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RESEARCH

Cross-Sectional Study of the Frequency and Severity of Traumatic Childbirth Events and How They Affect Maternity Care Clinicians

Keisha A. Robinson, Mary E. Johantgen, Carla L. Storr, Joanna M. Gaitens, Robert O. Atlas, and Yolanda Ogbolu

Correspondence
Keisha A. Robinson, MSN, CNM, University of Maryland, School of Nursing, 655 W. Lombard Street, Baltimore, MD 21201.
keisha.robinson@umaryland.edu

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ABSTRACT

Objective: To describe the frequency and severity of traumatic childbirth events (TCEs) and how they affected the professional practice and personal lives of maternity care clinicians, including registered nurses (RNs), certified nurse-midwives, attending physicians, and resident physicians.

Design: Descriptive cross-sectional study.

Setting: Maternity units across five hospitals in the Baltimore metropolitan area.

Participants: Maternity care clinicians ($N = 160$) including RNs ($n = 104$), certified nurse-midwives ($n = 17$), attending physicians ($n = 28$), and resident physicians ($n = 11$).

Methods: Participants completed an online survey to measure the frequency and severity of TCEs and how they affect participants' professional practice and personal lives. We used descriptive statistics to characterize maternity care clinicians and bivariate analysis and linear regression to examine relationships.

Results: Most participants were women (92.5%), White (62.5%), between the ages of 21 and 54 years (89.4%), RNs (65.0%), and employed full-time (79.2%). Shoulder dystocia was the most frequently observed TCE (90.6%), and maternal death was the most severe TCE ($M = 4.82$, $SD = 0.54$). Attending physicians (50.0%) reported a significantly greater frequency of exposure to TCEs than the other participants, $\chi^2(6) = 23.8$ ($n = 159$), $p < .001$. The frequency of TCEs had a significant medium correlation with perceived effect on professional practice, $r(154) = 0.415$, $p < .001$, and personal life, $r(155) = 0.386$, $p < .001$. Perception of severity was strongly associated with professional practice, $\beta = 0.52$, $p < .001$, and personal life, $\beta = 0.46$, $p < .001$.

Conclusion: If severe, TCE exposure can affect the professional practice and personal life of maternity care clinicians.

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Keisha A. Robinson, MSN, CNM, is a PhD candidate, University of Maryland School of Nursing, Baltimore, MD.

Mary E. Johantgen, PhD, RN, is an associate professor emerita, University of Maryland School of Nursing, Baltimore, MD.

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Occupational trauma is a known stressor in the workplace that can disrupt clinician well-being (Cocker & Joss, 2016). Exposure to occupational trauma can occur when emergency and health care workers are exposed to and care for individuals who experience trauma. Traumatic events include exposure to actual or threatened death, serious injury, or sexual violence (American Psychiatric Association, 2013; Benjet et al., 2016). Exposure may occur directly when an individual witnesses an event or indirectly when an individual learns about the event secondhand or experiences repeated reminders of such events (American Psychiatric Association, 2013; Benjet et al., 2016). Exposure to physical and mental trauma has been observed in a variety of health care fields, including maternity care (Beck et al., 2015; Beck & Gable, 2012; M. Simpson & Catling, 2016; Wahlberg et al., 2017). The careers of maternity care clinicians (registered nurses [RNs], certified nurse-midwives [CNMs], attending physicians,

and resident physicians) are often perceived as filled with continuous joy and instant gratification. However, these clinicians experience occupational trauma related to adverse maternal and newborn events.

A traumatic childbirth event (TCE) is defined as the "perception or actual threat to the life of the mother, the newborn, or both" (Beck & Watson, 2010, p. 241). Although TCEs are usually described from the patient's perspective, maternity care clinicians also experience these events. Accurate measurement of the frequency of TCEs among maternity care clinicians has been challenging, partially because of the inconsistent use of terms and measures to describe TCEs. Furthermore, research is needed to accurately describe the types of TCEs experienced on maternity units, and consistency should be used to identify their severity. Findings related to the frequency, type, and severity of TCEs have the potential to increase understanding of maternity care clinicians' exposure to trauma and whether this exposure influences their professional and personal well-being.

