 3) Victimization only; and 4) Both perpetration and victimization.

We computed bivariate and multivariate multilogistic regression analyses to determine the statistical associations between demographic and psychosocial correlates and violence victimization and perpetration using the SAS 9.2 (SAS institute) and SUDAAN 10 (RTI) (statistical software packages). We dichotomized most variables to indicate the presence or absence of the particular risk factor. The reference category for each variable in the logistic regression analyses was the absence of the particular risk factor.

RESULTS

The demographic characteristics and psychosocial characteristics, as well as prior experience with child maltreatment, are outlined in Table 1. In terms of family context, 76% of the participants had one or more deceased parents, 42% reported taking care of themselves at night, 61% reported hunger (food insufficiency), 63% reported being hit or beaten by their parents, and 21% reported that their parents' alcohol use had prevented them from providing care. In terms of the participants' own alcohol and drug use, 34% reported any drunkenness, 9% reported drinking alcohol prior to age 13, and 14% reported any drug use. With regards to their skills, 44% reported that they had no apprenticeship skills. In terms of mental health characteristics, 75% reported sadness and 44% reported that they expect to die before the age of 30.The overall prevalence of reporting violence victimization involving a weapon was 36%, and the prevalence of violence perpetration with a weapon was 19%. In terms of the overlap between victimization and perpetration, 16.6% of youth (11.6% of boys and 24.1% of girls) reported both.

Bivariate associations between demographic and psychosocial correlates and violence experiences are presented in Table 2. Girls were significantly more likely than boys to report victimization only (OR=2.23; 95%CI: 1.33—3.73) and both perpetration and victimization (OR=3.26; 95%CI: 2.12—6.16). Both parental neglect due to alcohol and any self-reported drunkenness were associated with all 3 forms of the outcome variable (perpetration only, victimization only, and both perpetration and victimization). Sadness was also associated with victimization and both perpetration and victimization. Several correlates were specifically associated with both perpetration and victimization including reporting both parents deceased, self-monitoring/care at night, hunger, early alcohol use initiation, any drug use, and sadness.

The multivariate analyses of all correlates are identified in Table 2. Parental neglect due to alcohol use and sadness were significant correlates of victimization only. Reporting hunger, any drunkenness, and any drug use were significantly associated with both perpetration and victimization.

DISCUSSION

In this study of youth living in the slums of Kampala, the findings show that many vulnerable youth, in particularly girls, report both weapon-involved violence perpetration and victimization, which currently is a largely unaddressed issue. While the context for these violent incidences was not assessed, it is clear that the circumstances of these youth living in the slums may present a range of situations involving conflict and altercation with respect to obtaining resources, such as money, food, shelter, and alcohol and drugs. Moreover, these youth reported many adverse childhood experiences and a substantial proportion are orphans with 1 or 2 deceased parents. Thus, the family contexts of these youth are grim and further exacerbated by reports of food insufficiency and limited care, nurturing, or supervision.

In terms of adverse childhood experiences, a substantial proportion of the youth in our study reported having been hit or beaten by their parents and also reported that their parents had been unable to care for them due to their alcohol use, a factor that proved an important correlate of violent victimization in multivariate analyses. Alcohol use is an important concern since estimates indicate that Uganda has one of the highest per capita levels of alcohol consumption in the world.[26] Accordingly, parental alcohol abuse appears to be a key concern and perhaps also a contributor to the current living situations for the youth participating in our study.

Among the youth who participated in our study, drunkenness and drug use were significant correlates of reporting both perpetration and victimization involving a weapon. These findings are similar to previous research conducted in the U.S. that underscore the link between a range of alcohol and drug use measures and involvement in violence, as a perpetrator or victim, and also within gang cultures and marginalized youth.[27–29] However, as previously mentioned, these youth also experienced a range of adverse experiences and child maltreatment, which may have increased their risk for drinking.[30] Intriguingly, overall, levels of drinking and early alcohol use initiation prior to age 13 were low among participants when compared to school-attending adolescents in Uganda and Zambia, which may be due to the youth participants in this survey being service-seeking.[31,32]

In comparing the statistically significant correlates of victimization only, perpetration only and reports of both perpetration and victimization, it is intriguing to note that sadness and parental neglect due to alcohol use were specifically associated only with victimization. In contrast, hunger, drunkenness and drug use were specifically associated with reports of both perpetration and victimization. No correlates were specifically associated with perpetration only, although it should be noted that this category accounted for only 2% of the study sample. Among the study participants, victimization was more frequently reported than perpetration. As such, it may be that the context for either victimization or perpetration of violence involving a weapon may be different and situation-dependent. Because of the scarcity of data on youth who live in the slums and on the streets, it is difficult to make any relevant comparisons of these experiences.

Table 2. Bivariate and multivariate associations between demographic and psychosocial correlates and violence victimization and perpetration among youth living in the slums of Kampala (*N*=457).

	Victimization Only OR (95% CI)	Perpetration Only OR (95% CI)	Perpetration and Victimization OR (95%CI)	Victimization Only Adj. OR* (95% CI)	Perpetration Only Adj. OR* (95% CI)	Perpetration and Victimization Adj. OR* (95%CI)
Percent Reporting	18.90%	2.00%	16.60%	18.90%	2.00%	16.60%
Sex						
Girls	**2.23 (1.33—3.73)**	1.67 (0.40—6.90)	**3.26 (2.12—6.16)**	**2.38 (1.31—4.35)**	1.51 (0.36—6.33)	**2.49 (1.29—4.81)**
Boys	1	1	1	1	1	1
No apprenticeship skills	1.41 (0.84—2.39)	0.72 (0.18—2.95)	0.87 (0.52—1.47)	-	-	-
Both parents dead	0.93 (0.48—1.79)	1.31 (0.21—8.11)	**2.14 (1.12—4.09)**	**-**	**-**	**-**
One parent dead	0.87 (0.49—1.52)	1.11 (0.22—5.67)	1.31 (0.71—2.42)			
Both parents living	1	1	1			
Self monitoring/ care at night	0.87 (0.52—1.45)	0.81 (0.20—3.32)	**3.05 (1.79—5.21)**	0.60 (0.32—1.14)	0.26 (0.05—1.42)	1.09 (0.56—2.12)
Hunger	1.64 (0.98—2.74)	2.92 (0.59—14.39)	**4.78 (2.41—9.48)**	1.08 (0.59—1.97)	2.56 (0.41—15.80)	**2.87 (1.30—6.33)**
Parental physical abuse of child	1.37 (0.81—2.31)	1.25 (0.30—5.12)	1.54 (0.88—2.71)	-	-	-
Parental neglect of child due to alcohol use	**2.82 (1.59—5.01)**	**4.59 (1.18—17.96)**	**3.00 (1.64—5.47)**	**2.28 (1.12—4.62)**	2.55 (0.48—13.63)	1.39 (0.70—2.78)
Any drunkenness	**1.73 (1.02—2.92)**	**3.89 (1.01—14.99)**	**4.84 (2.81—8.31)**	1.49 (0.75—2.96)	3.48 (0.58—20.82)	**2.35 (1.12—4.92)**
Alcohol use initiation <age 13	1.71 (0.71—4.14)	1.96 (0.23—16.69)	**3.28 (1.51—7.13)**	**-**	**-**	**-**
Any drug use	2.10 (0.95—4.63)	3.98 (0.77—20.65)	**9.51 (4.92—18.39)**	1.13 (0.42—3.07)	2.01 (0.34—11.98)	**3.02 (1.16—7.82)**
Sadness	**5.42 (2.27—12.99)**	0.85 (0.21—3.84)	**2.71 (1.32—5.54)**	**4.36 (1.81—10.53)**	0.52 (0.11—2.44)	1.98 (0.86—4.59)
Expect to die early	1.24 (0.76—2.04)	1.84 (0.48—7.02)	**1.97 (1.18—3.31)**	0.95 (0.54—1.67)	1.65 (0.42—6.53)	1.21 (0.64—2.30)

Reference groups are those without the risk factors examined. * All variables included in the adjusted analyses are listed in the table. Statistically significant associations are boldfaced.

Some limitations restrict the interpretation of the findings of this study. First, the study used a broad definition of street youth, including both homeless youth and youth living in the slums in a variety of living arrangements. Second, because the participants in this study were recruited from UYDEL drop-in centers, the study is based on a convenience sample that may not be generalizable to other populations. Third, the survey instrument used in this study had not been previously piloted among Ugandan youth. However, the majority of the survey items were adopted from previously validated surveys, including the U.S. Youth Risk Behavior Survey[24] and the Global School-based Health Survey which has been conducted in Uganda previously.[25] Fourth, the low literacy level of many of the study participants required that the survey was read aloud to the participants. The direct face-to-face interaction between the interviewer and the participant may have resulted in underreporting of certain risk behaviors because of social desirability. A fifth limitation is that several study participants provided their responses to survey items in their local language of Luganda, thus requiring the interviewers to translate the answers into English. Sixth, some of the statistical analyses included relatively small sample sizes and yielded relatively wide confidence intervals indicating that findings may be less stable. Lastly, our findings are limited by the cross-sectional nature of this study. A temporal relationship between the psychosocial variables and violence victimization or perpetration cannot be determined, nor can causation be inferred.

Despite these important limitations, the findings from this study describe the prevalence and correlates of relatively severe forms of violence involving a weapon among these vulnerable youth. Hunger, drunkenness, and drug use were the most important factors associated with perpetration and victimization of weapon-involved violence. Because of the scarcity of data related to violence perpetration and victimization among youth in sub-Saharan Africa, additional research is needed to validate these findings. In particular, a longitudinal cohort study would be more suitable to determine the initiation of risk behaviors, as well as contextual factors that may increase risk for involvement in violence. Efforts should also be made to determine modifiable factors that can be incorporated into prevention programs that may reduce, at least partially, the consequences of the adverse childhood experiences experienced by many of these youth.

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Intimate Partner Violence and Social Pressure among Gay Men in Six Countries

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Introduction: Recent research suggests that men who have sex with men (MSM) experience intimate partner violence (IPV) at significantly higher rates than heterosexual men. Few studies, however, have investigated implications of heterosexist social pressures – namely, homophobic discrimination, internalized homophobia, and heterosexism – on risk for IPV among MSM, and no previous studies have examined cross-national variations in the relationship between IPV and social pressure. This paper examines reporting of IPV and associations with social pressure among a sample of internet-recruited MSM in the United States (U.S.), Canada, Australia, the United Kingdom, South Africa, and Brazil.

Methods: We recruited internet-using MSM from 6 countries through selective banner advertisements placed on Facebook. Eligibility criteria were men age over 18 reporting sex with a man in the past year. Of the 2,771 eligible respondents, 2,368 had complete data and were included in the analysis. Three outcomes were examined: reporting recent experience of physical violence, sexual violence, and recent perpetration of physical violence. The analysis focused on associations between reporting of IPV and experiences of homophobic discrimination, internalized homophobia, and heteronormativity.

Results: Reporting of experiencing physical IPV ranged from 5.75% in the U.S. to 11.75% in South Africa, while experiencing sexual violence was less commonly reported and ranged from 2.54% in Australia to 4.52% in the U.S. Perpetration of physical violence ranged from 2.47% in the U.S. to 5.76% in South Africa. Experiences of homophobic discrimination, internalized homophobia, and heteronormativity were found to increase odds of reporting IPV in all countries.

Conclusion: There has been little data on IPV among MSM, particularly MSM living in low- and middle-income countries. Despite the lack of consensus in demographic correlates of violence reporting, heterosexist social pressures were found to significantly increase odds of reporting IPV in all countries. These findings show the universality of violence reporting among MSM across countries, and highlight the unique role of heteronormativity as a risk factor for violence reporting among MSM. The results demonstrate that using internet-based surveys to reach MSM is feasible for certain areas, although modified efforts may be required to reach diverse samples of MSM. [West J Emerg Med. 2012;13(3):260–271.]

INTRODUCTION

Recent studies suggest that men who have sex with men (MSM) experience intimate partner violence (IPV) at rates that are substantially higher than those experienced by men who do not have sex with men, rates that are comparable or higher to those among heterosexual women, and that MSM are uniquely at risk for experiencing IPV over their lifetimes.[1–3] Although the majority of data on IPV among MSM are drawn from cross-

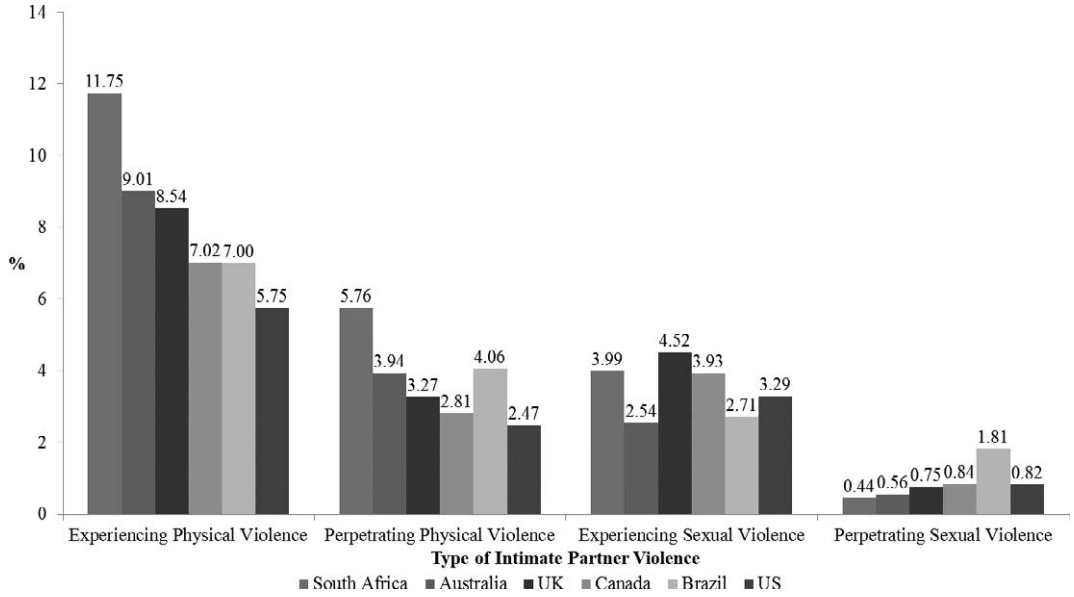

Figure. Reporting of 4 types of intimate partner violence (experiencing physical violence, perpetrating physical violence, experiencing sexual violence, and perpetrating sexual violence) in the past year among gay men in 6 countries.

sectional samples of United States (U.S.) MSM, and existing studies vary widely in their definitions of violence, the existing data do suggest that approximately 25–50% of MSM report experiencing physical IPV over their lifetimes, and 12–30% report experiencing sexual IPV.[1,2,4–6] Fewer studies have measured perpetration of IPV among MSM, but existing estimates range from 12–36%.[7] There has been a lack of attention regarding rates of IPV among non-U.S. MSM, although recently, high rates of IPV have been documented among MSM in Canada (28% experience of physical IPV) and among South African MSM (8% experience of physical IPV and 4.5% experience of sexual IPV).[8,9]

Historically, the preponderance of evidence indicates that IPV, experienced and/or perpetrated, is correlated both with acute physical effects (e.g., trauma), sustained physical effects (e.g., substance abuse, sexually transmitted infections), and adverse mental health outcomes (e.g., suicidal ideation, depression, chronic mental illness).[10–12] These associations have been found in diverse settings and populations, and although such evidence is primarily drawn from heterosexual populations, similar associations are beginning to be documented among MSM.[13–17] Of particular importance to MSM is emergent evidence demonstrating a link between IPV, sexual risk-taking, and risk for Human Immunodeficiency Virus (HIV) infection, as MSM worldwide continue to be disproportionately affected by the HIV epidemic.[4,8,14,16,18–23]

While several of the aforementioned studies have begun to examine the influence of IPV on MSM's mental and physical health, few published studies have examined the influence of sources of negative social stress, for example, internalized homophobia, experiences of homophobic discrimination, and experience of heteronormativity, as influencing risk for IPV itself, despite emerging evidence that such sources of social stress interact with known syndemics of partner violence, poor mental health, substance abuse, and sexual risk-taking among MSM.[7,24–30] The confluence of all of these sources has been described by Meyer[31] as the theory of Minority Stress, which postulates that the social stress experienced by persons of minority status is (a) unique to their minority status and (b) additive in nature. For example, the vulnerability experienced by MSM experiencing partner violence would be exacerbated by the stress experienced by MSM from social stigmatization and legal persecution, creating syndemic processes. However, the specific nature of these syndemics may vary across different regions and social contexts, given the wide variation in both the legality and the social acceptance of same-sex sexual behavior worldwide.[22,32–34] Thus, while IPV and adverse mental and physical health outcomes exist syndemically in MSM, the characteristics of these syndemics may be specific to different geographic locations or cultural settings.[35–37]

This study addresses gaps in the literature in several key ways. We report rates of IPV among MSM, including experiencing and perpetrating both physical and sexual violence, using data drawn from online surveys conducted in 6 countries, including one middle-income country (Brazil) and one low-income country (South Africa). For 3 of these countries (UK, Australia, and Brazil), the authors found no previous studies that report the prevalence of IPV among MSM. Critically, the authors also found no studies that compare the varying influences of sources of social stress, including homophobia and heteronormative social pressures, on the experience of IPV among MSM across multiple countries.

Table 1. Background demographic characteristics and mean index scale score by country of 2,368 internet-recruited men who have sex with men in 6 countries.

	Countries					
	US (n=365)	Canada (n=356)	Australia (n=355)	UK (n=398)	RSA (n=451)	Brazil (n=443)
Age (%)						
18–24	58.08	39.61	52.11	49.25	25.28	64.11
25–34	15.62	24.72	22.82	23.62	35.03	-
35+	26.3	35.67	25.07	27.14	39.69	-
25+	-	-	-	-	-	35.89
Education (%)						
≤12 years	29.86	25.28	38.59	21.86	31.26	35.67
>12 years	70.14	74.72	61.41	78.14	68.74	64.33
Race/Ancestry (%)						
White	82.19	81.46	-	95.73	-	58.47
European	-	-	57.75	-	-	-
Australian/Other	-	-	42.25	-	-	-
Black African	-	-	-	-	7.98	-
White African	-	-	-	-	83.81	-
Colored/Other	-	-	-	-	8.20	-
Mixed	-	-	-	-	-	31.38
Black/Other	-	-	-	-	-	10.16
Other	17.81	18.54	-	4.27	-	-
HIV Status (%)						
Negative	64.11	68.82	69.86	66.58	81.60	60.05
Positive/Unknown	35.89	31.18	30.14	33.42	18.40	39.95
Drug Use within 12 mos. (%)						
No	62.19	49.16	58.31	64.57	58.98	70.20
Yes	37.81	50.84	41.69	35.43	41.02	29.80
Behavioral Bisexuality (%)						
No	64.11	58.99	60.56	61.31	59.87	63.43
Yes	35.89	41.01	39.44	38.69	40.13	36.57
Scale Indices Scores (mean)						
Homophobic Discrimination	5.10	5.21	5.15	4.81	5.91	5.68
Internalized Homophobia	14.33	14.18	15.28	12.94	13.00	16.97
Heteronormativity	7.60	7.28	6.73	6.53	6.90	8.33

US, United States; *UK,* United Kingdom; *RSA*, Republic of South Africa

METHODS

We drew the data for this study from an online survey. Study participants were recruited through advertisements on social networking site Facebook in the U.S., Canada, Australia, United Kingdom, Republic of South Africa (RSA), Brazil, Nigeria, Kenya, and India over a 5-14 day period in each country. Advertisements were shown to male Facebook users over 18 years of age who indicated an interest in men in their user profiles. Clicking the advertisement led potential participants to information on the survey, after which informed consent was obtained and participants were directed to the survey. Participants were eligible for survey completion if they reported being born male, being over 18 years of age, and having had sex with a man in the past year. The surveys were conducted in English in all countries, with the exception of the Brazilian survey, which was administered in Portuguese. The response to the survey was insufficient for analysis in Nigeria (n=11), Kenya (n=22), and India (n=80). Of the combined 2,771 responses to the survey in the six countries with sufficient response, 2,368 men had complete data for all covariates of interest and were included in the analysis.