In the United States, the current maternal death rate is 23.8 per 100,000 live births (Hoyert, 2022), and the fetal death rate is 5.4 deaths per 1,000 live births (Centers for Disease Control and Prevention [CDC], 2022; Driscoll et al., 2022). Although there have been consistent annual decreases in the annual fetal death rate (Driscoll et al., 2022), the United States has witnessed a gradual increase in maternal morbidity and mortality during and after birth (CDC, 2022; Driscoll et al., 2022), especially among non-Hispanic Black women (CDC, 2022). Comorbidities in pregnancy and increasing patient acuity have become commonplace, including an increased prevalence of gestational diabetes (CDC, 2021b), hypertension (CDC, 2021a), advanced maternal age (Frederiksen et al., 2018), and other chronic health conditions (Lassi et al., 2014), which makes the frequency of exposure to TCEs by maternity care clinicians more likely.

Maternity care clinicians most frequently experience TCEs that involve the death or threatened death of a newborn as a result of preterm birth being the second leading cause of death in neonates (Hamilton et al., 2021). In the United States, there are 500,000 premature neonates born each year (CDC, 2021c). Births of neonates at less than 32 weeks gestation represent approximately 1.6% of all births in the United States (Barfield, 2018). Less than 50% of premature neonates born before 24 weeks gestation survive (Fanczal et al., 2020). Furthermore, maternity care clinicians attend the births of approximately 24,000 stillborn fetuses each year (CDC, 2020). The most common causes of premature birth and stillbirth are multiple gestation, diabetes, and hypertension (Hamilton et al., 2021). Maternity care clinicians also experience TCEs related to birth injuries, which are estimated to occur in 1.9 per 1,000 births in the United States (Dumpa & Kamity, 2021). Scalp injuries related to instrument-assisted births and injuries to the fetal skeleton are two of the most common birth injuries (Dumpa & Kamity, 2021; Ojumah et al., 2017).

The threatened loss of a woman's life is a TCE also experienced by maternity care clinicians. Maternal deaths occur in the United States at a rate of 28.3 per 100,000 live births (CDC, 2022); of all maternal deaths, 13% are attributable to postpartum hemorrhage and 15.5% are attributable to maternal cardiovascular conditions (CDC, 2022; Zheutlin et al., 2022).

Earlier cross-sectional, retrospective research findings provided evidence that when a TCE occurs, the event may trigger psychological distress in the clinician (Beck et al., 2015; Wahlberg et al., 2017). Kerkman et al. (2019) found that 17% of 691 Dutch midwives screened positive for posttraumatic stress disorder (PTSD) after experiencing work-related TCEs: 14% reported symptoms of anxiety, and 7% reported symptoms of depression. In a study conducted in Sweden, researchers found that 15% of 1,628 maternity care clinicians had some degree of psychological distress, and midwives experienced PTSD more frequently than their obstetrician colleagues (Wahlberg et al., 2017). In a study of 1,301 Japanese obstetricians and gynecologists, Sugiura-Ogasawara et al. (2012) used the K-6 distress scale and found psychological distress at almost identical rates by sex for obstetricians and gynecologists: 8.9% of male and 7.7% of female obstetrician and gynecologist respondents suffered from depression or anxiety related to TCEs at work. Using a mixed-methods approach, Beck et al. (2015) reported that 29% of 473 CNMs who were members of the American College of Nurse-Midwives reported high to severe secondary stress and that 36% screened positive for PTSD. Similarly, Slade et al. (2020) conducted a mixed-methods study of 1,095 physicians and reported that 31% of 728

Carla L. Storr, ScD, MPH, is an associate professor emerita, University of Maryland School of Nursing, Baltimore, MD.

Joanna M. Gaitens, PhD, MSN/MPH, is an associate professor, University of Maryland School of Medicine, Baltimore, MD.

Robert O. Atlas, MD, is the Department Chair, Obstetrics & Gynecology, Mercy Medical Center and an assistant professor, Department of Obstetrics, Gynecology and Reproductive Science, University of Maryland School of Medicine, Baltimore, MD.

Yolanda Ogbolu, PhD, CRNP, FAAN, is an associate professor, University of Maryland School of Nursing, Baltimore, MD.