We collected demographic data for age, race, and

education level. Survey participants were asked about their sexual orientation, and we included only men who self-identified as homosexual/gay in the analysis. We classified HIV status as negative for men who reported negative HIV status and positive/unknown for men who reported positive HIV status, had never been tested for HIV, had received an indeterminate/inconclusive result, had never received the results of their last test, or preferred not to answer. Participants reported drug use in the last 12 months, and were categorized as having any drug uses versus none. We defined behavioral bisexuality as having ever had sex with a woman.

We assessed internalized homophobia using a 20-item subset of the Gay Identity Scale, a validated scale that measures an individual's acceptance of his homosexual thoughts, feelings, and behaviors.[38] From respondents' answers, we created an index scale by assigning positive point values to responses agreeing with internally homophobic sentiments, negative point values to responses affirming gay pride, and no points to any neutral response. Forty points were added to each index score to shift the range from −40 to 40 to zero to 80, with increasing index scores correlated with decreasing pride and lowered acceptance of one's homosexual thoughts, feelings, and behaviors. We quantified experiences of homophobic discrimination by creating an index scale of responses to 11 types of homophobic decimation that have been previously shown to correlate to adverse mental health outcomes.[39] Any affirmative response to an experience of discrimination (e.g., "*Due to your sexual orientation were you ever made fun of as a child?*"), resulted in one index point, creating a hypothetical range of zero to 11, with a higher score signifying increasing experiences of homophobic discrimination. Drawing from previous qualitative work with U.S. and South African MSM, we quantified experiencing heteronormative social pressure by creating an index scale of 4 questions on the degree to which respondents felt pressure to hide their sexuality, get married, have children, and have sex with women. We summed participants' reported responses to create an index scale ranging from 4 to 20, with a higher score representing greater experience of heteronormativity.

Finally, participants were asked about their experience of or perpetration of IPV, both physical and sexual, with any partner in the previous 12 months. Using WHO definitions of IPV, men were asked if they had been physically hurt by a partner (i.e., "*In the last 12 months have any of your partners ever tried to hurt you, this includes pushing, holding you down, hitting you with his fist, kicking, attempting to strangle, attacking with a knife, gun or other weapon?*"), and if a partner had forced him to have sex against his will (i.e., "*In the last 12 months have any of your partners ever used physical force or verbal threats to force you to have sex when you did not want to?*"). We used the same definitions of violence to assess if participants had perpetrated these same acts of physical and sexual violence against a partner in the past year.

We analyzed the data using STATA 12. We categorized age into discrete groups of 18–24, 25–34, and >34 in all countries but Brazil, in which age was dichotomized as 18–24 and >24. Race was defined differently in each country: White or Other (U.S., UK, Canada, Australia); White African, Black African, or Colored/Other (South Africa); and White, Mixed, or Black/Other (Brazil). We categorized level of education as having completed ≤12 years of education or having completed >12 years of education. In each country, we created 3 logistic regression models for 3 outcomes of interest: experiencing physical IPV, experiencing sexual IPV, and perpetrating physical IPV. Due to low reported prevalence of reporting perpetration of sexual IPV in all countries, perpetrating sexual IPV could not be modeled as an outcome. All models in all countries controlled for age, level of education, race/ancestry, HIV status, drug use, behavioral bisexuality, with the key covariates of interest being internalized homophobia, experiences of homophobic discrimination, and experiences of heteronormativity.

RESULTS

Demographic characteristics of the sample and mean index scores for homophobic discrimination, internalized homophobia, and heteronormativity are summarized by country in Table 1. In all countries, the sample was predominantly young (18–24), educated (>12 years of education), and of White/European race or ancestry. Additionally, the majority of the sample reported negative HIV status, no drug use in the past 12 months (excepting Canada, where 50.84% reported recent drug use), and no history of behavioral bisexuality. We observed some variation in reported experiences of homophobia and heteronormativity. Mean number of homophobic discrimination episodes ranged from 4.81 (SD: 0.11) in the UK to 5.91(SD: 0.11) in RSA. Internalized homophobia mean scores ranged from 12.94 (SD: 0.54) in the UK to16.97 (SD: 0.55) in Brazil, and heteronormativity mean scores ranged from 6.53 (SD: 0.17) in the UK to 8.33 (SD: 0.21) in Brazil.

The prevalence of IPV reporting in each country is shown in the Figure, and the variation in reporting of IPV across covariates is reported in Table 2. In all countries, the most commonly reported form of IPV was experiencing physical violence, with a range of 5.75% of respondents in the U.S. to 11.75% of respondents in South Africa. Reported experience of sexual violence was somewhat lower, with prevalence ranging from 2.54% in Australia to 4.52% in the U.S. Fewer men reported perpetrating violence, with 2.47% of U.S. men (lowest) and 5.76% of South African men (highest) reporting perpetrating physical violence against a partner in the past year. Very few respondents (less than 2% in all countries) reported perpetration of sexual violence.

Violence reporting did not vary significantly by most covariates, and varied differently within each country. Younger men (ages 18–24) in South Africa, less educated men in

Table 2. Prevalence of reporting of experience of physical violence (EPV), experience of sexual violence (ESV), perpetration of physical violence (PPV), perpetration of sexual violence (PSV), mean scale index scores, and chi-square test results by covariate strata in six countries. Significant difference across strata at α=0.05 are denoted in ***bold italics***. NB: - denotes a non-applicable stratum.

	United States				Canada				Australia			
	EPV	ESV	PPV	PSV	EPV	ESV	PPV	PSV	EPV	ESV	PPV	PSV
TOTAL (%)	5.75	3.29	2.47	0.82	7.02	3.93	2.81	0.84	9.01	2.54	3.94	0.56
Age (%)												
18–24	5.66	3.30	1.42	***0.47***	5.67	4.96	1.42	1.42	11.35	3.24	4.86	0.54
25–34	8.77	7.02	5.26	***3.51***	11.36	5.68	5.68	1.14	8.64	2.47	3.70	1.23
35+	4.17	1.04	3.13	***0.00***	5.51	1.57	2.36	0.00	4.49	1.12	2.25	0.00
25+	-	-	-	-	-	-	-	-	-	-	-	-
Race/Ancestry (%)												
White (US, Canada)	5.00	3.00	2.00	***0.33***	7.59	4.48	2.41	0.69	-	-	-	-
European (Aus.)	-	-	-	-	-	-	-	-	10.24	2.93	5.37	0.98
Australian, Other (Aus.)	-	-	-	-	-	-	-	-	7.33	2.00	2.00	0.00
Other (US, Canada)	9.23	4.62	4.62	***3.08***	4.55	1.52	4.55	1.52	-	-	-	-
Education (%)												
≤12 years	5.50	2.75	4.59	0.92	7.78	5.56	5.56	***3.33***	***13.14***	2.92	3.65	0.00
>12 years	5.86	3.52	1.56	0.78	6.77	3.38	1.88	***0.00***	***6.42***	2.29	4.13	0.92
HIV Status (%)												
Negative	5.56	4.27	1.71	0.43	8.57	3.67	3.67	5.21	8.06	2.02	4.44	***0.00***
Positive/Unknown	6.11	1.53	3.82	1.53	3.60	4.50	0.90	0.90	11.21	3.74	2.81	***1.87***
Drug Use within 12 mos. (%)												
No	6.61	3.08	3.52	1.32	4.57	3.43	1.71	0.57	7.73	2.42	2.42	0.97
Yes	4.35	3.62	0.72	0.00	9.39	4.42	3.87	1.10	10.81	2.70	6.08	0.00
Behavioral Bisexuality (%)												
No	5.98	2.56	2.56	0.85	7.62	4.29	2.86	0.95	***6.51***	3.26	***1.40***	0.93
Yes	5.34	4.58	2.29	0.76	6.16	3.42	2.74	0.68	***12.86***	1.43	***7.86***	0.00
Scale Indices (mean)												
Homophobic Discrimination	6.95	7.17	7.11	7.67	6.24	5.93	5.10	3.37	6.44	8.11	5.57	5.00
Internalized Homophobia	16.43	15.00	23.56	29.33	11.44	11.71	11.90	19.67	16.31	25.11	15.00	35.00
Heteronormativity	10.24	9.42	11.11	9.33	7.28	6.29	6.70	7.67	7.69	9.22	5.57	4.00
	United Kingdom				South Africa				Brazil			
	EPV	ESV	PPV	PSV	EPV	ESV	PPV	PSV	EPV	ESV	PPV	PSV
TOTAL (%)	8.54	4.52	3.27	0.75	11.75	3.99	5.76	0.44	7.00	2.71	4.06	1.81
Age (%)												
18–24	11.22	5.61	2.04	0.00	***12.28***	5.26	3.51	0.88	7.39	3.17	3.52	1.76
25–34	6.38	5.32	5.32	1.06	***17.09***	5.70	7.59	0.00	-	-	-	-
35+	5.56	1.85	3.70	1.85	***6.70***	1.68	5.59	0.56	-	-	-	-
25+	-	-	-	-	-	-	-	-	6.29	1.89	5.03	1.89
Race/Ancestry (%)												
White	8.66	4.46	***2.89***	0.79	-	-	-	-	5.02	1.93	3.09	1.54
Black African	-	-	-	-	22.22	***13.89***	5.56	0.00	-	-	-	-
White African	-	-	-	-	10.32	***2.65***	5.56	0.53	-	-	-	-
Colored, Other	-	-	-	-	16.22	***8.11***	8.11	0.00	-	-	-	-
Mixed	-	-	-	-	-	-	-	-	10.07	4.32	6.47	2.88
Black, Other	-	-	-	-	-	-	-	-	8.89	2.22	2.22	0.00

Table 2. Continued.

	United Kingdom				South Africa				Brazil			
	EPV	ESV	PPV	PSV	EPV	ESV	PPV	PSV	EPV	ESV	PPV	PSV
Other	5.88	5.88	***11.76***	0.00	-	-	-	-	-	-	-	-
Education (%)												
≤12 years	10.34	5.75	5.75	2.30	12.77	4.96	4.96	***1.42***	5.06	2.53	2.53	3.16
>12 years	8.04	4.18	2.57	0.32	11.29	3.55	6.13	***0.00***	8.07	2.81	4.91	1.05
HIV Status (%)												
Negative	8.30	4.91	3.02	0.75	11.96	3.26	5.71	0.54	7.14	2.63	4.51	2.26
Positive/Unknown	9.02	3.76	3.76	0.75	10.84	7.23	6.02	0.00	6.78	2.82	3.39	1.13
Drug Use within 12 mos. (%)												
No	7.00	4.67	2.72	0.39	10.15	3.76	4.89	0.38	7.72	3.22	4.82	1.61
Yes	11.35	4.26	4.26	1.42	14.05	4.32	7.03	0.54	5.30	1.52	2.27	2.27
Behavioral Bisexuality (%)												
No	6.56	3.69	2.87	1.23	13.33	4.07	4.81	0.74	7.12	3.56	4.63	2.14
Yes	11.69	5.84	3.90	0.00	9.39	3.87	7.18	0.00	6.79	1.23	3.09	1.23
Scale Indices (mean)												
Homophobic Discrimination	5.82	6.39	5.54	5.33	6.70	8.28	5.77	8.00	5.84	7.00	6.33	5.84
Internalized Homophobia	17.15	22.11	19.85	12.67	14.32	18.83	15.96	23.00	15.84	21.67	14.33	14.13
Heteronormativity	6.88	7.83	6.38	5.00	7.92	8.44	8.81	13.00	8.10	9.75	7.44	11.25

Australia, and men with a history of behavioral bisexuality in Australia more frequently reported experiencing physical IPV. Reported experience of sexual IPV varied significantly only by race in South Africa, with Black and Colored/Other South Africans reporting significantly more experience of sexual IPV compared to White South Africans (13.89% and 8.11% compared to 2.65%). Non-white British men reported significantly more perpetration of physical violence when compared to white British men (3.0% versus 0.33%), as did Australians with a history of behavioral bisexuality when compared to Australian men without a history of behavioral bisexuality (7.85% versus 1.40%). Lastly, reporting perpetration of sexual violence varied significantly by age and race in the U.S., level of education in Canada and RSA, and HIV status in Australia. Neither drug use, internalized homophobia, experiences of homophobic discrimination, nor heteronormativity varied significantly in any country for any outcome.

Results from the logistic regression modeling are summarized in Table 3. Across all 6 countries, there was no consistency in significant associations between IPV and demographic variables. For example, race modified odds of reporting violence only in South Africa and Brazil: Black African men were more likely to report experiencing sexual violence when compared to White men (OR: 8.33, 95% CI: 1.86, 37.27) in South Africa, and Mixed men were more likely to report experiencing physical violence in Brazil when compared to White men (OR: 2.27, 95% CI: 1.01, 5.06). A history of behavioral bisexuality was found to significantly increase odds of reporting experiencing physical violence in the UK (OR: 2.29, 95% CI: 1.03, 5.09) and Australia (OR: 2.94, 95% CI: 1.30, 6.66) and odds of reporting perpetrating physical violence in Australia (OR: 7.81, 95% CI: 1.95, 31.34).

Although few demographic characteristics significantly modified odds for reporting most forms of violence, both experiences of homophobia and internalized homophobia were found to universally increase odds of reporting IPV. Men reporting increased experiences of homophobic discrimination were significantly more likely to report experiencing physical IPV in 5 of 6 countries, with odd ratios ranging from 1.17 (95% CI: 1.03, 1.35) in South Africa to 1.41 (95% CI: 1.11, 1.78) in the U.S. Similarly, men who reported more experiences of homophobic discrimination were significantly more likely to report experiencing sexual IPV in 5 of 6 countries. For example, UK MSM who reported increasing episodes of homophobic discrimination were 41% (95% CI: 9%, 82%) more likely to report experiencing sexual IPV, and MSM in Australia had odds of experiencing sexual IPV that were 2.07 (95% CI: 1.37, 3.11) times those of Australian men who reported fewer experiences of homophobic discrimination. Men who reported increased amounts of internalized homophobia were found to have increased odds of reporting IPV in South Africa and in the UK, where reporting more internalized homophobia was associated with increased odds of reporting experiencing physical violence (UK, OR: 1.04, 95% CI: 1.00, 1.08), experiencing sexual violence (UK, OR: 1.07,

Table 3. Regression models for reporting experience of physical violence (EPV), experience of sexual violence (ESV), and perpetration of sexual violence (PSV) among a sample of internet-recruited men who have sex with men in 6 countries. Significant difference across strata at α=0.05 are denoted in ***bold italics***. NB: - denotes a non-applicable stratum.

	United States			Canada
	EPV	ESV	PSV	EPV
Age				
18–24	1.0	1.0	1.0	1.0
25–34	2.01(0.59, 6.79)	1.72(0.42, 7.08)	***8.56(1.03, 71.14)***	1.79(0.63, 5.06)
>34	0.68(0.18, 2.61)	0.13(0.01, 1.25)	4.15(0.52, 33.36)	0.73(0.23, 2.32)
Race/Ancestry				
White	1.0	1.0	1.0	1.0
Non-white	1.36(0.80, 2.31)	1.25(0.60, 2.59)	1.49(0.66, 3.37)	0.64(0.17, 2.33)
Non-European	-	-	-	-
Education				
≤12 years	1.0	1.0	1.0	1.0
>12 years	0.93(0.33, 2.64)	0.95(0.23, 3.85)	0.25(0.05, 1.19)	0.84(0.32, 2.22)
HIV Status				
Negative	1.0	1.0	1.0	1.0
Positive/ Unknown	1.58(0.57, 4.35)	0.51(0.10, 2.63)	5.05(0.87, 29.45)	0.42(0.14, 1.32)
Drug Use within 12 mos.				
No	1.0	1.0	1.0	1.0
Yes	0.67(0.24, 1.84)	1.48(0.42, 5.15)	0.18(0.02, 1.87)	2.27(0.93, 5.54)
Behavioral Bisexuality				
No	1.0	1.0	1.0	1.0
Yes	0.86(0.30, 2.50)	2.12(0.59, 7.65)	0.68(0.11, 4.14)	0.75(0.29, 1.90)
Homophobic Discrimination				
	1.41(1.11, 1.78)	***1.54(1.10, 2.16)***	1.35(0.96, 1.90)	***1.20(1.01, 1.42)***
Internalized Homophobia				
	0.99(0.95, 1.03)	0.99(0.93, 1.05)	1.02(0.97, 1.08)	0.97(0.92, 1.02)
Heteronormativity				
	1.13(0.99, 1.28)	1.03(0.86, 1.24)	1.21(0.99, 1.47)	1.01(0.89, 1.15)
	United Kingdom			South Africa
	EPV	ESV	PSV	EPV
Age				
18–24	1.0	1.0	1.0	1.0
25–34	0.45(0.16, 1.24)	0.87(0.25, 3.06)	3.04(0.72, 12.95)	1.67(0.80, 3.49)
>34	***0.19(0.06, 0.59)***	***0.09(0.01, 0.58)***	0.96(0.18, 5.20)	0.76(0.32, 1.85)
>25	-	-	-	-
Race/Ancestry				
White	1.0	1.0	1.0	-
White African	-	-	-	1.0
Black African	-	-	-	0.41(0.16, 1.03)
Colored, Other	-	-	-	0.55(0.16, 1.92)
Mixed	-	-	-	-
Black, Other	-	-	-	-
Other	0.88(0.57, 1.36)	0.96(0.59, 1.56)	1.37(0.95, 1.97)	-

Table 3. Extended.

Canada		Australia		
ESV	PSV	EPV	ESV	PSV
1.0	1.0	1.0	1.0	1.0
1.01(0.28, 3.61)	4.43(0.76, 25.80)	0.71(0.27, 1.88)	0.46(0.06, 3.50)	0.44(0.10, 1.87)
0.23(0.04, 1.27)	1.48(0.20, 10.78)	***0.22(0.06, 0.76)***	0.17(0.01, 2.67)	***0.16(0.03, 0.84)***
1.0	1.0	1.0	1.0	1.0
0.39(0.05, 3.21)	2.39(0.53, 10.83)	-	-	-
-	-	0.97(0.64, 1.46)	0.93(0.43, 2.02)	0.55(0.27, 1.12)
1.0	1.0	1.0	1.0	1.0
0.68(0.21, 2.20)	***0.24(0.06, 0.92)***	0.53(0.24, 1.17)	1.41(0.27, 7.30)	1.45(0.43, 4.90)
1.0	1.0	1.0	1.0	1.0
1.19(0.36, 3.90)	0.25(0.03, 2.17)	1.30(0.57, 2.97)	1.52(0.34, 6.81)	0.82(0.20, 3.35)
1.0	1.0	1.0	1.0	1.0
1.33(0.44, 4.03)	2.50(0.61, 10.20)	1.15(0.52, 2.53)	1.02(0.21, 4.89)	1.78(0.54, 5.91)
1.0	1.0	1.0	1.0	1.0
0.99(0.29, 3.43)	0.70(0.16, 3.01)	***2.94(1.30, 6.66)***	0.59(0.09, 3.85)	***7.81(1.95, 31.34)***
1.18(0.95, 1.46)	0.95(0.72, 1.23)	***1.35(1.13, 1.63)***	***2.07(1.37, 3.11)***	1.03(0.79, 1.35)
0.99(0.93, 1.05)	0.97(0.90, 1.05)	0.99(0.96, 1.03)	1.04(0.99, 1.10)	1.03(0.97, 1.09)
0.90(0.73, 1.10)	0.98(0.80, 1.21)	1.07(0.95, 1.19)	1.16(0.95, 1.41)	0.78(0.58, 1.06)
South Africa		Brazil		
ESV	PSV	EPV	ESV	PSV
1.0	1.0	1.0	1.0	1.0
1.10(0.32, 3.80)	2.62(0.77, 8.87)	-	-	-
0.41(0.08, 2.06)	1.99(0.55, 7.25)	-	-	-
-	-	0.73(0.31, 1.72)	0.57(0.14, 2.42)	1.11(0.38, 3.21)
-	-	1.0	1.0	1.0
1.0	1.0	-	-	-
8.33(1.86, 37.27)	0.84(0.17, 4.09)	-	-	-
2.66(0.54, 13.06)	1.28(0.19, 8.79)	-	-	-
-	-	***2.27(1.01, 5.06)***	2.25(0.63, 8.10)	2.62(0.95, 7.24)
-	-	1.78(0.53, 5.99)	0.67(0.07, 6.82)	0.69(0.08, 5.98)
-	-	-	-	-

Table 3. Continued.

	United Kingdom			South Africa
	EPV	ESV	PSV	EPV
Education				
≤12 years	1.0	1.0	1.0	1.0
>12 years	0.51(0.20, 1.27)	0.33(0.09, 1.14)	0.32(0.08, 1.20)	0.90(0.48, 1.70)
HIV Status				
Negative	1.0	1.0	1.0	1.0
Positive/Unknown	0.99(0.44, 2.24)	0.66(0.20, 2.19)	1.21(0.34, 4.34)	0.86(0.39, 1.90)
Drug Use within 12 mos.				
No	1.0	1.0	1.0	1.0
Yes	1.75(0.81, 3.77)	1.05(0.35, 3.18)	1.64(0.50, 5.39)	1.54(0.83, 2.87)
Behavioral Bisexuality				
No	1.0	1.0	1.0	1.0
Yes	***2.29(1.03, 5.09)***	2.17(0.73, 6.48)	1.34(0.37, 4.89)	0.73(0.38, 1.40)
Homophobic Discrimination				
	1.32(1.09, 1.58)	***1.41(1.09, 1.82)***	1.15(0.88, 1.50)	***1.17(1.02, 1.35)***
Internalized Homophobia				
	1.04(1.00, 1.08)	***1.07(1.02, 1.13)***	***1.07(1.02, 1.13)***	1.00(0.97, 1.04)
Heteronormativity				
Mean	0.94(0.82, 1.07)	0.93(0.79, 1.11)	0.84(0.66, 1.08)	1.05(0.97, 1.13)

95% CI: 1.02, 1.13; South Africa, OR: 1.05, 95% CI: 1.00, 1.12), and perpetrating sexual violence (UK, OR: 1.07, 95% CI: 1.02, 1.13).

DISCUSSION

This analysis presents several findings previously not reported in the literature, and provides strong evidence for the influence of heteronormative social pressure on reporting of intimate partner violence among MSM. First, this study presents evidence that using internet-based social networking sites to recruit MSM, a traditionally difficult-to-reach population, is feasible in several settings, but currently less feasible in others. This finding calls attention to added challenges of reaching MSM living in communities where homosexual behavior remains illegal and/or stigmatized, and suggests that internet-based methods in and of themselves may be currently insufficient for these efforts in those places, a finding that has previously been documented for MSM in South Africa.[9]

Second, this study presents rates of IPV reporting among MSM that have yet to be documented in the literature, namely in the UK, Brazil, and Australia. Perpetration rates of IPV among MSM have also yet to be documented in the majority of these countries. From these data, it is clear that IPV, both physical and sexual, occurs in male-male relationships worldwide. Furthermore, the patterns of violence reporting are similar in each country, and mirror previous studies of partner violence among both heterosexual and MSM populations; that is, in all countries, experience of physical violence was most commonly reported while perpetration of sexual violence was least commonly reported. [9,20,40] Of primary importance in this study is the finding that the demographics correlates that are commonly viewed as "classic" risk factors for partner violence, such as low levels of education and drug use, do not uniformly affect reporting of violence among MSM cross-nationally. Context is critical. For example, while older age was found to significantly decrease odds of reporting violence in the U.S., Australia, and the UK, non-White race was instead the more important demographic risk factor in South Africa and Brazil for increasing odds of reporting IPV. This finding highlights the importance of understanding the unique history and culture of a given community; for example, the influence of race on partner violence in South Africa, with its apartheid past, may be different from the influence of race in a more racially homogenous country, such as Canada. This suggests that interventions targeting IPV among MSM must take said context into account, and that interventions developed in one area or country may need modification before they can be used in other locations. Additional research is needed to clarify these demographic risk factors in each setting such that practitioners may begin to screen for IPV among MSM.

Third, despite the lack of consistency observed between demographic correlates and violence across the 6 countries of interest, heteronormative social pressures were found to

Table 3. Extended. Continued.

South Africa		Brazil		
ESV	PSV	EPV	ESV	PSV
1.0	1.0	1.0	1.0	1.0
0.51(0.16, 1.57)	1.32(0.52, 3.32)	1.73(0.73, 4.08)	1.13(0.31, 4.07)	1.88(0.58, 6.12)
1.0	1.0	1.0	1.0	1.0
2.73(0.83, 8.98)	1.13(0.39, 3.30)	0.83(0.38, 1.82)	0.81(0.23, 2.86)	0.63(0.22, 1.82)
1.0	1.0	1.0	1.0	1.0
1.46(0.46, 4.71)	1.90(0.80-4.53)	0.68(0.28-1.66)	0.51(0.11–2.43)	0.45(0.12-1.60)
1.0	1.0	1.0	1.0	1.0
1.33(0.43, 4.13)	1.63(0.69, 3.88)	0.99(0.44, 2.22)	0.40(0.08, 2.09)	0.54(0.17, 1.68)
1.95(1.43**, **2.66)	0.89(0.73, 1.08)	1.06(0.88, 1.26)	***1.48(1.08**, **2.02)***	1.20(0.95, 1.52)
1.05(1.00**, **1.12)	1.02(0.98, 1.06)	0.99(0.96, 1.03)	1.03(0.98, 1.08)	0.99(0.94, 1.03)
0.98(0.86, 1.13)	***1.15(1.04**, **1.26)***	0.98(0.89, 1.07)	0.99(0.87, 1.13)	0.93(0.82, 1.06)

significantly increase odds of reporting IPV in all countries. That is, while the influence of different manifestations of heterosexist social pressure did vary across countries, the experience of any form of heterosexism consistently emerged from the data as a risk factor for reporting of IPV in all countries. This finding suggests that MSM who more explicitly report experiencing heteronormative pressures may be at increased risk for IPV, regardless of their geographic location, age, race, or education, and indicates that there may be associations between violence and homophobia that are necessarily unique to MSM. One possible way that homophobia and heterosexism may increase risk for IPV among MSM would be through larger processes of social stigmatization and marginalization, as posited by Minority Stress theory. For example, a lack of formal recognition of gay partnerships through civil unions or marriage may position MSM at a primarily increased risk of experiencing violence from their partners due to the lack of safeguards against IPV normally afforded married or otherwise legally recognized couples. Alternatively, there may be direct effects of heterosexist social pressure on MSM. For example, MSM who feel that they must hide their sexuality may feel less able negotiate un-coerced sex with male partners, or MSM with higher levels of internalized homophobia may report higher levels of sexual violence and sexual coercion owing to their reported lack of acceptance of their homosexual thoughts and behaviors. MSM experiencing violence may also experience a "double closet" of learned social shame of homosexual behaviors and shame of victimhood, making MSM less likely to seek out IPV support. The specific pathways through which homophobic social pressures influence these risks among MSM should be clarified through future research.

LIMITATIONS

There are several limitations to this study, the majority of which arise from its internet-based sampling. In all countries, the survey tool reached only MSM with access to the internet who were registered users of Facebook and who listed their interest in men in their profiles. Using such methods will necessarily oversample affluent MSM who are more open about the fact that they have sex with men, leading to possible underreporting of internalized homophobia and heteronormativity. Furthermore, this analysis includes only self-identified gay men to the exclusion of non-gay-identifying MSM, as this study seeks to examine the unique role that anti-gay sentiment and heterosexism has in the lives of gay-identified MSM. Reporting of all forms of intimate partner violence was not limited to male partners; although MSM may be reporting violence experienced and/or perpetrated by their female partners, such findings are still of importance. Additionally, the cross-sectional nature of the survey means that all data are correlative and causality cannot be assessed, that is; it remains unknown whether experiencing heterosexist

social pressures increases risk for violence or vice versa. Despite these limitations, use of an internet survey is appropriate insofar as it reaches traditionally hard-to-reach populations, and due to the anonymous nature of the internet, social desirability bias, which would lessen reporting of violence, is mitigated.

CONCLUSION

This study demonstrates that, cross-nationally, multiple forms of IPV are prevalent among MSM. Furthermore, these heretofore undocumented findings suggest that regardless of the varied demographic correlates of IPV in different contexts, heteronormative social pressure universally increases odds of reporting of IPV among MSM. An additional finding is that online surveys are able to reach MSM in many different countries and contexts, although modified efforts may be required to reach less affluent, less educated, and non-White MSM via the internet. Given the emerging body of literature that links experience of partner violence among MSM to several comorbidities, particularly risk for HIV infection, these findings elucidate the pressing need for MSM-focused services in all contexts, including non-Western contexts, to address partner violence as it occurs in male-male relationships. Both future research and future public health interventions shoulder consider and address the effect of heterosexist social pressures on the lives of MSM in all contexts, particular as they influence intimate partner violence.

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Trajectories of Intimate Partner Violence Victimization

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Introduction: The purposes of this study were to assess the extent to which latent trajectories of female intimate partner violence (IPV) victimization exist; and, if so, use negative childhood experiences to predict trajectory membership.

Methods: We collected data from 1,575 women at 5 time-points regarding experiences during adolescence and their 4 years of college. We used latent class growth analysis to fit a series of person-centered, longitudinal models ranging from 1 to 5 trajectories. Once the best-fitting model was selected, we used negative childhood experience variables—sexual abuse, physical abuse, and witnessing domestic violence—to predict most-likely trajectory membership via multinomial logistic regression.

Results: A 5-trajectory model best fit the data both statistically and in terms of interpretability. The trajectories across time were interpreted as low or no IPV, low to moderate IPV, moderate to low IPV, high to moderate IPV, and high and increasing IPV, respectively. Negative childhood experiences differentiated trajectory membership, somewhat, with childhood sexual abuse as a consistent predictor of membership in elevated IPV trajectories.

Conclusion: Our analyses show how IPV risk changes over time and in different ways. These differential patterns of IPV suggest the need for prevention strategies tailored for women that consider victimization experiences in childhood and early adulthood. [West J Emerg Med. 2012;13(3):272–277.]

INTRODUCTION

Latent Trajectories of Intimate Partner Violence Victimization

Male physical violence against women within the context of an intimate relationship—intimate partner violence (IPV)—is an unfortunate global reality. Over 30% of women in the United States (U.S.) are physically victimized by their intimate partners at some point during their lives.[1] Although similar rates have been found for men and women, the consequences of male-to-female IPV are decidedly more severe; the majority of patients who visit emergency departments for IPV-related injuries are women,[2] and far more women are killed at the hands of male partners than the converse.[3] This study analyzed longitudinal data on women's experiences of IPV victimization to test whether there is a single trajectory of IPV across time that represents all women or if there are multiple trajectories.

Because IPV occurs within the context of intimate relationships, it is common for women to be repeatedly victimized: one in three victims of IPV reported experiencing 4 or more incidents of physical violence committed by the same partner.[4] In fact, the strongest predictor of IPV victimization is previous victimization.[5] Researchers know more about characteristics of perpetrators who commit multiple acts of IPV, than about victims.[6,7] Researchers also know a large proportion of IPV victims were also victims of childhood abuse, a phenomenon known as *revictimization*.[8,9] Revictimized women report experiencing significantly more depression, anxiety, and post-traumatic stress disorder related

symptomology than women without a history of victimization.[10]

The purpose of this investigation is to determine whether latent trajectories of physical IPV victimization exist, and if so, the role of revictimization in these trajectories. We tested a series of latent class growth models to assess meaningful patterns of IPV experiences using longitudinal data collected from female college students. Latent class growth analysis (LCGA) is a simplified case of growth mixture modeling where within-class variances are fixed at zero.[11,12] This technique has been used previously to explore trajectories of female sexual victimization.[13]

Our first research question concerned latent heterogeneity within our sample in terms of the frequency of IPV experiences across time. Based on the previous literature, we expected to find at least 2 distinct subgroups: a large group of women who were not victimized during adolescence or college and a smaller group of women who were consistently victimized across this time period.[5]

Our second research question examined whether negative childhood experiences could differentiate between groups that emerged. To test this question we explored whether childhood sexual abuse, witnessing domestic violence and parental physical punishment predicted latent trajectory membership. Consistent with previous literature, we hypothesized these negative childhood experiences would differentially predict IPV trajectory membership.

METHODS

Participants

Data for this study are part of a large longitudinal dataset of social experiences (data available at http://dx.doi.org/10.3886/ICPSR03212). Participants were 18- to 19-year-old women enrolled at a medium-sized university in the southeastern U.S. Two incoming classes of first-year women were invited to complete a series of 5 surveys over 4 years of college; 85% of women invited agreed to participate by completing the initial survey ($n = 1,575$). Approximately 25.3% of women self-identified as African-American, 70.9% as Caucasian, and 3.8% identified with other ethnic groups. Participants' average age was 18.3 years; 92.8% had never been married.

Procedure

The local institutional review board approved all procedures. The surveys gauged a number of social experiences including predictors, correlates, and consequences of interpersonal violence. Data collection at the first time-point—negative childhood experiences and adolescent IPV victimization—was conducted during the university's fall first-year orientation for 2 consecutive years with hour-long sessions conducted by trained undergraduate orientation leaders. Leaders acquired informed consent before survey administration after explaining the purpose and method of data collection. Experiences during each year of college—collegiate IPV victimization—were assessed at the end of the spring semester over the subsequent four years. Participants were given $15 in exchange for each survey completed. To protect confidentiality, the third author obtained a federal Certificate of Confidentiality from the National Institutes of Mental Health. Yearly participant retention rates were 89%, 86%, 80%, and 78%, respectively; 47.2% of the initial sample completed all 5 time-points of the study.

Measures

Intimate Partner Violence (IPV). The Conflict Tactics Scale (CTS)[14,15] assessed physical IPV victimization during adolescence and college. The CTS has been the most widely used measure over 3 decades of research on conflict and violence within intimate relationships. Participants are asked to indicate the number of times they have experienced: (1) threats to hit or throw something at the participant; (2) throwing something; (3) pushing, grabbing, or shoving; (4) hitting or attempting to hit, but not with anything; or (5) hitting or attempting to hit with something hard. The item assessing whether a respondent was "beaten up" was excluded due to low endorsement-rates during pilot testing. Participants responded to each item on a scale ranging from 1 to 5, with 1 = "never," 2 = "once," 3 = "2 to 5 times," 4 = "6 to 10 times," 5 = "more than 10 times." IPV experiences during high school were assessed at the first time point, and experiences during each year of college were measured during each subsequent time points. Responses were coded so "never" was scored 0, "once" was scored 1, "2 to 5 times" was scored 2, "6 to 10 times" was scored 6, and "more than 10 times" was scored 11.

Negative Childhood Experiences. Participants provided retrospective reports of childhood sexual abuse, parental physical abuse, and witnessing domestic violence during initial data collection. Each form of abuse was assessed based on measures used by Koss, Gidycz, and Wisniewski.[16]

Childhood Sexual Abuse. Childhood sexual abuse was defined as being a victim of sexual acts perpetrated by an adult or any coercive sexual act perpetrated by a similarly-aged peer prior to the age of 14 (e.g., "A person fondled you in a sexual way or touched your sex organs or asked you to touch their sex organs"). Four items were recorded on 5-point scales ranging from "Never had this experience" to "More than 5 times;" the resulting childhood sexual abuse frequency ranged from 0 to 24.

Parental Physical Abuse. Parental physical abuse was defined as recurrent experiences, rather than rare events, during childhood. Participants read the following: "Physical blows (like hitting, kicking, throwing someone down) sometimes occur between family members. For an average month, when

you were growing up (i.e., ages 8 to 14 years), indicate how often one of your parents did this to you." Participants responded on a 5-point scale ranging from "Never" to "Over 20 times." Responses were recoded to yield a frequency score that ranged from 0 to 21.

Witnessing Domestic Violence. Witnessing domestic violence was defined by the statement: "For an average month, indicate how often one of your parents or stepparents delivered physical blows to the other." Participants responded on a 5-point scale ranging from "Never" to "Over 20 times." Responses were recoded to yield a witnessing domestic violence frequency that ranged from 0 to 21.

Analytic Strategy

We conducted an LCGA with Mplus version 5.1 to estimate models using maximum likelihood estimation with robust standard errors.[17] Because this estimator assumes data are missing at random, it uses all cases and all data to estimate model parameters.[18] Please see White and Smith (2009) for an overview of attrition within this sample.[19] The frequency of physical victimization at each time-point was entered as an indicator in the analysis. Thus, the latent trajectory class structure is based on patterns of physical victimization frequency across time. We designated the frequency variables as count, which prompted the software to use a Poisson distribution—where the mean equals the conditional variance.[20] To assess the power of past negative childhood experiences in discriminating between latent trajectory classes, we regressed class membership on childhood sexual abuse, parental physical abuse, and witnessing domestic violence; although these three variables were not used to estimate the latent groups or *classes*.