Occupational trauma and its effect on the well-being of clinicians is concerning; measuring factors such as traumatic childbirth events is important.

respondents who reported a work-related trauma exposure had experienced symptoms of PTSD. Of 464 maternity RNs in the United States, 26% met the diagnostic criteria for PTSD, and 35% experienced secondary traumatic stress (Beck & Gable, 2012). In mixed-methods studies, researchers were able to identify the presence of symptoms of PTSD and secondary traumatic stress in CNMs (Beck et al., 2015) and labor and delivery RNs (Beck & Gable, 2012) more distinctly than with the use of quantitative methods alone.

Although these studies primarily focused on the effects of experiencing TCEs on maternity care clinicians' personal lives, including their mental health, it is our intent to also focus on how TCEs may affect the professional practice of maternity care clinicians. Researchers described the effect of exposure to TCEs as potentially career altering (Beck et al., 2015; Slade et al., 2020). For example, CNMs reported that after exposure to TCEs, they engaged in defensive practices in their professional practice, including moving to hospitals where backup physicians were readily available to assist with emergencies, returning to nursing roles, withdrawing from full-scope midwifery practice, and no longer providing intrapartum care (Beck et al., 2015). Physicians also reported defensive practices in their professional practice after exposure to TCEs, including distancing themselves from patients, approaching procedures with increased anxiety, and withdrawing from obstetric practice (Slade et al., 2020). Staff RNs reported a strong desire to leave their careers on maternity units after exposure to TCEs (Beck & Gable, 2012).

While conducting this study, we discovered that accurately measuring the frequency of TCEs in maternity care is challenging, partially because of the inconsistency of terms used to define TCEs, which are also referred to as birth injuries and adverse pregnancy outcomes. A birth injury is the structural destruction or functional deterioration of the body of the neonate because of a traumatic event at birth (Dumpa & Kamity, 2021). Birth injuries can be related to forceps and vacuum extraction procedures and also include shoulder dystocia (Akangire & Carter, 2016; Collins & Popek, 2018; Ojumah et al., 2017). Adverse pregnancy outcomes are defined as chromosomal abnormalities, congenital malformations, miscarriage, stillbirth, or birth before 34 weeks gestation (CDC, 2016). By definition, adverse pregnancy outcomes focus only on fetal outcomes and exclude maternal outcomes.

We decided that TCE is the preferred term for our study because the definition is inclusive of the perceptions of threat to the life of the mother, the newborn, or both, thereby capturing maternal and newborn adverse outcomes. Beyond conceptual definitions, a cohesive approach to identify, measure the frequency of, and assess perceptions of occupational stressors such as TCEs is essential. We used an objective measure of TCEs to contribute to strengthening the consistent measurement of occupational trauma exposures in maternity care clinicians. Therefore, the purpose of our study was to describe the frequency and severity of TCEs and how they affect the professional practice and personal lives of maternity care clinicians, including RNs, CNMs, attending physicians, and resident physicians.

Methods

Design

We conducted a descriptive cross-sectional study using an anonymous online survey. We distributed the survey as an electronic link in an e-mail from each participating hospital's maternity unit's departmental mass e-mail list. The University of Maryland institutional review board approved our study and granted an exempt status. We maintained participants' confidentiality using password-protected encrypted data collection software and by not permitting research team members access to the recruitment sites' departmental mass e-mail lists. In addition, personal identifiers were not collected.

Setting

We recruited participants from five hospital maternity units in the Baltimore Metropolitan area. Three of these recruitment sites were teaching institutions. The recruitment sites provided care to populations of women seeking maternity care with similar risk factors. Clinicians at these five units cared for women in the intrapartum period with similar high-risk challenges, including hypertension, diabetes, multiple gestations, substance abuse, and morbid obesity. All recruitment sites had an onsite Level 2 or greater NICU. Level

2 or greater NICUs treat neonates with mild to severe health problems and are more likely to care for high- and low-risk births, thereby increasing the likelihood of clinician exposure to a TCE event (American College of Obstetricians and Gynecologists, 2019). Recruitment site A was a 22-bed maternity unit with an estimated 1,700 births annually, staffed by RNs, CNMs, physician assistants, attending physicians, and obstetrics and family medicine resident physicians (resident physicians). Recruitment site B was a 14-bed maternity unit with an estimated 2,500 births annually that is also staffed by RNs, CNMs, physician assistants, attending physicians, and resident physicians. Recruitment site C was a 10-bed maternity unit with 1,500 annual births staffed only by attending physicians and RNs. Recruitment site D was a 15-bed maternity unit with an estimated 3,000 annual births staffed by RNs, CNMs, physician assistants, attending physicians, and resident physicians. Recruitment site E was a 12-bed maternity unit with an estimated 1,770 annual births staffed by attending physicians, CNMs, and RNs.