The data were fit to LCGA models ranging from 1 to 5 classes. When building a mixture model there is no singular indicator of model fit; multiple statistical indicators must be paired with a theoretical understanding of the constructs to determine an appropriate class structure.[21,22] We used the Bayesian Information Criterion (BIC) and the Lo-Mendell-Rubin adjusted Likelihood Ratio Test to compare model fit, and entropy and posterior probabilities to compare how cleanly each model classified cases into each class structure.[23] In addition, we reviewed plots of estimated means for each model to compare heterogeneous class structures with past theoretical and empirical information concerning frequency of sexual victimization. We used negative childhood experience covariates to establish additional discriminant validity between the latent trajectory classes.[24]

RESULTS

Means, standard deviations, and correlations between variables used in the modeling process are presented in Table 1. The five-class model best fit the data, significantly better than the 4-class model ($p = 0.04$) according to the Lo-Mendell-Rubin adjusted Likelihood Ratio Test. The 5-class model has a higher BIC compared with the 4-class model; although the entropy is a bit lower for the 5-class model compared with the 4-class model (.904 versus .921), both exhibited respectable classification quality. Finally, we selected the 5-class model because we found it most interpretable; see Figure 1 for the estimated means plot of the 5-class model. We interpreted each of the latent trajectory classes below based on parameters noted in Table 2 and the plot depicted in Figure 1.

Low or No IPV

Of the 5 classes, this class had the highest most-likely membership (n=1066, 67.6%). The intercept of this trajectory class is significantly lower than the average frequency at baseline (see Table 3). Although the linear and quadratic slopes are significant, the frequency of IPV in this trajectory starts and stays low across the 5 time-points (Figure 1). Because most-likely members of this class experienced little to no victimization across the study, this class was used as the reference group for the multinomial logistic regressions of latent trajectory class membership on the negative childhood experience variables.

Low to Moderate IPV

This class is estimated to account for over 12% of the sample (n=200). The intercept of this trajectory class is not significantly different from average, but its linear slope is significantly positive and its quadratic slope is significantly negative (Table 3). This translates to a trajectory including women who have slightly elevated levels of victimization during adolescence and then experience more IPV as they progress through college, although this increase is somewhat attenuated during their fourth year of college (Figure 1). We interpreted this latent class as the low to moderate IPV trajectory for these reasons.

Moderate to Low IPV

This class accounted for over an estimated 14% of the sample (n=218). The intercept of this trajectory class is significantly higher than average, the linear slope is significantly negative, and the quadratic slope is significantly positive (see Table 3). Figure 1 and Table 4 show IPV frequency is elevated during adolescence but drops sharply beginning at year 1 of college to a consistently low frequency thereafter. For this reason we interpreted this latent class as the moderate to low IPV trajectory.

High to Moderate IPV

This class is one of the smaller groups in terms of most-likely membership (n=47, 3.0%). In a similar pattern to the moderate to low trajectory, this trajectory has a significantly above average intercept, a significantly negative linear slope, and a significantly positive quadratic slope. The obvious difference between these two trajectories—as depicted in

Table 1. Correlations, means, and standard deviations between variables used in the latent class growth analysis to assess negative childhood experiences relative to intimate partner violence among college-age women.

	CSA	PPA	WDV	IPV1	IPV2	IPV3	IPV4	IPV5	*M*	*SD*
CSA	1.00								1.90	3.85
PPA	.11*	1.00							1.41	3.51
WDV	.10*	.36*	1.00						.44	1.86
IPV1	.11*	.09*	.13*	1.00					2.64	6.43
IPV2	.11*	.06*	.07*	.24*	1.00				1.19	3.62
IPV3	.10*	.08*	.06*	.22*	.38*	1.00			1.31	4.36
IPV4	.10*	.05	.17*	.21*	.39*	.41*	1.00		1.33	4.50
IPV5	.09*	.04	.05	.23*	.26*	.32*	.41*	1.00	.87	2.83

CSA. Childhood Sexual Abuse; *PPA,* Parental Physical Abuse; *WDV,* Witnessing Domestic Violence; *IPV*, Intimate Partner Violence.
* $p<0.05$.

Figure 1—is the intercept of this trajectory greatly exceeds that of the moderate-to-low IPV trajectory. Women in this IPV trajectory are the most highly victimized group during adolescence, but these levels drop sharply at year 1 of college, although a moderate level of victimization persists across college. We interpreted this latent class as the high to moderate IPV trajectory.

High to Increasing IPV

The final class is the smallest group in terms of most likely membership (n=44, 2.8%). The intercept of this class trajectory is significantly higher than the average, the linear slope is significantly positive, but the quadratic slope is significantly negative (Table 3). This translates to a trajectory of women who are highly victimized during adolescence and whose average frequency of victimization experiences actually increase in number after they enter college, although this increase is somewhat attenuated toward their later 2 years of college (Figure 1). These factors let us to interpret this latent class as the high to increasing IPV trajectory.

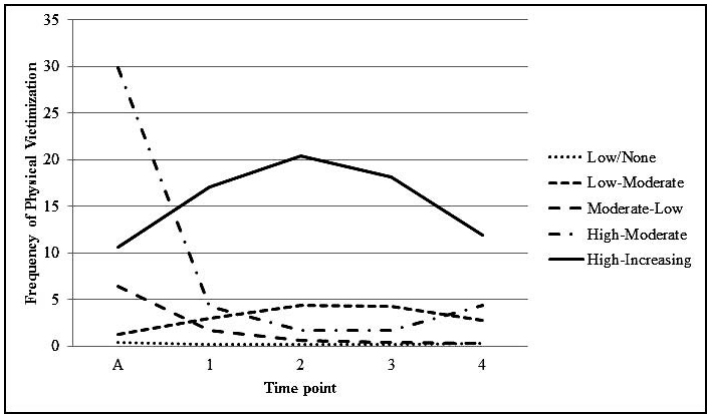

Figure 1. Estimated latent trajectories of intimate partner violence victimization.

Negative Childhood Experiences

We specified observed negative childhood experience variables as auxiliary covariates to predict latent trajectory class membership. With the low or no trajectory class as the reference group, multinomial logistic regressions suggested that negative childhood experiences predicted IPV victimization trajectory membership (Table 3). Childhood sexual abuse predicted membership in all of the elevated IPV victimization trajectories when compared with the low or no victimization trajectory. Furthermore, witnessing domestic violence predicted membership in the high to moderate trajectory, and parental physical abuse marginally predicted high to increasing trajectory membership.

DISCUSSION

Our primary goal was to investigate the heterogeneity of women's experiences of IPV beginning in adolescence and spanning their 4 years of college. Using a person-centered approach to longitudinal data analysis, we identified 5 clearly articulated trajectories. Based upon estimated intercepts and slopes for each trajectory, the 5 IPV trajectories were interpreted as low or no, low to moderate, moderate to low, high to moderate, and high to increasing. This distribution of trajectories suggests college women have very diverse

Table 2. Fit Statistics for each class-structure estimated.

Model	BIC	Adj. LRT	Entropy
One-Class	36957.30	—	1.000
Two-Class	24803.93	10715.71 ($p<.001$)	0.969
Three-Class	22146.30	2598.83 ($p=.06$)	0.956
Four-Class	20356.06	1759.930 ($p<.05$)	0.921
Five-Class	**19428.96**	**925.13 ($p<.05$)**	**0.904**

BIC, Bayesian Information Criterion; *Adj. LRT*, Lo-Mendell-Rubin adjusted Likelihood Ratio Test. Bold-type indicates the selected model.

Table 3. Characteristics for the 5-class model of physical victimization.

Latent Trajectory Classes	% of Sample	Frequency of Physical Victimization		
		Intercept (*SE*)	Linear slope (*SE*)	Quadratic (*SE*)
1. *low or none*	65.5	−.92*	−.80*	.17*
2. low-moderate	14.1	.26	1.02*	−.21*
3. moderate-low	14.6	1.85*	−1.51*	.18*
4. high-moderate	3.0	3.39*	−2.42*	.48*
5. high-increasing	2.8	2.36*	.63*	−.15*

* $p<0.05$.

experiences with IPV; it also indicates the frequency of IPV dramatically changes across time for most women affected. The period between adolescence and the end of the first year of college seems to be where most of the change occurs, in both positive and negative directions.

Our second goal was to predict trajectory membership with negative childhood experiences. Women who were victims of childhood physical abuse are more likely to be in the trajectory characterized by frequent and consistent IPV—findings consistent with the revictimization literature.[8–10] Childhood sexual abuse predicted membership in all 4 elevated IPV trajectories, underscoring its central role in future victimization experiences. Witnessing domestic violence predicted membership in the high to moderate trajectory and childhood physical abuse predicted membership in the high to increasing trajectory, the 2 most worrisome trajectories.

IMPLICATIONS

The ultimate goal of this research is to decrease or even prevent IPV. To prevent IPV, we must understand patterns of risk. Our analyses suggest how IPV risk can change over time for different groups of women. Many IPV prevention and intervention programs are indiscriminately applied with the belief that all girls and women are at relatively equal risk of becoming victims, although the literature has indicated otherwise for some time.[4,5] Differential patterns of IPV apparent in our data suggest the need for prevention strategies for women that consider victimization experiences in childhood and early adulthood. Future investigation should focus on other childhood variables predicting future IPV trajectories, such as family income, parents' education, and the presence of substance use in the home. Future research should also assess factors leading to these increases and decreases in IPV shortly after college matriculation to better understand IPV risk and protective factors.

Table 4. Estimated log-odds and standard errors from logistic regressions of trajectory membership on negative childhood experiences.

Latent Trajectory Classes	Estimate (*SE*)		
	CSA	WDV	PPA
2. low-moderate	0.49 (0.02)*	0.06 (0.04)	0.03 (0.2)
3. moderate-low	0.06 (0.02)*	0.02 (0.05)	0.03 (0.02)
4. high-moderate	0.09 (0.03)*	0.15 (0.05)*	0.01 (0.05)
5. high-increasing	.09 (.03)*	.09 (.06)	.07 (.04; p=.08)

Note: CSA, Childhood Sexual Abuse; *WDV*, Witnessing Domestic Violence; *PPA* , Parental Physical Abuse; Low-None class as reference

LIMITATIONS

All data used for these analyses were collected from students at 1 Southeastern university. Although the Carnegie Foundation has found students at this institution to be representative of all students at U.S. state colleges and universities,[25] the findings of this study may not generalize to all female U.S. college students, students from other countries, or non-college populations. The IPV literature does not suggest trajectories would differ across subpopulations of women; however, caution should be used in generalizing these findings. Another limitation of this work was its primary focus on the frequency of women's IPV experiences. By limiting the scope of the current research to frequency of victimization, all IPV experiences are given the same weight in the analysis. Future research designs that include examinations of IPV severity or other assault characteristics will extend the current findings. Finally, witnessing domestic violence and physical abuse during childhood each were measured with 1 item; future research should use validated measures including multiple items to assess each construct.

CONCLUSION

The present study makes the case for subgroups of college women in terms of their patterns of IPV frequency across time. LCGA identified 5 classes across adolescence and 4 years of college. These 5 classes are interpreted as low or no, low to moderate, moderate to low, high to moderate, and high to increasing IPV trajectories of victimization across time. Negative childhood experiences—childhood sexual abuse, witnessing domestic violence, and parental physical punishment—distinguished between the latent trajectories. Application of research that distinguishes cohesive subgroups of victims may inform the disparate efforts of IPV prevention programs.

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Association between Intimate Partner Violence and Health Behaviors of Female Emergency Department Patients

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Introduction: We assessed the correlation between intimate partner violence (IPV) and health behaviors, including seat belt use, smoke alarm in home, handgun access, body mass index, diet, and exercise. We hypothesized that IPV victims would be less likely to have healthy behaviors as compared to women with similar demographics.

Methods: All adult female patients who presented to 3 Atlanta-area emergency department waiting rooms on weekdays from 11AM to 7PM were asked to participate in a computer-based survey by trained research assistants. The Universal Violence Prevention Screen was used for IPV identification. The survey also assessed seatbelt use, smoke alarm presence, handgun access, height, weight, exercise, and diet. We used chi-square tests of association, odds ratios, and independent t-tests to measure associations between variables.

Results: Participants ranged from 18 to 68 years, with a mean of 38 years. Out of 1,452 respondents, 155 patients self-identified as white (10.7%), and 1,218 as black (83.9%); 153 out of 832 women who were in a relationship in the prior year (18.4%) screened positive for IPV. We found significant relationships between IPV and not wearing a seatbelt ($p<0.01$), handgun access ($p<0.01$), and eating unhealthy foods ($p<0.01$).

Conclusion: Women experiencing IPV are more likely to exhibit risky health behaviors than women who are not IPV victims. [West J Emerg Med. 2012;13(3):278–282.]

INTRODUCTION

Intimate partner violence (IPV) is a serious and commonly encountered public health issue in the United States (U.S.). Studies have shown that almost one-fourth of U.S. women have been victimized by an intimate partner at some point in their lives, with higher rates in low-income and black populations.[1–3]

IPV is associated with several health problems and behaviors. Victims of IPV have been shown to have 2 to 5 times the risk of family and social problems, depression, anxiety, and sexually transmitted diseases when compared to never-abused women in age-adjusted models.[4] Additionally, women victimized by IPV have been shown to engage in more negative health behaviors, such as cigarette smoking, binge drinking, and failing to have a checkup with a doctor within the past one year.[5]

While it is reasonable to assume that IPV victims who have been shown to endorse negative health behaviors would similarly report less healthy behaviors, very little research has been performed to link IPV with a decrease in these healthy behaviors, such as seat belt use and eating a healthy diet. This link is important; as it demonstrates how likely IPV victims are to engage in behaviors that can result in personal injury and development of chronic disease, in addition to the conditions and injuries that directly result from their abuse. This association may also help explain why certain populations are more susceptible to IPV by qualifying some women as greater

risk-takers in multiple behavioral areas, such as in personal relationships as well as their health. Finally, these results will highlight areas of behavioral modification that healthcare providers can screen for and address when treating women who have experienced IPV.

Our goal was to study the relationship between IPV and commonly practiced health behaviors among at-risk patients in the emergency department (ED), using data generated from a computer-based survey of female patients who presented to three urban EDs. We specifically looked at associations with seat belt use, handgun access, smoke alarm presence, body mass index (BMI), diet, and exercise. While these particular variables were selected from a preexisting dataset, they were all chosen due to their requirement of personal effort for successful behavior performance. As they are all highly dependent on individual action, these behaviors demonstrate high potential for future modification.

We hypothesized that women who had experienced IPV would be more likely to engage in unhealthy behaviors and less likely to endorse healthy behaviors.

METHODS

Study Design, Setting and Population

This study was a correlational analysis of a preexisting dataset. We obtained the dataset from a study that was based in 3 EDs in a large city in the southeastern U.S. Most participants were patients at a Level I trauma hospital in this city, which sees approximately 105,000 ED patients annually. This main study location conducted 969 patient screenings from June 2008 to August 2009. Ninety-nine patients were screened at a tertiary and quarternary care hospital that has an annual ED census of over 30,000 patients, from March 2009 through December 2009. The third hospital is a community-based hospital with 50,000 ED patients annually. This location screened 449 participants between July 2008 and March 2009. All three hospitals are academically affiliated with a nationally prominent university, with residents from various services and medical students rotating through each ED.

Study Protocol

Research assistants asked all adult female patients who presented to these 3 ED waiting rooms on weekdays from 11AM to 7PM to participate in a computer-based survey. These assistants had received training in following protocol and documentation, patient interaction, and working in the ED. Participants were excluded if they were not fluent in English, showed evidence of intoxication, or were critically ill, currently taking anti-psychotics, or unable to complete a 20-minute questionnaire.

Women who agreed to participate were taken to a private kiosk in the ED to complete a computer survey. Women who screened positive for IPV received printed educational information and a list of community resources for IPV. Research assistants then consented them to participate in the study and administered a short survey regarding any relationship issues and general health status.

The data collected through the surveys and follow-up interviews were entered into a computer database and cleaned by research assistants.

Measures

The main study outcomes were comparisons of health maintenance behaviors to the incidence of IPV. The health maintenance behaviors studied were seatbelt use, smoke alarm presence in home, handgun access, BMI, daily healthy or unhealthy diet, and weekly exercise frequency.

Participants responded "yes" or "no" to the questions, "When you are in a car, do you always use a seatbelt?", "Does your home have a working smoke alarm (by working we mean installed and with a working battery in it)?," and "Do you have access to a handgun?" In order to assess diet habits, participants responded "yes" or "no" to the questions, "Do you eat foods like whole grain bread, cereal, fresh fruits or vegetables every day?", and "Do you eat foods like fatty meat, cheese, fried foods, or eggs everyday?" To assess exercise frequency, participants were asked, "In an average week, how many times do you engage in physical activity (exercise or work which lasts at least 20 minutes without stopping and which is hard enough to make you breathe heavier and your heart beat faster)?", to which they could answer, "At least 3 times per week," "1–2 times per week," or "Less than 1 time per week." Participants self-reported their height and weight, which were used to calcuate a BMI for each woman.

The computerized survey used the Universal Violence Prevention Screening Protocol (UVPSP), a 6-item, previously validated instrument initially developed by the ED at George Washington University. This tool identifies IPV victimization by assessing any physical, sexual, and verbal violence with yes or no responses. A positive answer to any one question causes the respondent to screen positive for IPV. This tool has been validated in other studies; one study published in 2003 showed that women who were victims of IPV were more likely to answer affirmatively to each screening question on the UVPSP.[6]

Data Analysis

This project was a secondary analysis of a preexisting dataset from a cross-sectional multisite study. This initial study assessed the impact of educational brochures on patient contact with support resources and patient harm-reduction strategies. This study was reviewed and approved by the institutional review board of the university associated with the main study location and the hospital research oversight committee.

We undertook all analyses using SPSS (SPSS Inc.; v. 19.0; Chicago, IL). Simple descriptive statistics were calculated and are reported as counts, percentages, means, SDs, and ranges, as appropriate. We compared seatbelt use, smoke alarm access,

handgun access, exercise frequency, and daily consumption of healthy and unhealthy foods between IPV victims and non-victims using chi-square tests of association and odds ratios. We also used chi-square tests of association to analyze differences in exercise frequency between victims and non-victims, using those who reported exercising less than once per week as the reference group to compare against women who exercised 1 to 2 times per week and those who exercised at least 3 times weekly. We used an independent t-test to assess for significant differences in BMI between IPV victims and non-victims. Standard assumptions for chi-square tests of association and t-tests were verified. We did not conduct power analyses, as this was a retrospective analysis.

RESULTS

Of 3,381 women approached, 1,474 (43.6%) agreed to participate in the survey and comprised our study population for the general comparisons of IPV associations with health measures. One hundred and fifty-three women out of the 832 women in a recent relationship (18.4%) were positive for IPV.

Our study sample was largely black (84%) and U.S.-born (94%). Most women were single (64%), and more than half were unemployed (55%). The average age of this sample was 38 years (SD 12.8). About half our sample had at least some college education (52.3%), and most women were poor, reporting an annual household income of less than $20,000 (69%). (Table 1)

Compared with nonvictims, IPV victims were about half as likely to wear seatbelts (OR=0.53, p=0.008), more than twice as likely to have access to a handgun (OR=2.27, p=0.002), and were 80% more likely to report daily consumption of unhealthy foods (OR=1.80, p=0.002). Women who screened positive for IPV were less likely than those with no IPV to have a working smoke alarm in their home, although this relationship was not statistically significant (OR=0.59, p=0.078). There was no significant relationship between IPV victimization and BMI, frequency of weekly exercise, or healthy food intake, although IPV victims were 23% less likely to endorse eating healthy foods on a daily basis (OR 0.77, p=0.158). (Table 2)

Table 1. Self-described demographic characteristics of study participants (n=1474).

Race		
	Black	1218 (83.9%)
	White	155 (10.7%)
	Hispanic	16 (1.1%)
	Asian	9 (0.6%)
	Other	54 (3.7%)
Marital Status		
	Single	928 (64.2%)
	Married	224 (15.5%)
	Divorced	129 (8.9%)
	Separated	113 (7.8%)
	Widowed	52 (3.5%)
Born in the United States		
	Yes	1355 (93.5%)
	No	94 (6.5%)
Education		
	<9th Grade	42 (2.9%)
	Some High School	177 (12.3%)
	High School	468 (32.5%)
	Some College	406 (28.2%)
	College	217 (15.1%)
	Graduate School	130 (9%)
Employed		
	Yes	645 (44.9%)
	No	792 (55.1%)
Annual Household Income		
	<$20,000	984 (68.6%)
	$20,000-$29,999	196 (13.7%)
	$30,000-$39,999	95 (6.6%)
	$40,000-$49,999	47 (3.3%)
	>$50,000	112 (7.8%)
Age	37.95 (SD 12.8)	

DISCUSSION

Women who experience IPV are more likely to engage in unhealthy behaviors; these findings show that women who experience IPV are at risk of adverse health outcomes from their increased negative health behaviors.

Women could be more likely to endorse negative health behaviors as a result of their increased stress from being IPV victims, resulting in having less time and effort to devote to eating healthy food. IPV has also been linked with depression, which can lead to decreased motivation to actively perform health behaviors, such as wearing a seatbelt and eating a healthy diet. [4] Additionally, when faced with the real and present threat of violence, avoiding seemingly less likely bodily injury through seatbelt use can have relatively decreased importance in the lives of IPV victims. The increased incidence of handgun access among IPV victims might be explained by their increased level of personal danger threat due to experienced violence. However, this finding is concerning given the increased risk of homicide for females by a partner when a gun is the home.[7]

While we found that IPV victims are more likely to endorse eating unhealthy foods everyday compared to nonvictims, these same women were no less likely to report eating healthy foods consistently than women who did not screen positive for IPV. An explanation for this finding could lie in the sample itself, a poor and urban population that likely does not have healthy eating habits at baseline. The BMIs

Table 2. Frequencies (percentages) of health behaviors based on intimate partner violation victimization.

		Negative	Positive	OR	P
Seatbelt Use:					
	Yes	600 (89.4%)	125 (81.7%)	0.53	**0.008**
Smoke Alarm in Home					
	Yes	624 (93.0%)	134 (88.7%)	0.59	0.078
Handgun Access					
	Yes	51 (7.7%)	24 (15.9%)	2.27	**0.002**
Eat Healthy Foods Daily					
	Yes	474 (70.5%)	99 (64.7%)	0.77	0.158
Eat Unhealthy Foods Daily					
	Yes	384 (57.1%)	108 (70.6%)	1.80	**0.002**
Exercise Frequency Per Week					0.447
	<1	236 (35.3%)	46 (30.7%)	Ref.	
	1–2	205 (30.6%)	53 (35.3%)	1.33	
	>3	228 (34.1%)	51 (34.0%)	1.15	
BMI		29.99 (SD 7.83)	29.76 (SD 7.34)		0.757

BMI, body mass index; *OR*, odds ratio; *SD,* standard deviation

between both groups were fairly similar, averaging just over 29 (which is widely considered to be at the end of the "overweight" spectrum, and close to the "obese" category), as were exercise habits, providing evidence for the argument that this population might not have healthy eating or exercise habits at baseline. The IPV victims who reported eating more unhealthy foods could be reacting to the increased stress in their lives by eating more "comfort" foods that might be unhealthy.

Violence and resulting increased stress have been linked to somatic disorders, such as fibromyalgia, chronic fatigue syndrome, and irritable bowel syndrome.[8,9] Stress has similarly been linked to chronic diseases, such as cardiovascular disease, asthma, diabetes, and gastrointestinal disorders.[8,10] It is widely accepted that certain health behaviors, such as poor diet and exercise, are related to higher risk of chronic diseases, such as obesity and hypertension; similarly, certain risk behaviors, such as not wearing a seatbelt, having a smoke alarm, and handgun access, put people at increased risk of personal injury. Subsequently, this study's demonstration of associations between IPV and certain negative health behaviors is concerning, as IPV already puts women at risk of chronic disease and personal injury, a risk which is further increased by adoption of unhealthy behaviors.

LIMITATIONS

This study is limited by using patients seeking care at EDs and not the general population. In addition, our patients were largely black and all the sites were in the same region. While this may limit generalizability, our findings provide data about a vulnerable population that is at particularly high risk for IPV and highlights the need for studying the health behaviors of other populations.

Another limitation is the use of a survey that relied on self-reported information. While previously validated survey instruments were used to address this limitation, data still could be misrepresented due to inaccurate recall or social desirability bias for self-reported measures, such as weight, diet, and exercise. Also, this cross-sectional study provides measures of association, but do not address causality; it is difficult to say whether the decreased adoption of health behaviors puts women at risk for IPV or vice versa. Finally, as this was a retrospective analysis of an existing dataset, the health behaviors we studied were limited to those initially surveyed. The survey did not assess frequency and context of IPV experienced, which could have influenced the association between IPV and certain health behaviors.

CONCLUSION

These findings highlight the need for interventions that identify and provide counseling for common health behaviors, particularly for women who disclose IPV. Adherence to these health behaviors can have a significant impact upon injury prevention and chronic disease development and progression. Healthcare providers should address the role of violence in women's lives and how it affects their ability to adhere to health maintenance regimens. Finally, future IPV interventions should focus on significant health behaviors, as well as ending abusive relationships when addressing the needs of women who experience IPV in order to improve their overall health outcomes.

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Race, Ethnicity, Substance Use, and Unwanted Sexual Intercourse among Adolescent Females in the United States

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Introduction: The purpose of this study was to examine racial/ethnic disparities in being forced to have sexual intercourse against one's will, and the effect of substance use on these disparities.

Methods: We analyzed data from adolescent women participating in the Youth Risk Behavior Survey. Bivariate associations and logistic regression models were assessed to examine associations among race/ethnicity, forced sex, and substance use behaviors.

Results: Being forced to have intercourse against one's will and substance use behaviors differed by race/ethnicity. African Americans had the highest prevalence of having been forced to have sexual intercourse (11.2%). Hispanic adolescent women were the most likely to drink (76.1%), Caucasians to binge drink (28.2%), and African Americans to use drugs (44.3%). When forced sexual intercourse was regressed onto both race/ethnicity and substance use behaviors, only substance use behaviors were significantly associated with forced sexual intercourse.

Conclusion: Differences in substance use behaviors account for the racial/ethnic differences in the likelihood of forced sexual intercourse. Future studies should explore the cultural and other roots of the racial/ethnic differences in substance use behavior as a step toward developing targeted interventions to prevent unwanted sexual experiences. [West J Emerg Med. 2012;13(3):283–288.]

INTRODUCTION

The United States (U.S.) Centers for Disease Control and Prevention (CDC) defines sexual violence as nonconsensual completed or attempted penetration, unwanted non-penetrative sexual contact, or noncontact acts (e.g., verbal sexual harassment, being flashed, being forced to look at sexual materials) by any perpetrator.[1] Sexual violence is a major public health concern, in part because of its prevalence, and also because it results in quantifiable psychological and physical injuries, as well as other long-term health impacts.[2]

The most likely victims of sexual violence are young and female.[2] The vast majority of victims experience their first sexual assault before 18 years old,[4] and a recent CDC report stated that 42.2% of first experiences of forced sexual intercourse occur during adolescence.[5] Overall, the prevalence of unwanted sexual experiences among adolescent women is reported to be between 13.5% and 30.0%.[3,4] Although the prevalence estimates vary due to measurement and data collection issues, sexual assault is most likely under-reported.[3] Experiences of sexual assault, in particular, during adolescence are associated with a number of adverse outcomes, including re-victimization, increased prevalence of mental disorders, and risky health behaviors.[5–15]

Increasing diversity of the U.S. population requires a better understanding of risk factors for adverse outcomes, such as sexual assault, by race/ethnicity. For adult women, recent data from the CDC report lifetime prevalence of rape as about 1 in 5 for African Americans (22.0%) and whites (18.8%), and 1 in 7 for Hispanics (14.6%).[5] Some studies have shown that the prevalence of forced sexual intercourse among adolescents differs by racial and ethnic groups, while others have found no differences.[5,8,16–19] In the studies that find differences, the

results are mixed. For instance, 1 study only found differences among race/ethnic groups for adolescent men, but not adolescent women.[17] In another study, African American adolescents reported the highest proportion of forced sexual intercourse, which is consistent with results from the National Violence Against Women Survey showing that black, Hispanic, and American Indian/Alaskan Native women are at greater risk for rape victimization than white women.[2,16,18] Since race/ethnicity is, at best, a *marker* for those with a high risk, it is important to explore whether particular causal risk *factors* are associated with race/ethnicity, and whether these risk factors may explain differences in the rates of forced sexual intercourse among the members of various racial/ethnic groups. Identifying the causal factors will enable development of preventive interventions that can then be targeted to the groups at risk.

Substance use is one candidate risk factor as it is a common behavior among teens and is reported to vary by race/ethnicity. Binge drinking, or heavy episodic drinking, is most often defined as consuming 5 or more drinks during 1 occasion. This behavior occurs frequently among younger persons; 7.3% of women aged 12 to 17 years in 2010 reported binge drinking in the previous month.[20] This behavior also differs by race/ethnicity. For example, Asian and African Americans tend to report lower levels of binge drinking than other groups.[20,21] Compared with alcohol use, illicit drug use is less prevalent, with 19.4% of adolescents reporting past year use.[20] However, compared with binge drinking, reported illicit drug use among women between the ages of 12 to 17 is considerably higher (19.4%).[20] African Americans report similar levels of drug use compared with whites and Hispanics, while Asians report lower levels.[20]

Cross-sectional studies of substance use and forced sexual intercourse find that they frequently co-occur. For example, adolescent women who report drug use, such as marijuana and other illicit drugs, are significantly more likely to report sexual victimization.[9,18] Similar results are found for alcohol use, especially binge drinking.[1,17] Research about the causal relationship between forced sexual intercourse and substance use suggests bi-directionality.[22] More specifically, given the emotional impact of forced sexual intercourse, it can increase future alcohol and drug use.[23,24] On the other hand, longitudinal studies of adolescent women suggest that alcohol and drug use increase risk for sexual victimization.[9,25] In fact, a national survey found that 1 per 1000 adolescents reported having experienced a drug- or alcohol-facilitated rape by a dating partner, and 2% of college students were victims of alcohol-related sexual assault or date rape.[26–27] Adolescent women who experience drug- or alcohol-facilitated rape are more likely to report having abused alcohol or used drugs in the past year compared to adolescent women who report other types of sexual assault.[28] Alcohol and drug use may place adolescents in high-risk environments where forced sexual intercourse is more likely to occur. Alcohol consumption influences sexual risk behavior, reducing perceptions of individual risk, which may provide increased opportunity for experiencing sexual assault among adolescents who drink alcohol.[29] Using alcohol and being in risky situations may be the two risk factors that best predict forced sexual intercourse.[2,30]

The literature cited above suggests that substance use may be an important risk factor confounding the relationship between race/ethnicity and forced sexual intercourse. Most research investigating outcomes associated with forced sexual intercourse controls for race/ethnicity, but very little has examined racial and ethnic differences in sexual victimization, especially while controlling for the effects of other risk factors.[13,22,31] Furthermore, researchers have called for a better understanding of the role of substance use in forced sexual intercourse,[3] particularly among racial and ethnic groups.[18] In response, this research was designed to explore the following questions:

1. Does the prevalence of forced sexual intercourse vary by race/ethnicity among adolescent women?
2. Does drinking behavior and drug use vary by race/ethnicity among adolescent women?
3. Does racial/ethnic variation in forced sexual intercourse among adolescent women persist when drinking behavior and drug use are controlled?

METHODS

The Youth Risk Behavior Survey (YRBS) is a biannual survey conducted by the CDC to monitor the health behaviors of high school students in the U.S. Data on forced sexual intercourse, binge drinking, and drug use, as well as race/ethnicity were available from the 2009 YRBS.

The YRBS selects respondents based on a 3-stage, cluster sample design through proportional probability methods used to select counties, schools, and then classrooms. Before administering the survey, local parental permission procedures were followed, and students were informed that their participation was anonymous and voluntary. The self-administered questionnaire was completed in the students' classrooms. The 2009 YRBS public-use data file included responses from 16,410 adolescents, including 7,816 women in the weighted sample. However, only women who responded to the questions about forced sex, drinking behavior, drug use, and the demographic variables comprised the sample for this study. Additionally, respondents who reported sexual intercourse before the age of 13 were removed from the sample in an effort to eliminate cases of child sexual abuse.[32] The final sample consisted of 5,966 adolescent women.

Measures

Questions from the YRBS were used to investigate the relationship between race/ethnicity and forced sexual intercourse, race/ethnicity and alcohol and drug use, and whether alcohol and drug use confound the relationship

Table 1. Prevalence of forced sex, drinking behavior, and drug use among adolescent women by race/ethnicity, 2009.

	African American	Asian	Caucasian	Hispanic	Total	Chi-square, p value
Forced Sexual Intercourse	11.2%	4.0%	8.8%	8.8%	8.9%	$X^2(3)=11.94$, $p=0.008$
Drinking Behavior						$X^2(9)=211.14$, $p<0.001$
Binge Drinker	12.5%	7.1%	28.2%	23.9%	24.5%	
Non Binge Drinker	24.3%	9.3%	17.1%	19.3%	18.2%	
Former Drinker	30.6%	27.9%	28.3%	32.8%	29.4%	
Abstainer	32.7%	55.8%	26.4%	23.9%	27.8%	
Drug Use	44.3%	15.0%	36.1%	40.6%	37.2%	$X^2(3)=71.88$, $p<0.001$

between race/ethnicity and forced sexual intercourse. The YRBS is reported to be a reliable data source of adolescent health behaviors.[33]

Forced sexual intercourse was the dependent variable and coded as positive if the participant responded "Yes" to the question, "Have you ever been forced to have sexual intercourse when you did not want to?"

Race/ethnicity was grouped into four dummy-coded variables (i.e., yes/no): African American, Asian (Asian and Native Hawaiian/Other Pacific Islander), Hispanic (Hispanic and Multiple-Hispanic), and Caucasian. In the logistic regression analyses, Asian race/ethnicity was selected as the referent group because this group had the lowest prevalence of forced sexual intercourse, alcohol use, and drug use.

Drinking behavior was assessed using 3 questions: "During your life, on how many days have you had at least 1 drink of alcohol?", "During the past 30 days, on how many days did you have at least 1 drink of alcohol?", and "During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?" Respondents were placed into 1 of 4 categories: binge drinker, non-binge drinker, former drinker, and abstainer. Binge drinkers responded that they had drunk more than 5 drinks in a row on 1 or more days in the past 30 days. Non-binge drinkers had one or more days of drinking at least 1 drink of alcohol, but not more than five drinks in a row on one or more days in the past 30 days. Former drinkers were individuals who responded that they had drunk alcohol within their lifetime, but not within the last 30 days, and abstainers were individuals who did not meet any of the above definitions. The category of abstainers was the referent group for the drinking behavior variables.

Drug use was operationalized with a composite variable, due to the low prevalence of use of many of the individual drugs. Seven questions in the YRBS ask about lifetime use of drugs, including marijuana, cocaine, glue or aerosol spray cans, heroin, methamphetamines, ecstasy, or injection drugs. The variable was dichotomous, with lifetime drug use or no lifetime drug use as the two categories. No lifetime drug use was the referent category for the logistic regression analyses.

Age was grouped into five categories: 14 and younger, 15, 16, 17, and 18. Eighteen was the referent group for the logistic regression analyses.

Statistical Analysis

Using SPSS 19, we completed the analyses with the weighted, public-use YRBS data files. First, we used descriptive and bivariate statistics to assess whether the prevalence of forced sex, alcohol use, and drug use differed by race/ethnicity. Then, we created 2 logistic regression analyses to examine whether racial variation in forced sexual intercourse persisted when controlling for the effects of drug and alcohol use variables. The first logistic regression model assessed the relationship between forced sex and race/ethnicity, when controlling for age. The second logistic regression model assessed whether controlling for alcohol and drug use altered the relationship between forced sex and race/ethnicity. We assessed significance of the model using the Omnibus Test, and Fit of the Model using the Hosmer and Lemeshow Chi Square.[34] Collinearity was assessed by examining the correlations between the independent variables. Age was controlled in each of the regression analyses.

RESULTS

Research Question 1

Overall, the prevalence of forced sexual intercourse among adolescent women was 8.9%. Prevalence differed by race/ethnicity ($X^2(3)=11.94$, $p=0.008$), with 11.2% of African Americans, 8.8% of Caucasians and Hispanics, and 4.0% of Asians reporting forced sexual intercourse.

Research Question 2

Table 1 presents the prevalence of forced sexual intercourse, drinking behavior, and drug use by race/ethnicity. The prevalence of alcohol use differed significantly based on adolescents' race/ ethnicity ($X^2(9)=211.14$, $p<0.001$). Across all groups, the prevalence of binge drinking was 24.5%. Caucasians had the highest prevalence of binge drinking (28.2%), followed by Hispanics (23.9%), and African Americans (12.5%). Asians had the lowest prevalence (7.1%).

Table 2. Multivariable models of forced sex by age, race/ethnicity and substance use among adolescent women, 2009 (N = 5,966).

	Model 1, OR (95% CI)	Model 2, OR (95% CI)
Age 14	0.45 (0.30, 0.66)***	0.65 (0.43, 0.97)*
Age 15	0.69 (0.51, 0.92)*	0.83 (0.62, 1.12)
Age 16	0.78 (0.59, 1.03)	0.86 (0.64, 1.15)
Age 17	0.86 (0.65, 1.13)	0.91 (0.68, 1.20)
African American	3.12 (1.53, 6.35)**	1.98 (0.96, 4.10)
Caucasian	2.38 (1.20, 4.72)*	1.40 (0.69, 2.82)
Hispanic	2.45 (1.21, 4.96)*	1.40 (0.68, 2.88)
Binge Drinker	-	3.06 (2.14, 4.36)***
Current Drinker	-	1.80 (1.24, 2.62)**
Former Drinker	-	2.08 (1.48, 2.91)***
Drug Use	-	2.61 (2.11, 3.24)***

* $p<0.05$; ** $p<0.01$; *** $p<0.001$
OR, odds ratio; *CI*, confidence interval.