Sample

Study participants consisted of maternity care clinicians, including RNs, resident physicians (obstetrics or family medicine), attending obstetrician physicians, and CNMs. Participant inclusion criteria consisted of maternity care clinicians employed at any of the recruiting hospitals who provided direct care for women during the intrapartum period.

Measures

We defined TCEs based on our review of the literature as events that may provoke psychological distress and defensive practice behaviors, specifically, shoulder dystocia, uncontrolled postpartum hemorrhage, stillbirth/infant death, unsuccessful newborn resuscitation, maternal death, uterine rupture, and instrument injury to mother or newborn during the birth process. We developed survey items to assess the frequency of exposure to these eight TCEs, perceptions of the severity of the TCEs, and their perceived influence on participants' professional practice and personal life. Before implementing the research study, we pilot-tested the TCE survey items to validate the eight birth outcomes as TCEs. The pilot test also allowed us to perfect the questions in our study by identifying ambiguous questions or wording, unclear instructions, or other problems with the TCE measurement before widespread dissemination of our survey. The pilot sample consisted of a convenience sample ($N = 15$) of maternity care RNs, CNMs, and obstetrics physicians. We asked the pilot study recipients to complete a paper survey that would gauge their exposure to TCEs and the severity of those TCEs. Respondents were asked to indicate a "yes" or "no" response for a history of exposure to each individual TCE. The respondents were then asked to use a scale of 0 to 10 to separately rate the severity of the TCE and the influence the TCE had on their professional practice and personal life. These respondents endorsed the eight specific birth outcomes as TCE events. The pilot study findings were congruent with those birth outcomes identified in the literature as TCEs, suggesting content validity. As a result of the pilot study, we revised one survey item. Instead of respondents indicating "yes" or "no" to having experiencing a particular TCE, respondents were asked to indicate the frequency with which they experienced each individual TCE, with *never* offered as a valid response.

The frequency with which maternity clinicians are exposed to severe traumatic childbirth events can affect their professional practice and personal life.

The revised TCE survey questionnaire measured the frequency of exposure, perception of severity, and perceived influence on the participant's professional practice and personal life for each of the eight TCEs. Frequency of exposure was measured with the question, "How many times have you experienced the following?" The five response options included *never*, *1–3 times*, *4–6 times*, *7–9 times*, and *10 times or more* and were coded as 1 through 5, respectively. We summed the frequency categories across the eight TCEs and used tertiles to create low, medium, and high levels of TCE exposure. TCE severity categories consisted of none (1), very mild (2), mild (3), moderate (4), or severe (5). We also summed the severity categories and used tertiles to create low, medium, and high levels of severity. The two survey items, influence on professional practice and influence on personal life, were measured independently with 5-point Likert responses (*none*, *very mild*, *mild*, *moderate*, and *major*) and also coded as 1 through 5, respectively. Both items were summed independently of each other to create two separate variables, total influence on professional practice and total influence on personal life. Multiple-choice items consisted of

demographic variables including age (21–34, 35–54, 55–64, 65–75 years), sex (male or female), race (White, Black Asian/Pacific Islander, Hispanic/other), and relationship status (married, single in a relationship, single, divorced). Participants also provided multiple-choice responses to describe their professional characteristics, including employment status (full-time, part-time, self-employed, or pro re nata), occupational title (RN, CNM, attending physician, or resident physician), and years in practice (1 or less, 2–3, 4–5, 6–10, 11–15, 16–20, 21 or more). The four subscales (Frequency, Severity, Effect on Professional Life, Effect on Personal Life) of the TCE measure had Cronbach's alpha coefficients of internal consistency reliability of .824 for Frequency, .774 for Severity, .783 for Effect on Professional Practice, and .821 for Effect on Personal Life.

Procedures

We acquired letters of support from the five hospitals that served as data collection sites. These letters of support served as agreements that ensured the sites would post a flyer about the study on the maternity unit and distribute the survey link via the departmental mass e-mail list. One week after the flyers were posted, we sent out an introductory e-mail to maternity care clinicians on each hospital's mass e-mail list that included a secure link to our anonymous survey. The introductory e-mail included a paragraph describing the study's purpose, inclusion criteria (clinician role type), what the participant was being asked to do, and an indication that participation was voluntary. The introductory paragraph also explained that completion or partial completion of the survey implied consent. After we sent this initial introductory e-mail, we sent two reminder e-mails 30 days apart. At the end of the survey, participants were given the option to provide their e-mail address to receive a $20 e-gift card as compensation for their time and expertise.

Analysis

We were unable to estimate an effect size from the literature because previous researchers did not measure multiple TCEs and their effects on maternity care clinicians' professional practices and personal lives. Therefore, we assumed a conservative small to medium effect. An a priori power analysis with G*Power indicated that a sample of 126 was needed to achieve a small to medium effect size ($F = 0.09$) as well as a power of .80 and an alpha of .05 (Faul et al., 2007) for linear regression with three explanatory variables (TCE frequency, TCE severity, and years in

Table 1: Characteristics of Participants ($N = 160$)

Characteristic	*n* (%)
Sex	
Male	12 (7.5)
Female	148 (92.5)
Race	
White	100 (62.5)
Black	37 (23.1)
Asian/Pacific Islander	11 (6.9)
Hispanic/other	12 (7.5)
Age, years	
23–34	74 (46.2)
35–54	69 (43.1)
55–64	14 (8.8)
65–75	3 (1.9)
Relationship status	
Married or civil union	92 (57.5)
Single in a relationship	29 (18.1)
Single	28 (17.5)
Divorced	11 (6.9)
Employment status	
Full-time	126 (79.2)
Part-time	19 (11.9)
Self-employed/pro re nata	14 (8.8)
Occupational title	
Registered nurse	104 (65.0)
Certified nurse-midwife	17 (10.6)
Attending physician	28 (17.5)
Resident physician	11 (6.9)
Years in practice	
<1	21 (13.2)
2–3	29 (18.2)
4–5	12 (7.5)
6–10	32 (20.1)
11–15	27 (16.9)
16–20	12 (7.5)
≥21	26 (16.3)

Note. Data are missing from employment status and years in practice.

practice) and the association of these variables with two outcome variables (influence on professional practice and influence on personal life). We analyzed our data using SPSS, version 27, and used frequencies and proportions to describe participant characteristics and types of TCEs. We used chi-square analysis to compare levels of TCE exposure stratified by clinician type and score means to describe the perceived severity of TCEs. We confirmed significant findings via the Fisher exact test for cells less than five. Finally, after parametric assumptions were met, we used Pearson's correlations to examine the relationships among the variables of age, years of practice, influence on professional practice, and influence on personal life. Based on correlation, a linear regression was then used to identify the influence of TCE frequency, perception of severity, and years in practice on the participants' professional practice and personal life.

Results

Characteristics of Participants

A total of 167 participants accessed our TCE survey. Although surveys with missing data were included in the analysis, we removed seven participants' files during the data cleaning process because of missing values on all variables, resulting in a final sample of 160 participants. Each of the five hospitals had some respondents, but we could not determine the return rate by hospital because the total number of maternity care clinicians to serve as the denominator was not available for each hospital.

As depicted in Table 1, most participants were women (92.5%), White (62.5%), between the ages of 21 and 54 years (89.4%), RNs (65.0%), and employed full-time (79.2%). Only 16.3% reported having 21 years or more of work experience. The work experience question was generalized and not specific to work in maternity care. Four RN participants reported not experiencing a TCE event; three of these participants had less than five years of work experience, and another had 21 years or more of nursing experience. In addition, one RN participant chose not to answer any TCE frequency items but answered all other items within the survey, whereas others chose not to answer severity items as well as items for influence on their professional practice and personal life. All were included in the analysis.

Frequency of TCEs

Most (97.5%) participants had experienced at least one TCE during their careers (see Table 2).