Asians had the highest prevalence (55.8%) of the referent abstainer category, and Hispanics had the lowest prevalence (23.9%). In total, 27.8% of adolescent women reported abstaining from alcohol.

More than one-third (37.2%) of adolescent women reported lifetime drug use. African Americans had the highest prevalence of drug use (44.3%), whereas Asians had the lowest prevalence of drug use (15.0%). Again, the racial/ethnic groups were significantly different from each other ($X^2(3)=71.88$, $p<0.001$).

Research Question 3

The first multivariable model examined the risk for forced sexual intercourse by race/ethnicity, controlling for age (Table 2). The model was significant ($X^2(7)=34.29$, $p<0.001$) and demonstrated a good fit (Hosmer-Lemeshow $X^2(8)=4.85$, $p=0.773$). Compared with Asians, African Americans (OR = 3.12 [95% CI 1.53, 6.35]), Caucasians (OR=2.38 [95% CI 1.20, 4.72]) and Hispanics (OR=2.45 [95% CI 1.21, 4.96]) had significantly higher odds of reporting forced sexual intercourse.

The second model (Table 2), controlling for drinking behavior and drug use as well as age, also was significant ($X^2(11)=272.25$, $p<0.001$) and demonstrated a good fit (Hosmer-Lemeshow $X^2(8)=10.64$, $p=.223$). With drinking behavior and drug use controlled, race/ethnicity was no longer significant, but each of the drinking behavior variables was. Binge drinkers had three times greater odds, and current or former drinkers had about two times greater odds of being forced to have sexual intercourse against their wills than abstainers. Additionally, those who reported any lifetime drug use had about two-and-one-half times the odds of being forced to have sex against their wills than those who never used drugs.

DISCUSSION

Summary of Findings

Using recent national data, the likelihood of adolescent women being forced to have sexual intercourse against one's will differed by race/ethnicity. This differs from the results of Howard and Wang,[17] which showed differences among race/ethnic groups for adolescent men, but not women. According to the current study, the greatest likelihood of forced sexual intercourse among adolescent women was reported by African Americans, and the lowest likelihood by Asians (which included Native Hawaiians and other Pacific Islanders). Several prior studies have reported the highest rate of forced sexual intercourse among African-American adolescent and adult women.[5,16,18]

The likelihood of drinking alcohol and using drugs also differed by race/ethnicity. While Hispanics were the most likely to report having had a drink at some point in their lives, Caucasians were the most likely to report binge drinking in the past month; Asians were the most likely to report never having drunk alcohol. Like prior studies, we found that Asians and African Americans reported lower levels of binge drinking compared with Caucasians and Hispanics.[20,21] In contrast to data from the Substance Abuse and Mental Health Services Administration (SAMHSA) showing that African Americans reported similar levels of drug use compared with whites and Hispanics, however, we found that these groups differed; African Americans had the highest rate of lifetime drug use followed by Hispanics and then Caucasians.[20] As in the SAMHSA data, however, Asians in this study reported lower levels of drug use.

Results of the multivariable model demonstrated, once substance use was controlled, racial/ethnic differences were no longer significant. This indicates that it is the risk factor of substance use, either alcohol or drugs, that explains much of the variation in prevalence of forced sexual intercourse by racial/ethnic group.

Implications

The presence of a disparity by race/ethnic group in the likelihood of being forced to have intercourse against one's will can be used to develop preventive interventions targeted toward those at greatest risk, but race/ethnicity is neither the cause of the problem nor a modifiable risk factor amenable to intervention. The finding that substance use is a more probable causal factor associated with unwanted sexual experiences provides direction for the content of future preventive interventions. Among the adolescent women studied, Caucasians were the most likely to binge drink, Hispanics the most likely to drink alcohol, and African Americans the most likely to use drugs. Identifying the cultural and other roots of these differences in substance use behavior could be an

important step toward targeting interventions to prevent unwanted sexual experiences.

LIMITATIONS

The results of this study should be interpreted in light of several limitations. First, while the YRBS is designed to be representative of the adolescent population of the U.S., the sampling frame does not include adolescents who do not attend school, limiting the ability to generalize the data. In addition, the data are cross-sectional, so it is not possible to determine whether substance use preceded forced sexual intercourse, or the reverse. From the analyses, however, we do know that substance use is a stronger associate of forced sex than is race/ethnicity, which was the objective of this paper. Furthermore, the YRBS survey is based on self-reported respondent behavior, which has some limitations with respect to validity.[35] These limitations are cognitive (e.g., problems with recall, or failure to comprehend the question) and situational (e.g., desire to respond socially, attention seeking, and concerns about stigma). Studies of self-reported assessments of substance use by adolescents suggest that it is not greatly under-reported, but sexual activity is more subject to self-report bias.[35] Being forced to have sexual intercourse against one's will is a very sensitive experience and may particularly be affected by situational influences, although this measure was found to have substantial reliability using 1999 YRBS data.[33]

CONCLUSION

We found that the prevalence of being forced to have sexual intercourse against one's will differed for different racial and ethnic groups, with African Americans having the greatest likelihood. We also found that substance use and patterns of substance use varied by race/ethnicity and that this behavior accounted for the racial/ethnic differences in being forced to have sexual intercourse against one's will. Future research should explore the cultural and other roots of substance use behavior among adolescent women from varying racial and ethnic groups as a step toward intervening to reduce unwanted sexual experiences.

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Emergency Department Visits for Traumatic Brain Injury in Older Adults in the United States: 2006-08

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Introduction: Traumatic brain injury (TBI) can be complicated among older adults due to age-related frailty, a greater prevalence of chronic conditions and the use of anticoagulants. We conducted this study using the latest available, nationally-representative emergency department (ED) data to characterize visits for TBI among older adults.

Methods: We used the 2006-2008 National Hospital Ambulatory Medical Care – Emergency Department (NHAMCS-ED) data to examine ED visits for TBI among older adults. Population-level estimates of triage immediacy, receipt of a head computed tomography (CT) and/or head magnetic resonance imaging (MRI), and hospital admission by type were used to characterize 1,561 sample visits, stratified by age <65 and ≥65 years of age.

Results: Of ED visits made by persons ≥65 years of age, 29.1% required attention from a physician within 15 minutes of arrival; 82.1% required a head CT, and 20.9% required hospitalization. Persons ≥65 years of age were 3 times more likely to receive a head CT or MRI compared to younger patients presenting with TBI (adjusted odds ratio [aOR] 3.2; 95% confidence interval [CI], 1.8-5.8), and were 4 times more likely to be admitted to an intensive care unit, step-down unit, or surgery (aOR 4.1; 95% CI 2.1-8.0) compared to younger patients presenting with TBI, while controlling for sex and race.

Conclusion: Results demonstrate increased emergent service delivery for older persons presenting with TBI. As the United States population ages and continues to grow, TBI will become an even more important public health issue that will place a greater demand on the healthcare system. [West J Emerg Med. 2012;13(3):289-293.]

INTRODUCTION

Injury among older persons can be complicated by frailty and an increased number of chronic conditions which results in poorer outcomes compared to younger adults.[1] Use of emergency department (ED) services and the resulting use of rehabilitation services for injury-related morbidity are greater among older persons compared to younger persons.[2] Additionally, falls resulting in head trauma have been implicated as a more common cause of injury-related morbidity among older persons compared to younger persons.[3]

Traumatic brain injury (TBI) has been identified as a leading cause of injury-related morbidity and mortality among older adults (≥ 65 years of age) in the United States (U.S.).[4] Earlier work suggests that differences in both the treatment and outcomes of TBI for older persons compared to younger persons. Older age has been suggested as an independent predictor of receiving increased numbers of procedures and medications for treatment of TBI in the ED, as well as poorer outcomes after treatment in the ED.[5-8] Another risk factor among older patients for poor outcomes is the higher prevalence of cardiovascular conditions (e.g. atrial fibrillation and heart valve replacements) that require anticoagulant medications such as warfarin (Coumadin), low-molecular weight heparin (Lovenox), Clopidogrel (Plavix), and aspirin.

Among older patients, use of these medications is a risk factor for intracranial hemorrhage and hematoma.[9] It has also been demonstrated that as age increases, hospitalization rates for TBI increase, possibly due to the increased medical complexity of the patients presenting for treatment.[10-11]

As the U.S. population ages and continues to grow, it is likely that there will be an increased demand for emergency services to treat TBI among older Americans, who will present with more complicated treatment requirements. To better understand the use of emergency services for TBI among older persons, we conducted this study to use the latest available nationally representative ED data to characterize the visits for TBI among persons 65 years of age and older and to compare these visits to those made by persons less than 65 years of age.

METHODS

We combined data from the 2006, 2007 and 2008 National Hospital Ambulatory Medical Care Survey– Emergency Department (NHAMCS-ED) data to examine ED visits for TBI by patients 65 years of age and older. The NHAMCS-ED is conducted annually as a stratified, national probability sample of ED visits in all 50 U.S. states and the District of Columbia. Information on visits is collected over a 4-week period, for each year of the survey, in each selected ED. Further information on the design and conduct of the survey can be found elsewhere.[12]

TBI was identified using International Classification of Diseases, 9th Revision Clinical Modification (ICD-9-CM) codes collected in the ED. We used the Centers for Disease Control and Prevention (CDC) definition of TBI and included the codes: (800.0-801.9) fracture of the vault or base of skull; (803.0-804.9) other and unqualified multiple fractures of the skull; (850.0-854.1) intracranial injury, including concussion, contusion, laceration, and hemorrhage; (950.1-950.3) injury to optic nerve and pathways, and (959.01) head injury, unspecified. We collected three admission diagnoses for each patient presenting to the ED and used identification of any of the previously described codes in any of the three admitting diagnoses for inclusion of the patient visit in the analyses. Using this definition of TBI produced a sample size of 1,561 visits.

Using data from these visits, triage immediacy, receipt of a head computed tomography (CT) and/or magnetic resonance imaging (MRI) of the head and admission to specialty care within the hospital were used to characterize the severity of the injury. We chose these variables based on availability of data within the dataset. Other indicators of severity, such as Glasgow Coma Scale (GCS), intubation of the patient and other indicators, were not available due to insufficient sample size or lack of inclusion in the dataset.

We categorized triage immediacy as being either "emergent" or "non-emergent." Emergent visits were defined as visits requiring immediate physician attention or visits requiring physician attention within 14 minutes or less and those triaged as being urgent (attention required in 15-60 minutes). We defined non-emergent visits as those triaged as being semi-urgent (attention required in > 1 hour – 2 hours), and non-urgent (attention required in > 2 hours – 24 hours). We excluded visits requiring no triage from analyses as these visits represent patients who died during transport to the ED. Receipt of head imaging was defined as receiving either a head CT or MRI of the head and dichotomized into receiving imaging or not. Admission to specialty care included admission to an intensive care unit (ICU), step-down unit, or to surgery and was dichotomized into being admitted or not.

We estimated the total number of visits for TBI and stratified them by age, sex, and race. Percentage estimates of triage immediacy, receipt of head CT and/or head MRI, and admission to specialty care were made for all visits and compared among three age groups including visits where patients were 0-34 years of age, 35-64 years of age and 65 years of age and older. We tested differences in receipt of services among these age groups using Pearson's Chi-square analyses. These differences were further tested using multivariate logistic regression models controlling for sex and race. We conducted all analyses in SUDAAN to take into account the complex sampling design of the survey.[13] These secondary analyses were considered to be exempt under institutional review board guidelines.

RESULTS

Estimates of the number of visits to EDs for TBI increased each year beginning with nearly 1.6 million in 2006, 1.7 million in 2007 and 2.1 million in 2008. During the 3-year study period (2006-2008) there were an estimated 5.4 million total visits to U.S. EDs for TBI. Approximately 15% of these visits were made by persons greater than 65 years of age, among these the average age of the patient was 80 years. Just over 60% of the visits were made by females and just over half were whites. Among those between 35 and 64 years of age, the average age was 48.6 years. Approximately 47% were female and less than half of the visits were made by whites. Finally, among visits made by person 0-34 years of age, the average age was 14.5 years. Almost 38% of the visits were made by females and just over 40% were made by whites (Table 1).

We noted differences in the triage severity of the visits by age group. Just over two-thirds (66.9%) of visits made by persons 0-34 years of age were triaged as being immediate or urgent, compared to nearly three-quarters (74.8%) of visits made by persons 35-64 years of age, and over three-quarters (84.0%) of visits made by persons greater than 65 years of age. However, the difference in the percentage of visits triaged as being immediate or urgent made for persons 65 years of age and older and visits for persons 35 to 64 years of age was not statistically significant. However, the percentage of visits made by persons 65 years of age and older and triaged as being immediate or urgent was significantly greater than the percentage of visits made by those 0 to 34 years of age and triaged as being immediate or urgent ($p<0.01$). Significant differences were found for receipt of a head scan and being

Table 1. Demographic characteristics of visits to United States emergency departments for traumatic brain injury by age group, 2006-2008.*

N=1,561	0-34 years	35-64 years	65+ years
Total visits (n)	954	370	237
Population estimate of visits	3,325,491	1,317,480	799,879
Average age in years	14.5, (13.5-15.4)	48.6, (47.5 – 49.7)	80.0, (78.7 – 81.4)
% Female	37.5%, (33.1% - 42.2%)	46.8%, (40.9% - 52.8%)	61.1%, (54.2% - 67.5%)
% White	44.4%, (39.4% - 49.5%)	45.9%, (38.7% - 53.3%)	55.9%, (47.9% - 63.6%)

Source: 2006-2008 National Hospital Ambulatory Care Survey – Emergency Department Visits
*Weighted estimates and (95% confidence intervals)

Table 2. Characterization of services for traumatic brain injury visits by age group.*

N=1,561	0-34 years	35-64 years	65+ years	P**
Triaged as immediate/urgent***	66.9%, (61.1% - 72.2%)	74.8%, (66.6% - 81.5%)	84.0%, (74.2% - 90.5%)	<0.01
Receipt of head CT and/or MRI	55.9%, (50.8% - 60.8%)	72.2%, (64.6% - 78.7%)	83.5%, (74.4% - 89.7%)	<0.01
Admission to ICU, step-down, or surgery	2.10%, (1.3% - 3.4%)	10.0%, (6.2% - 15.8%)	14.1%, (9.1% - 21.1%)	<0.01

Source: 2006-2008 National Hospital Ambulatory Care Survey – Emergency Department Visits
* Weighted estimates and (95% confidence intervals)
**Chi-square test
***includes patients needing physician attention < 60 minutes of arrival
CT, computed tomography; *MRI*, magnetic resonance imaging, *ICU*, intensive care unit

Table 3. Multiple logistic regressions for receipt of services for traumatic brain injury by age group.*

N = 1,561	Odds Ratio	95% Confidence Interval
Triaged as immediate/urgent**		
65 + years	1.27	0.71 – 2.25
35-64 years	1.29	0.81 – 2.04
0-34 years	1.00	1.00 – 1.00
Receipt of head CT and/or MRI		
65 + years	3.93	2.20 – 7.02
35-64 years	2.05	1.36 – 3.09
0-34 years	1.00	1.00 – 1.00
Admission to ICU, step-down, or surgery		
65 + years	9.12	4.47 – 18.62
35-64 years	5.53	2.95 – 10.37
0-34 years	1.00	1.00 – 1.00

Source: 2006-2008 National Hospital Ambulatory Care Survey – Emergency Department Visits
*controlling for sex and race
** includes patients needing physician attention < 60 minutes of arrival
CT, computed tomography; *MRI*, magnetic resonance imaging, *ICU*, intensive care unit

admitted for advanced care (ICU or step-down) or surgery. Over three-quarters (83.5%) of all visits made by persons 65 years of age and older received a head CT and/or MRI, compared to 72.2% of visits made by persons 35 to 64 years of age and 55.9% of persons 0 to 34 years of age ($p<.01$). Just over 2 percent (2.1%) of visits made by persons 0 to 34 years of age were admitted to the ICU, step-down unit, or to surgery compared to 10% of visits made by persons 35 to 64 years of age and 14.1% of visits made by persons 65 years of age and older. Differences in receipt of advanced care between visits made by persons 65 years of age and older were significantly greater compared to visits made by persons 0 to 34 years of age ($p<.01$) (Table 2).

Adjusted logistic regression models controlling for patient

sex and race demonstrated similar differences found in the bivariate analyses. No significant differences were found among the three age groups for triage immediacy; however, older age groups tended to demonstrate increased odds of being triaged at a higher acuity. This was not statistically significant. Visits made by persons 65 years of age and older were nearly 4 times more likely to have received a head CT or MRI compared to visits made by persons 0 to 34 years of age (3.93 O.R.; 2.20 – 7.02 95% C.I.) and were nine times more likely to be admitted to the specialty care, such as ICU, a step-down unit, or to surgery, compared to visits made by persons 0 to 34 years of age (9.12 O.R.; 4.47 – 18.62 95% C.I.). Admission to specialty care was also significantly higher for persons 65 years of age and older compared to visits made by persons 35 to 64 years of age (Table 3).

DISCUSSION

The results of this study demonstrate an increased level of advanced care for older persons presenting to an ED with TBI. Persons 65 years of age and older were more likely to receive a head CT and/or MRI in the ED and to be admitted to either the ICU, step-down unit, or have surgery after presenting to the ED with TBI compared to younger persons. It is important to note that age was not a statistically significant predictive factor in determining the triage immediacy for visits, but still was an indicator for increased services. This could point to a possible opportunity to use age as a triage consideration in patients with head trauma presenting to an ED. Visits for head trauma were triaged as requiring immediate or urgent attention regardless of age. However, age could be a surrogate for anticoagulant use and should be further studied. In addition to these findings, our results also suggest that the numbers of ED visits for TBI are increasing.

Among older adults, falls are the leading cause of head injuries resulting in TBI. As the U.S. population continues to age and rapidly grow, falls resulting in injury will become an even more important public health issue.[14] Falls from ground level are common in older populations, resulting in significant morbidity and mortality.[15] Furthermore, due to the increased use of anticoagulants in this population, complications from falls can have deleterious outcomes such as subdural hematomas resulting in death.[9-16] Even minor head injuries in older patients result in a higher incidence of intracranial hemorrhage due to the use of antiplatelet and anticoagulant medications and could be a plausible explanation for the increased ICU, step-down unit, or emergent surgery rates found in this study.[17] Therefore, quick identification of this type of injury is important in older populations.

Age can also be related to the trajectory of recovery for those suffering from TBI, and can result in higher costs for care. Patients 65 years of age and older require greater levels of inpatient rehabilitation and do not progress as quickly with rehabilitation as do younger patients.[18] Rehabilitation charges for older patients were significantly higher compared to younger patients, as was total length of stay for inpatient rehabilitation services after TBI, due to more severe injuries.[19-20] To better understand the relationship of age on use of services, we examined age as a continuous variable and found that each year of age contributed to increased use of services ($p<.01$).