Table 2: Mean Severity and Frequency Rating of Traumatic Childbirth Events

		Severity	Frequency of Experience Percentages					
Traumatic Childbirth Event	*n*	*M SD* Range	Never *n* %	1–3 Times *n* %	4–6 Times *n* %	7–9 Times *n* %	≥10 Times *n* %	At least once *n* %
Maternal death	159	4.82 0.54 1–5	74 46.5	73 45.9	7 4.4	4 2.5	1 0.6	85 53.5
Unsuccessful newborn resuscitation	159	4.65 0.59 1–5	76 47.8	59 37.1	17 10.7	3 1.9	4 2.5	83 52.2
Uterine rupture	158	4.24 0.84 1–5	71 44.9	69 43.7	12 7.6	1 0.6	5 3.2	87 55.1
Postpartum hemorrhage	159	4.22 0.73 1–5	42 26.4	83 52.2	20 12.6	4 2.5	10 6.3	117 73.6
Stillbirth	158	4.10 0.95 1–5	31 19.6	41 25.9	30 19.0	16 10.1	40 25.3	127 80.4
Shoulder dystocia	159	3.72 0.98 1–5	15 9.4	58 36.5	31 19.5	14 8.8	41 25.8	144 90.6
Maternal instrument injury	159	3.64 0.99 1–5	118 74.2	38 23.9	1 0.6	2 1.3	0	41 25.8
Newborn instrument injury	159	3.10 1.07 1-5	91 57.2	55 34.6	11 6.9	2 1.3	0	68 42.8

Note. Mean severity was calculated only for those having any frequency of the experience.

The most common TCEs were shoulder dystocia (90.6%), stillbirth (80.4%), and uncontrolled postpartum hemorrhage (73.6%). More than half of participants reported being exposed at least once to a TCE during their careers, including maternal death (53.5%), unsuccessful newborn resuscitation (52.2%), and uterine rupture (55.1%). Only a few participants had experienced a birth that involved a maternal or newborn instrument injury (25.8% and 42.8%, respectively).

Mean Perception of Severity of TCEs

We assessed TCE severity with a range of 1 through 5, with higher scores indicating greater perceived severity (see Table 2). Maternal death had the greatest severity ($M = 4.82$, $SD = 0.54$), followed by unsuccessful newborn resuscitation ($M = 4.65$, $SD = 0.59$). Beyond death of mothers and their newborns, uterine rupture ($M = 4.24$, $SD = 0.84$), postpartum hemorrhage ($M = 4.22$, $SD = 0.73$), and stillbirths ($M = 4.10$, $SD = 0.95$) all ranked high in severity with means greater than 4.0. Participants scored shoulder dystocia ($M = 3.72$, $SD = 0.98$), maternal instrument injury ($M = 3.64$, $SD = 0.99$), and newborn instrument injury ($M = 3.10$, $SD = 1.07$) lowest in severity.

Frequency of Exposure to TCEs, Severity, and Influence on Professional Practice and Personal Life by Occupation

We stratified TCE frequency by occupation to explore variations in experiences. There was a significant difference in frequency of TCEs across occupational categories, $\chi^2(6) = 23.8$ ($n = 159$), $p < .001$, yet no difference in the perceptions of severity (see Table 3). Fifty percent of the 28 attending physician participants reported the greatest frequency of TCEs. The 17 CNM participants reported the greatest proportion of TCE effect on their professional practice (43.7%) and personal life (53.0%) compared to the other occupational groups. There was a significant difference in the effect of TCEs on personal life by occupation, $\chi^2(6) = 13.0$ ($n = 159$), $p = .04$; however, there was no difference in the effect of TCEs on professional practice.