Costs from TBI can be considerable. Finkelstein et al[21] have suggested that the lifetime costs for TBI in the U.S. in 2000 dollars was $60.4 billion. Data from the CDC Web-based Injury Statistics Query and Reporting System (WISQARS) estimates that total 2005 costs from TBI among persons 65 years of age and older were over $5 billion.[22] Older patients suffering from TBI have also been found to become physically and financially dependent on others after injury and suffer significant decreases in independence.[23] This suggests that there an increase in medical costs for TBI in the inpatient and outpatient setting, but in costs at a societal and personal level due to a loss of both physical and mental functionality. It has been proposed that a reduction in societal costs, which appear to be the most significant contributor of cost, could be achieved through widespread adoption of the Brain Trauma Foundation (BTF) treatment guidelines that address treatment of patients with severe TBI who account for approximately 10% of all TBIs.[24]

The main limitation of this study was the small sample size. We took the data used for these analyses from the NHAMCS-ED sample, which collects data from the ED during a four-week period in selected hospitals with just three admission diagnoses. The total sample size for each collected year of data was no greater than 35,000 records. With the overall incidence of TBI for each year, this limited the likelihood of collecting information on TBIs within the four-week sampling period of the survey. Therefore, a complete characterization of each ED visit for TBI that described all procedures was not possible. However, by combining three years of data, robust estimates of overall visits by age, sex and race were possible, as well as several descriptors of the visit, including triage immediacy, receipt of a head CT and/or MRI and admission to the hospital. Furthermore, by using this dataset, national estimates were possible. To the authors' knowledge, this is the first presentation of this level of data for older persons presenting with TBI to an ED.

A second limitation of this study was that there was no measurement of GCS collected in the dataset. Use of this scale is a commonly used measure of severity for head injury. Even so, this study demonstrates that older persons presenting to an ED with diagnosed TBI potentially require higher acuity treatment compared to younger persons, which could be indicative of a more deleterious GCS measure. Furthermore, antiplatelet and anticoagulant use was not collected in this database, preventing comparisons with prior studies on these medications.

A final limitation was our inability to determine the specific reason for increased triage immediacy, receipt of head CT and/or MRI or admission to the hospital for each of these cases from this data. Both age and comorbidities could be the

driving factors that would require additional service provision. This study only searched for a diagnosis of TBI among the three listed diagnoses on admission to the ED. However, it is reasonable to believe that complications, such as increased risk of subdural hematomas and the increased frailty of older persons, are most likely the driving forces behind the outcomes examined in this study.

CONCLUSION

As the population ages, there will be increasing numbers of older Americans on antiplatelet and anticoagulant medications, who are prone to falling, and therefore at substantial risk of sustaining life-threatening traumatic brain injuries requiring the use of significant health services for treatment. Increasing dissemination of fall prevention programs could reduce this public health threat. Furthermore, understanding the scope of these healthcare needs and the impact of this phenomenon on EDs will help decision makers allocate resources for optimal treatment of injury.

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Do-Not-Resuscitate Orders in Fatal Toxic Exposures: A Poison Center's Review

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Introduction: Self-exposure is a leading method for suicide both in the United States and worldwide and thus is a major preventable public health issue. Surrogate decision makers are tasked with making medical decisions for the patient while keeping the patient's wishes in mind. Decisions related to code status become more complicated when the patient's situation is the result of a suicidal act. The objectives were to 1) determine how frequently Do Not Resuscitate orders (DNR orders) are placed for the intentionally self-exposed (ISE) patient using the Regional Poison Control Center (RPCC) data, and 2) identify if DNR orders in intentionally self-exposed patients were placed before or after development of poor prognostic signs.

Methods: We analyzed all exposure-related deaths reported to the RPCC from January 1, 2000 to December 31, 2010. We reviewed data for the following: exposure intent, exposure substance, outcome, age, code status, date of DNR/withdrawal of care order, previous suicide attempts, and poor prognostic signs.

Results: Of the 476 total deaths, nearly half were the result of an intentional self-exposure (n= 235; 49.4%). Most deaths, when code status was reported, had advanced cardiac life support, or "full codes" (n=131; 55.6%). Of the total deaths with a DNR or withdrawal of care order (n=104), over half were from an ISE (n=55; 52.9%). A higher percentage of the ISEs had a DNR order/withdrawal of care order; however, it was not a statistically significant difference OR 1.23 (95% CI 0.64, 2.37). Regardless of intent, patients treated as full codes were on average 19.5 years younger than the DNR orders group. Only 2 DNR orders were placed *prior* to development of poor prognostic signs. Unintentional self-exposures consumed a mean of 1.4 substances (range 1 to 4). ISEs consumed a mean of 2.3 substances (range 1 to 19).

Conclusion*:* People are often asked to make life-and-death decisions for a loved one. The nature of the exposure can complicate the issue if the exposure has an antidote or is known to have a limited effect. Further study is needed to assess the extent of these cases and to identify optimal management guidelines or policy to aid both the medical teams caring for these patients and the surrogate decision makers. [West J Emerg Med. 2012;13(3):294-297.]

INTRODUCTION

Death by suicide has increased 60% over the past several decades and is one of the top 3 causes of death in those younger than 44 years in many countries.[1] It is the 10th most common cause of death in the United States. Self-poisoning is a leading method for suicide both in the U.S. and worldwide and thus is a major preventable public health issue.[2-4]

Care of the severely ill patient, whose ability to communicate is impaired, is dictated by the medical team and the patient's surrogate decision makers (family members, legal guardians, etc). In most situations, surrogate decision makers

are tasked with making medical decisions for the patient while keeping the patient's wishes in mind. In one study of 668 Do-Not-Resuscitate (DNR) patients (none were self-poisonings), most of the DNR orders were placed solely by a surrogate decision maker (n=389; 58%) and a substantial number by both the patient and the surrogate decision maker (n=88; 13%).[5] Not surprisingly, surrogate decision makers took significantly longer to reach a decision compared to patients (6.6 days versus 3.2 days).[5] Decisions related to code status, however, become more complicated when the patient's situation is the result of a suicidal act. Case reports describe patients who place DNR orders prior to attempting suicide to prevent institution of life-saving medical treatment.[6,7] In a chart review of 191 hospitalized geriatric patients with major depressive disorder or bipolar disorder, close to half wanted to have a DNR order (n=91; 48%). Patients with suicidal ideation (n=50; 26%) were significantly more likely to choose to have a DNR order (60% versus 43%).[8] How should prior DNR orders be handled in this unique population? Are surrogate decision makers for the self-poisoned patient more likely to place DNR orders since they are tasked with thinking of the patient's wishes? Should a DNR order placed by the surrogate decision makers be upheld when effective treatment for the poisoning is available?

The latter question was raised by a unique case reported to the Regional Poison Control Center (RPCC). A depressed male ingested a large amount of alprazolam in a suicide attempt. During his hospital course, the patient developed respiratory depression requiring ventilator support. His family, however, refused intubation and requested a DNR order out of respect for the patient's wishes as he had multiple previous suicide attempts. This decision prompted his nurse to call the RPCC to inquire about treatment options and guidance on how to handle the situation. The RPCC suggested discussing the temporary nature of his current condition with his family as the mental and respiratory suppression caused by the alprazolam could be treated until the medication was fully eliminated from the body. However, his family kept the DNR order in place and the patient remained unsupported and died. This case, like others reported in the literature, posed challenging ethical dilemmas for the family and the treating medical team. The frequency of these cases and the best management approach is unknown.

The objectives of this study were to 1) determine how frequently DNR orders are placed in the intentionally self-exposed patient using RPCC data; and 2) identify if the DNR order in the intentionally self-exposed patient was placed before or after development of poor prognostic signs.

METHODS

An exposure was defined as contact (ingestion, inhalation, dermal contact, or injection) with a substance foreign to the human body. Intentional self-exposure was defined as an exposure related to a foreign substance with intent to harm oneself. Unintentional self-exposure was defined as an exposure related to a foreign substance without intent to harm oneself. Malicious exposure was defined as an intentional exposure in a patient by an individual with intent to harm the patient. We analyzed all exposure-related deaths reported to the RPCC from January 1, 2000, to December 31, 2010. A trained coder reviewed the data for the following variables: exposure intent, exposure substance, outcome, age, code status, date of DNR/withdrawal of care order, and previous suicide attempts. The presence of poor prognostic signs, including ventilator support, use of vasopressors, severe acidosis (defined as pH<7 or bicarbonate <5), and poor neurologic function, was also recorded by the reviewer from RPCC data, if available. If prognostic signs were reported, the reviewer would determine whether the signs were present before or after determination of code status. We performed statistical analysis using Microsoft Excel 2007.

RESULTS

Table 1 shows the distribution of RPCC patient deaths by exposure intent and code status. Most of the 476 total deaths were the result of intentional self-exposures (n= 235; 49.4%). Nearly half had a reported code status (n=236; 49.6%). From those with a known code status, the majority were treated as full codes (n=131; 55.6%). Over half of the total deaths with a DNR or withdrawal of care order (n=104) were the result of an intentional self-exposure (ISE) (n=55; 52.9%). Ethnicity was not reported because it was not recorded in the RPCC data.

Table 2 compares exposure intent by code order status. A slightly higher percentage of ISE had a post-exposure DNR order; however, this difference was not statistically significant, OR 1.23 (95% CI 0.64, 2.37). In other words, intentional exposures did not have statistically significant higher odds of having a DNR order placed than unintentional self-exposures. Table 3 details the mean age of patients by exposure intent and code status. Regardless of intent, patients in whom advanced cardiac life support (full codes) was used were on average 19.5 years younger than the group in which it was not (the DNR group).

Only 2 DNRs were placed *prior* to development of poor prognostic signs, 1 of which was coded as intent unknown and the other as suspected ISE. The latter case involved a female who reportedly mistook paraquat for Robutussin. The only symptom at time of DNR order placement was oral swelling.

The most common exposure reported in the DNR group was acetaminophen for both the intentionally and unintentionally self-exposed groups. In those treated as full codes, anticonvulsant medications were the most common exposures reported for the intentionally exposed group and stimulant/street drugs were the most frequent exposures

Table 1. Distribution of Regional Poison Control Center (RPCC) patient deaths by exposure intent and code status, N=476.

Exposure Intent	Total	DOA	Code Status					
			Full Code	DNR	Withdraw Care	DNR & Withdraw Care	Hospice	Unknown*
All Patients	476	22 (4.6%)	131 (27.5%)	69 (14.5%)	35 (7.4%)	104 (21.8%)	1 (0.2%)	218 (45.8%)
Unintentional	113 (23.7%)	7 (1.5%)	33 (6.9%)	13 (2.7%)	8 (1.7%)	21 (4.4%)	1 (0.2%)	51 (10.7%)
Intentional	235 (49.4%)	12 (2.5%)	70 (14.7%)	36 (7.6%)	19 (4%)	55 (11.6%)	-	98 (20.1%)
Unknown	115 (24.2%)	3 (0.6%)	27 (5.7%)	19 (4%)	8 (1.7%)	-	-	58 (12.2%)
ADR	4 (0.8%)	-	1 (0.2%)	-	-	-	-	3 (0.6%)
Malicious	9 (1.9%)	-	-	1 (0.1%)	-	-	-	8 (0.9%)

DOA, dead on arrival; *DNR,* do not resuscitate; *ADR*, adverse drug reactions.
*Code status not reported.

Table 2. Comparison of exposure intent by code status.

Exposure Intent	Total	Full Code	Code Status		
			DNR	Withdraw Care	DNR & Withdraw Care
Unintentional	113	33 (29%)	13 (11.5%)	8 (7%)	21 (18.6%)
Intentional	235	70 (30%)	36 (15.3%)	19 (8%)	55 (23.4%)

DNR, do not resuscitate.

reported in the unintentionally exposed group. Patients with unintentional self-exposures consumed a mean of 1.4 substances per individual (range 1 to 4). Patients with ISEs consumed a mean of 2.3 substances per individual (range 1 to 19).

DISCUSSION

Regarding our first objective, to determine how frequently DNR orders are placed in the ISE patient, we found that DNR orders are not placed significantly more often than in the unintentionally self-exposed patient. One explanation for the slightly increased incidence of DNR orders in those with ISEs is that these patients tended to consume nearly double the amount of toxic substances as the unintentionally self-exposed. Thus, it is reasonable to suppose that these individuals tended to be more symptomatic, thereby leading their families to request DNR orders based not on the patients' wishes, but rather on the poor prognosis of meaningful recovery. This is supported by our finding that the overwhelming majority (98%) of DNR and withdrawal of care orders were placed after poor prognostic factors were apparent, thus fulfilling our second objective of identifying when the DNR order in the intentionally self-exposed patient is typically placed.

Surrogate decision makers for the ISE are faced with difficult decisions. They are instructed to keep the patient's wishes in mind when making medical decisions while knowing that their loved one wanted to die. They report many negative feelings, including guilt, ambivalence, and conflict.[9]

Table 3. Comparison of mean age by exposure intent and code status.

Exposure Intent	Total	Code Status			
		Full Code	DNR	Withdraw Care	Unknown*
All Patients	45 yrs (2d-94 yrs)	39 yrs (18mo-93 yrs)	54 yrs (23-93 yrs)	47 yrs (15-84 yrs)	45 yrs (2d-94 yrs)
Unintentional	41 yrs (1mo-88 yrs)	33 yrs (18mo-81 yrs)	53 yrs (3-88 yrs)	44 yrs (32-59 yrs)	45 yrs (1mo-87 yrs)
Intentional	44 yrs (15-87 yrs)	40 yrs (15-63 yrs)	52 yrs (23-78 yrs)	47 yrs (27-84 yrs)	44 yrs (16-87 yrs)
Unknown	49 yrs (2d-94 yrs)	42 yrs (17-93 yrs)	57 yrs (34-93 yrs)	49 yrs (15-80 yrs)	49 yrs (2d-94 yrs)
Other	39 yrs (27-64 yrs)	33 yrs (33 yrs)	64 yrs (64 yrs)	-	43 yrs (27-59 yrs)

DNR, do not resuscitate.*Code status unknown.

Surrogate decision makers may be influenced by several other factors as well, such as: 1) their own morals and beliefs on life and suicide; 2) personal guilt for not being able to help the patient; 3) fear of making medical decisions friends and other family may not agree with; 4) society's views on suicide; and 5) hopelessness. One study found that multiple DNR orders were placed by family members who felt unable to cope with the psychological stress of having a suicidal family member.[10] Since most of the ISE patients were treated as full codes (had advanced cardiac life support), it is apparent that factors other than the patient's implied wishes are playing a major role in the surrogate's decision. Additionally, our finding that the group who received advanced cardiac life support tended to be significantly younger than the average age of the group that did not receive it lends further support to the idea that the decisions of the surrogate are motivated by reasons external to those of the patient. A similar age-based bias was found by Fader et al.[11]

LIMITATIONS

Our results are limited by factors inherent to poison center data, such as incomplete data reporting and documentation. Additional limitations include convenience sampling and selection bias, as only cases reported to the RPCC were available for analysis.

CONCLUSION

Making life and death decisions for a loved one is stressful. Such decisions become extremely complex when compounded with the knowledge that the family's loved one chose suicide. The nature of the exposure can further complicate the issue if the exposure has an antidote or is known to exert its effects for a limited time. While the majority of deaths reported to the poison center were managed as full codes, the frequency with which cases of ISE have DNR orders placed is high. Further study is needed to fully assess the extent of these cases and to identify optimal management guidelines or policy to aid both the medical teams caring for these patients and the surrogate decision makers. Such guidelines should address the following questions: Is a DNR order appropriate when an exposure is reversible? How are ISE individuals with prior DNR orders to be managed? When is a DNR order appropriate in the ISE? Should surrogate decision makers be offered counseling prior to making such decisions?

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Feasibility Study of Social Media to Reduce Intimate Partner Violence Among Gay Men in Metro Atlanta, Georgia

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Intimate Partner Violence (IPV) is a major public health issue occurring in the United States and globally. While little is known in general about IPV, understanding about the prevalence of physical IPV among gay men is even more obscure. There is a clear disparity in violence research attention focused on this vulnerable segment of society. This cross-sectional survey study was conducted to examine the feasibility of enrolling 100 gay men from Atlanta into an IPV survey study. The survey was administered via Facebook. Ninety-nine usable surveys were collected. Chi-square tests reveal that minority ethnic status, illicit drug use, and non-disclosed orientation status were all significantly associated with positive IPV reports--in terms of both victimization as well as perpetration. Overall, the majority of the study sample indicated that they believe IPV is a health problem in the Atlanta gay community. These findings bear importance for the Atlanta gay community and public health professionals who must address this nearly invisible yet increasing public health issue. [West J Emerg Med. 2012;13(3):298-304.]

INTRODUCTION

Intimate partner violence (IPV) among same-sex couples is getting increasing attention, although researchers concur that the subject is still poorly understood.[1-3] IPV falls under the overarching umbrella of domestic violence (DV) and is defined as "violence between two people in close relationship which includes current and former spouses and dating partners."[4] The World Health Organization further elaborated on the definition to include "acts of physical aggression, psychological abuse, forced intercourse and other forms of sexual coercion, and various controlling behaviors, such as isolating a person from family and friends or restricting access to information and assistance." [5]

Overall, IPV among both heterosexual and homosexual couples accounts for 7.7 million physical assaults and rapes each year, 62% among women and 38% among men, yet many incidents go unreported.[6] Following HIV/AIDS and substance abuse, IPV has been described as the third largest public health issue facing gay men.[7] Men in same-sex relationships experience abuse rates similar to those of women, an estimated 25 to 33%, yet men in same-sex relationships are twice as likely to suffer abuse as men in heterosexual relationships.[7-8] A study of men who have sex with men (MSM) revealed that 34% of the study sample (N=2,881) suffered psychological battery, 22% had been victims of physical battery and 5% had been sexually battered, rates substantially higher than those of heterosexual men.[9] More recently, results of a random sample of 284 gay and bisexual men residing in British Columbia indicated that nearly all respondents had been psychologically abused, over one-third had been physically abused, and 10% of respondents reported having been forced or coerced into unwanted sexual activity.[10]

Health Outcomes

A significant body of evidence cites positive correlations between IPV and poor physical and mental health outcomes, although the majority of research has focused on women.[10-12] Immediate and long-term negative health outcomes of IPV include physical injury, chronic pain syndromes, gastrointestinal disorders, and depression or suicidal behaviors, as well as substance use and chronic mental and physical illness.[5,11] Abused men in same-sex

relationships are more likely to report health issues such as hypertension, obesity, depression, smoking-related illness, sexually transmitted infections; additionally, men in abusive relationships are more likely to engage in unprotected sex and substance abuse. [3]

The nature of IPV and lack of useful resources and guidance have discouraged victims from reporting abuse, and widespread ignorance and misconceptions about same-sex IPV have created barriers for treatment services among victims. Recent studies have shown that victims of same-sex IPV are more likely to seek help from informal sources, such as friends, because available formal sources, such as battered women's services, were perceived as unhelpful.[13,14] Additionally, shelters for victims of battery are predominately unequipped to serve men of any sexual orientation.[13,14] Recent research of IPV failed to find any significant difference in the number of medical visits between abused and non-abused men, which may suggest that cultural and/or institutional barriers prevent abused men from obtaining assistance.[3]

Correlates of IPV Among Gay Men

Many correlates of same-sex male IPV have been identified in the literature, including age, education, income, HIV status, risky sexual behaviors, alcohol/drug use, disclosed status and childhood abuse/family violence, although results are mixed. Greenwood et al[15] found that younger age (<40) was the strongest demographic correlate of all forms of psychological, physical, and sexual battery. Merrill and Woolfe[13] reported that the majority of gay and bisexual male survey respondents were between the ages of 25 and 50; 26- to 35year-olds represented 54% of respondents. However, a 2008 study examining correlates of IPV failed to find a significant association with age.[9]

Income and educational attainment have been found to be inversely associated with both perpetration and receipt of abuse.[9] Similarly, Houston and McKirnan[3] reported that higher socioeconomic status (SES) provided some degree of protection from same-sex IPV, as compared to low and middle SES. Problem-solving skills, such as negotiating or compromising obtained through education or personal experience, may provide a buffer.[16,17] To the contrary, Stall et al[18] did not find significant associations between IPV and education or income level.

The prevalence of experiencing violence in childhood has also been cited as a correlate of IPV. A study of African-American MSM found that those who readily disclosed having male sex partners reported significantly higher rates of early physical abuse, sexual abuse, and lifetime abuse when compared with non-MSM. Further, all MSM who experienced early abuse were more likely to be victims or perpetrators of IPV later in life.[19] Craft and Serovich[20] reported that experiencing parental abuse during childhood was positively correlated with perpetration of physical assault and both perpetration and receipt of sexual coercion. Similarly, a study of Puerto Rican gay men reported that those who reported violence in their relationships also reported experiencing violence in their childhood home.[21]

The prevalence of alcohol and drug use has also been found to be higher among cases of same-sex IPV.[22,23] McClennen et al[14] reported that substance abuse was significantly associated with IPV among both gay men and lesbians. Higher substance use rates among same sex couples were thought to have been a coping mechanism for dealing with stress experienced as a result of societal homophobia and by internalized homophobia.[22,24]

IPV has also been associated with public disclosure of sexual orientation. Bartholemew et al[9] reported that disclosure was positively associated with being the recipient of physical abuse. However, it is possible that those who remain undisclosed and fear being "outed" by their partners are more likely to remain in abusive relationships.

Same-Sex Relationships in Atlanta, Georgia

According to United States Census Population Estimates Program, in the year 2000 unmarried same-sex partners constituted 2.7% (11,402) of households in Atlanta, Georgia.[25] Atlanta has almost twice as many cohabitating same-sex partners than the national average.[26] The Center for Positive Aging has identified 13% of Atlanta's population as Lesbian Gay Bisexual Transgender [LGBT].[27] Additionally, the Williams Institute ranked Atlanta 5th with respect to cities having the highest percentage of gays, lesbians, and bisexuals.[28]

Atlanta's high number of same-sex couples makes it an appropriate location for a feasibility study of IPV using social media to examine sociodemographic factors as they relate to this issue. The purpose of this study was to 1) determine if social media, specifically Facebook, is a feasible method of recruiting a substantial study sample for survey participation; 2) measure the prevalence of physical IPV victimization and perpetration among the study sample; and 3) determine if the following variables were associated with positive reports of physical IPV among the study population: age, ethnicity, education level, drug and alcohol use, risky sexual behavior, and disclosure status.

METHODS

We used an anonymous, cross-sectional survey design to conduct this study. Given the exploratory nature of conducting IPV research on a relatively unknown study group, this study was developed to assess the feasibility of recruiting 100 participants who met the eligibility criteria. We created and administered the survey instrument using a licensed Psychdata account. The approved Institutional Review Board application for an expedited study was uploaded into the survey. We added a hyper-text link to the survey as an 'event' entitled *Feasibility Study of Gay Intimate Partner Violence in Atlanta* to a Facebook group dedicated to the gay male community

living in Atlanta. Then, the researcher sent a mass e-mail to all members of this Facebook group to explore the new event. The event explained the nature of the survey, and individuals, if interested, were to click on the link. If the survey link was selected, a potential study participant viewed the informed consent document. The content of the informed consent document detailed the overarching research question, the number of survey items, and where to direct questions about the study, as well as resources that provided information and services focusing on IPV in Atlanta. The e-mail invitation also encouraged participants to forward the invitation to other potential candidates; therefore, we also employed a snowball methodology of recruiting study participants. Study eligibility criteria were identified as being a gay men currently residing in Atlanta, Georgia.

Study Instrumentation

The study survey consisted of 49 items. Twenty-five of the survey items were from the Partner Abuse Scale-Physical (PASPH), and the principal investigator (PI) created the remaining 24 items.[29] The PASPH is designed to measure the severity of physical abuse in a didactic relationship and asks the survey respondent to answer questions about the types and frequency of abuse they have received from their partners. The instrument was created in 1997 and its psychometric properties indicate that it is a highly reliable scale (reliability coefficient of .9). Scores range from 0 to 100, where higher scores indicate greater amounts of physical abuse.

Sociodemographic items developed by the PI included questions regarding the participants' race, age, and educational attainment. Additional questions queried participants about their disclosure status (whether or not they are openly gay) and substance use. For the purposes of this survey, items that queried participants' prescription drug use referred to participants' use of medications prescribed by a physician; additional questions examined participants' use of tobacco, alcohol and illicit drugs. Other items developed by the PI asked participants if they believed that IPV was a health issue in the Atlanta gay community, and whether or not they are aware of any gay male relationships (current or past) involving IPV.

In addition to questions about victimization provided by the PASPH, the PI also included 3 questions asking whether or not the survey participant had been the perpetrator of violence against his intimate partner. Victimization of IPV was indicated if a respondent indicated that he had been the recipient of violence or had been threatened with violence by his intimate partner. Perpetration was indicated if the respondent provided any positive report of delivering physical harm or threatening to harm his partner. Therefore, we coded any response, other than "never," to the 25 PASPH items as positive for IPV victimization, and any affirmative response to the 3 questions regarding perpetration of violence as positive for IPV perpetration.

Table 1. Demographic profile of study sample.

Demographic Profile	Percent
Age (N=98)	
21 and under	11%
22 to 33	34%
34 to 45	35%
45 and above	20%
Educational Attainment (N=99)	
High school or less	12%
Some college	33%
Graduated from college	27%
Post graduate school	28%
Race (N=99)	
American Indian	1%
Asian	15.2%
Black or African American	16.2%
Native Hawaiian or Pacific Islanders	2%
White	62.2%
Other	3%
Orientation Status (N=98)	
Disclosed	73%
Orientation status	27%

RESULTS

Once the PI received 100 completed surveys, the survey was officially closed and the online event was removed. Data was downloaded from the Psychdata server and imported into SPSS—the Statistical Package for Social Sciences, Version 18.0 (Chicago, IL, www.spss.com). We ran descriptive statistics to summarize the demographic profile, behaviors, perceptions, and reported abuse among the sample. Chi-square tests were run to identify associations between individual characteristics and reported IPV victimization and perpetration. We dichotomized the variables race, education and age for the purpose of analyses due to insufficient numbers for each category.

The PI was successful in obtaining 100 surveys within a 16-day data collection time frame. The age, race, disclosure status (disclosed v. non-disclosed), and educational attainment distribution of the sample is presented in Table 1. Sixty percent of the study sample believed IPV is a health issue among gay men in Atlanta, and 66% reported that they know other gay couples, currently or in the past, that involve IPV.

Respondents were asked to whom they would report being a victim of IPV and were allowed to select multiple categories. These categories included friends, family, police, professional counselor and other. Respondents were also given

Table 2. Substance taking behavior summary of study sample.

Substance	Percent
Tobacco (N=99)	
Never/0 Days	70.7%
1-5 Days	8.1%
6-10 Days	6.1%
11-20 Days	6.1%
21 Days or More	9.0%
Alcohol (N=98)	
Never/0 Day	10.2%
1-5 Days	30.6%
6-10 Days	17.3%
11-20 Days	23.5%
21 Days or More	20.2%
Prescription Drugs (N=99)	
Never/0 Day	55.6%
1-5 Days	13.1%
6-10 Days	6.1%
11-20 Days	5.1%
21 Days or More	20.1%
Illicit Drugs (N=99)	
Never/0 Day	80.8%
1-5 Days	13.1%
6-10 Days	3%
11-20 Days	0.0%
21 Days or More	3.0%

Table 3. Prevalence of victimization per physical abuse item.

Physical Abuse Item	% Yes	% No
Forces to have sex (N=97)	12.4%	87.6%
Pushes and shoves (N=97)	23.7%	76.3%
Hits and punches (N=96)	21.9%	78.1%
Threatens with weapon (N=97)	6.2%	93.8%
Beats me so that I need medical help (N=97)	10.3%	89.7%
Slaps around face and head (N=97)	18.6%	81.4%
Beats me when he drinks (N=97)	27.8%	72.2%
Makes me afraid for life (N=96)	13.5%	86.5%
Throws me around the room (N=96)	11.5%	88.5%
Hits and punches in face and head (N=97)	11.3%	88.7%
Hits in face so that I'm ashamed to be seen in public (N=97)	11.3%	88.7%
Partner would like to kill me (N=97)	9.3%	90.7%
Threatens to cut or stab (N=97)	10.3%	89.7%
Tries to choke or strangle (N=97)	7.2%	92.8%
Knocks me down, kicks and stomps (N=97)	8.2%	91.8%
Twists fingers, arms, legs (N=97)	14.4%	85.6%
Throws dangerous objects (N=97)	13.4%	86.6%
Bites or scratches so I bleed or bruise (N=96)	12.5%	87.5%
Violently pinches or twists skin (N=96)	12.5%	87.5%
Hurts me during sex (N=97)	10.3%	89.7%
Injures genitals (N=95)	3.2%	96.8%
Tries to suffocate me (N=97)	13.4%	86.6%
Pokes or jabs me (N=96)	10.4%	89.6%
Has broken my bone(s) (N= 97)	9.3%	90.7%
Kicks face and head (N= 97)	3.1%	96.9%

the option of selecting that there was no one to whom they would report abuse. The top 3 outlets in descending order, to whom respondents indicated they would report, were friends (n=55), family (n=37) and police (n=33). Only 12 respondents indicated that they would report abuse to a professional counselor and 5 selected "other." Importantly, 27% of respondents indicated that they would not disclose abuse to anyone.

Substance Use

Respondents were asked about their substance use behavior within the past 30 days, which included tobacco, alcohol, prescription and illicit drugs. Table 2 presents a summary of findings related to substance use behaviors among the respondents.

Perpetration

The overall prevalence of perpetration among the study sample was 26.3%. Slightly over 18% of respondents indicated that they had physically harmed their intimate partner and 19% indicated that they had threatened to hurt their intimate partners with use of words, gestures, weapons or other means. Five percent of respondents reported they had forced their intimate partners to have sex.

Victimization

The overall prevalence of victimization among the study sample was 31%. The most commonly reported types of physical IPV reported by victims were "beats me when he drinks" (27.8%), "pushes and shoves me around violently" (23.7%), "hits and punches my arms and body" (21.9%), and "slaps me around my face and head" (22.8%). Table 3 presents the prevalence of victimization for each physical abuse item.

Severity of Victimization

Table 4 presents the mean and range of the severity of IPV victimization scores by age, educational attainment, race, and disclosure status. The calculations of IPV scores are based on the WALMYR Assessment Scales where the higher the score (1-100) indicates more severe abuse.[29]

Associations of Victimization and Perpetration

We ran chi-square tests to identify associations between victimization and the following variables: race, education, age, disclosure status and substance use. Victimization was positively associated with illicit substance use ($\chi 2$ (1) = 9.923, p=0.002) and non-White race ($\chi 2$ (1) = 5.196, p=0.023). We also ran chi-square tests to identify associations between perpetration and race, education, age, disclosure status and substance use. Results indicated that perpetration was also positively associated with illicit substance use ($\chi 2$ (1) =16.528, p<0.01) and non-White race ($\chi 2$ (1) =4.088, p=0.043). Of the survey sample, 28.3% of Whites had experienced some form of IPV, as compared to 51.4% of non-Whites. Of perpetrators, 46.2% were White and 53.8% were non-White. Among victims of IPV, 36.1% reported illicit drug use while 46.2% of perpetrators reported using illicit drugs. We found no statistically significant associations with regard to age, education or disclosure status.

DISCUSSION

It is only within the last decade that violence prevention programs, specifically those that target the lesbian, gay, bisexual, transgender (LGBT) community, have begun to bring awareness to IPV-related issues. Gay IPV is particularly difficult to identify because of the social stigma associated with homosexuality. Although this study measured physical and sexual violence, other forms of abuse including psychological abuse and sexual coercion may also exist within our sampled population.

The overall prevalence of perpetration among the study sample was 26.3%, and victimization was 31%. Study results highlight significant associations between IPV and both race and illicit drug use, findings that may be useful in addressing this problem and reducing disparities in violence. As previously mentioned, this population experiences extreme forms of societal stress, and using substances is one mechanism of coping. These study findings align with the previous research that indicates substance abuse among the gay population is prevalent and linked to a range of unhealthy conditions, including violence.

IPV is a complex and multi-layered issue. This study clearly does not begin to understand the complexities surrounding it. Since this study focused primarily on physical violence, future research may expand upon psychological and sexual abuse or coercion among intimate partners. Unlike physical violence, which may be visible, psychological and sexual abuse or coercion may be more traumatic and less obvious. Psychological abuse can have long-term and short-term effects. Victims may not realize the damage of short-term abuse (believing he will change and disregarding any future occurrences) until long-term harm has been done (inability to form healthy relationships with someone else in the future). Further study should also measure the intensity of IPV. The duration and frequency of the episodes may provide additional insight to IPV dynamics. Additionally, qualitative research can provide greater depth of understanding to issues of gay IPV. For example, a person who identified himself as a victim may also be a perpetrator at another time. The perpetrator may have

Table 4. Mean intimate partner violence (IPV) victimization score by sociodemographic variables and disclosure status.

Demographic Features	IPV Mean (Range)
Age	
21 and under	0.44 (0-4.00)
22 to 33	4.32 (0-42.00)
34-45	4.97 (0-24.67)
45 and above	3.53 (0-32.00)
Educational attainment	
High school or less	5.81 (0-23.33)
Some college	3.56 (0-42.00)
Graduated from college	2.28 (0-24.67)
Post graduate school	5.36 (0-32.00)
Race	
White	3.35 (0-42.00)
Non-white	4.20 (0-24.67)
Disclosure status	
Disclosed	4.69 (0-42.00)
Non-disclosed	2.35 (0-2-.77)

Table 5. Associations of intimate partner violence (IPV) victimization and socio-demographics, disclosure status and substance use.

Demographic Features	% Positive IPV	P-values
Race(N=97)		0.023*
White	28.3%	
Non-White	51.4%	
Education (n=97)		0.575
Some college and below	34.1%	
College graduate and beyond	39.6%	
Age		0.205
Under 40	41.2%	
40 and above	27.6%	
Disclosure Status(N=96)		0.953
Disclosed	37.7%	
Not-disclosed	37.0%	
Substance Use		
Tobacco(N=97)	38.9%	0.137
Alcohol (N=96)	97.2%	0.058
Prescription drugs (N=97)	47.2%	0.549
Illicit drugs (N=97)	36.1%	0.002*

*significant association p<.05

Table 6. Associations of intimate partner violence (IPV) Perpetration and Socio-demographics, Disclosure Status and Substance Use.

Demographic Features	% Positive IPV	P-values
Race (N=99)		0.043
White	46.2%	
Non-white	53.8%	
Education (N=99)		0.475
Some college and below	38.5%	
College graduate and beyond	61.5%	
Age (N=99)		0.574
Under 40	73.1%	
40 and above	26.9%	
Disclosure status (N=98)		
Disclosed	72%	0.954
Not-disclosed	28%	
Substance use		
Tobacco (N=99)	38.5%	0.232
Alcohol (N=98)	92.3%	0.622
Prescription drugs (N=99)	46.2%	0.838
Illicit drugs (N=99)	46.2%	0.000*

*significant association p<.05

retaliated as a means of self-defense. The parties may have dual roles, but this can only be clarified with an interview. Formal interviews of former victims/perpetrators can provide a different perspective on why the episode occurred in the past.

IPV continues to be a major public health issue. Violence research in marginalized populations, such as in the LGBT community, lags behind IPV research focusing on heterosexual couples. Although this study used one of the most prominent social network websites, Facebook, it captures a mere fraction of the greater MSM population in Atlanta, Georgia. However, the finding that most participants agree that IPV is a real public health threat in the Atlanta gay community warrants further attention. More astoundingly, a majority of the participants knew other people engaged in IPV. Raising awareness and implementing evidence-based interventions will be key in addressing IPV within the gay community.

LIMITATIONS

This study used a snowball convenience sample and is therefore subject to selection bias. The ultimate research question about whether or not it would be feasible to recruit 100 participants from an underrepresented population via Facebook to provide data on a sensitive topic (IPV) was demonstrated. The ability to generalize these study results to a greater population of MSM is not possible, as the sample likely features characteristics that are different from the overall MSM population, such as generation issues and Internet access.

Results are further limited in that the sample represents only 100 individuals. While the size of the study sample is adequate for reasonable statistical testing of relationships between risk factors and IPV, a more sophisticated sampling methodology and larger sample size would enhance the study power. This pilot study reveals that there are patterns in the data that must be further explored. This pilot demonstrated the feasibility of recruiting study subjects (without any incentive for doing so) from the MSM population regarding IPV research.

A final limitation of this study is that all variables were based on self-reported data, possibly resulting in inaccuracies and skewing the reliability and validity of results. Due to the size of the respective samples, the analyses of race, age, and educational attainment were constrained to dichotomous variables. Although this study used a prominent social network website, it only captured a small portion of the population in Atlanta, Georgia. However, this methodology illustrated the role social networking can play as a viable recruitment technique. Our findings illustrate that IPV among gay males is a significant issue with far-reaching health implications and stresses the importance of assessing IPV when addressing other health issues. Our findings provide insight into IPV among a highly invisible and vulnerable population that suffers health disparities, lack of resources and equal protection under the law.

CONCLUSION

Despite the fact that IPV among gay male couples occurs at similar or higher rates than heterosexual couples, few studies have focused on abuse in same-sex male relationships. This lack of attention occurs despite mounting evidence that IPV among the gay male population poses a significant threat to short- and long-term health outcomes. Given the correlation found between illicit substance use and IPV, further research is needed to understand the rates, patterns, motivations, and contexts of substance use in order to develop strategies to prevent initiation and reduce ongoing use of these substances. Results from this study can help inform future research studies so that better screening and detection systems can be developed. It is likely that gay IPV victims will present in emergency department settings, but if front line staff are not aware of signs and factors that may be associated with IPV the cycle of violence will continue. It is imperative that public health researchers and healthcare providers collaborate in advancing the understanding of IPV within gay communities. It is an imperative associated with grave, yet preventable, health inequities.

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