Table 3: Frequency, Severity, and Effect of Traumatic Childbirth Events on Participants

Subscales	Registered Nurses *n* (%)	Certified Nurse-Midwives *n* (%)	Attending Physicians *n* (%)	Resident Physicians *n* (%)	Chi-Square Statistic and *p* Value
Frequency					
Low	50 (48.5)	4 (23.5)	2 (7.1)	6 (54.5)	$\chi^2 = 23.8$ $p < .001$
Medium	20 (19.4)	9 (52.9)	12 (42.9)	3 (27.3)	
High	33 (32.0)	4 (23.5)	14 (50.0)	2 (18.2)	
Severity					
Low	38 (36.9)	6 (35.3)	4 (14.3)	4 (36.4)	$\chi^2 = 6.29$ $p = .391$
Medium	36 (35.6)	6 (35.3)	12 (42.9)	5 (45.5)	
High	29 (28.2)	5 (29.4)	12 (42.9)	2 (18.2)	
Influence on practice					
Low	34 (33.7)	3 (18.8)	8 (28.6)	7 (63.6)	$\chi^2 = 6.48$ $p = .380$
Medium	34 (33.7)	6 (37.5)	10 (35.7)	2 (18.2)	
High	33 (32.7)	7 (43.8)	10 (35.7)	2 (18.2)	
Influence on personal life					
Low	40 (39.6)	4 (23.5)	5 (17.9)	6 (54.5)	$\chi^2 = 13.0$ $p = .04$
Medium	34 (33.7)	4 (23.5)	9 (32.1)	4 (36.4)	
High	27 (26.7)	9 (52.9)	14 (50.0)	1 (9.1)	

Note. Fisher's exact test was used to confirm significance for cell counts of less than 5.

Despite the findings indicating a significant difference in the proportion of TCE levels of exposures and influence on personal life stratified by occupation, the chi-square statistics must be interpreted cautiously because of violations of the lowest expected cell frequency assumption. Therefore, two-sided Fisher exact tests were performed and confirmed that significant differences existed among maternity care clinician provider types and levels of TCE frequency ($p <$ .001, Fisher exact test) and influence on personal life ($p = .041$, Fisher exact test).

Associations Among TCE Variables

We used Pearson's correlations to examine the relationships among the four TCE dimensions (frequency, severity, effect on professional practice, effect on personal life) and participants' characteristics (see Table 4). TCE frequency scores had significant positive correlations with age, $r(157) = 0.440$, $p < .001$, and years in practice $r(154) = 0.509$, $p < .001$. Significant correlations were observed between TCE frequency and perceived severity, $r(157) = 0.570$, $p < .001$, and between TCE frequency and perceived effect on professional practice, $r(154) = 0.415$, $p < .001$ and personal life, $r(155) = 0.386$, $p < .001$.

Influence of TCEs on Professional Practice and Personal Life

We used linear regression in two models to quantify the strength of relationships between frequency of TCE, severity of TCE, participants' years in practice, and their occupation with the dependent variables of influence on participants' professional practice and personal life. We excluded age because of collinearity with years in practice. Attending physicians were the referent group because they experienced TCEs at a greater proportion than all other maternity care clinicians. As depicted in Table 5, although the frequency of TCE exposure and perceived severity of TCEs shared significant relationships with influence on professional practice and personal life in bivariate analysis, only perception of TCE severity was strongly associated with effect on professional practice ($\beta = 0.52$, $p < .001$) and personal life ($\beta = 0.46$, $p < .001$). Years in practice had no effect on influence on professional practice yet had a modest relationship with effect on personal life ($\beta = 0.19$, $p < .05$). Also, despite the chi-square analysis indicating a significant relationship between occupation and influence on personal life, the regression model did not support this relationship.

Measuring traumatic childbirth events can create pathways for intervention with at-risk clinicians and reduce the negative influence on their professional practice.

Discussion

Despite their varying roles on maternity units, participants in all occupational categories reported experiencing at least one TCE during their careers. The most frequently encountered TCE was shoulder dystocia, with a large majority (90.6%) of participants experiencing at least one. This is not surprising, because the incidence of shoulder dystocia ranges from 0.1% to 3.0% of all births in the United States (Ouzounian, 2016). Most (80.4%) participants also reported exposure to stillbirth. Although not the most frequent TCE experienced, maternal death (53.5%) and unsuccessful newborn resuscitation (52.2%) were perceived as the most severe by participants.

With TCE frequency stratified by occupation, attending physicians had the greatest frequency of exposure, followed by RNs, CNMs, and

Table 4: Correlations Among Participant Characteristics and TCE Variables

Scale	1	2	3	4	5
1. TCE exposure	–				
2. Age	.440**	–			
3. Years in practice	.509**	.831**	–		
4. Perceived severity of TCE	.570**	.232**	.275**	–	
5. TCE effect on professional practice	.415**	.185*	.288**	.586**	.696**
6. TCE effect on personal life	.386**	.212**	.333**	.529**	–

TCE = traumatic childbirth event.
*$p < .05$; **$p < .001$.

Table 5: Linear Regression of TCE Effect on Professional Practice and Effect on Personal Life

	Effect on Professional Practice			Effect on Personal Life		
Variables	Standardized β	*SE*	95% CI	Standardized β	*SE*	95% CI
Constant	—	2.04	[2.41, 5.67]	0.02	2.01	[–4.18, 3.78]
Frequency	0.06	.126	[0.139, 0.359]	—	.124	[–0.199, 0.291]
Severity	52**	.076	[0.352, 0.653]	46**	.075	[0.277, 0.573]
Years in practice	0.11	.309	[–0.305, 0.917]	0.19*	.305	[0.052, 1.52]
Registered nurse	0.011	1.39	[–2.58, 2.93]	–0.078	1.38	[–3.904, 1.53]
Certified nurse-midwife	0.042	1.99	[–2.86, 5.01]	–0.015	1.93	[–4.17, 3.44]
Resident physician	–0.087	2.40	[–7.33, 2.16]	0.109	2.36	[7.75, 1.59]

Note. CI = confidence interval.
*$p < .05$. **$p < .001$.

resident physicians, which aligns with traditional patient care responsibilities established by many professional organizations and their scope of practice guidelines. Many CNMs, family medicine residents, and first-year obstetrics residents have limited roles with or engage in co-management of the care of women with high-risk pregnancies, and others are required to transfer the care of these women to attending physicians (American Academy of Family Medicine Physicians, 2018; American College of Nurse-Midwives, 2014; American College of Obstetricians and Gynecologists, 2018; Council on Resident Education in Obstetrics and Gynecology, 2020). The practice guidelines for CNMs and resident physicians requiring the transfer of care or co-management of the care of women with high-risk pregnancies may explain why the frequency of exposure to TCEs among CNMs and resident physicians was lower than among attending physicians. Despite their ability to transfer the care of women to attending physicians, CNM participants reported that TCE exposure had a strong effect on their professional practice in comparison to the effect experienced by attending and resident physicians.

The second greatest frequency of exposure to TCEs occurred among RN participants. This finding is consistent with the responsibilities on most maternity units in that RNs provide maternity care to all women despite the presence of high-risk factors (K.R. Simpson et al., 2019). Staffing guidelines typically require the presence of two RNs at birth: an RN to provide care for the mother and an RN for the neonate (K.R. Simpson et al., 2019). These staffing ratios increase the likelihood of RNs' TCE exposure.

We also identified a strong association between participants' perceptions of TCE severity and the effect on their professional practice. This finding aligns with previous reports of RNs describing a strong desire to leave the maternity unit and pursue careers in other areas of nursing after exposure to TCEs (Beck & Gable, 2012). In earlier studies, CNMs reported returning to RN roles or withdrawing from full-scope midwifery practice and no longer providing intrapartum care (Beck et al., 2015), and physicians reported withdrawing from obstetric practice because of TCE exposures (Slade et al., 2020).

Implications

Participants' perceptions of the severity of TCEs were associated with influence on their personal lives, which may be due to the psychological distress associated with TCEs (Beck & Gable, 2012; Beck et al., 2015; M. Simpson & Catling, 2016; Wahlberg et al., 2017). Prior researchers identified an association between TCE exposures and psychological disorders such as depression, PTSD, and anxiety. It is possible that behaviors associated with psychological disorders, including avoidance, sadness, and engagement in self-destructive behaviors such as alcohol and drug abuse, may result in difficulties within relationships and enjoyment in activities of daily life (Cocker & Joss, 2016). Measuring TCEs can help identify maternity care clinicians who are most at risk for developing psychological distress, burnout, or early withdrawal from practice. The ability to identify vulnerable or

at-risk maternity care clinicians can facilitate the development and implementation of strategies to mitigate the negative effects of TCEs and promote clinician well-being. Potential mitigating strategies consist of debriefing tools, educational modules, and simulated drills of the most frequent and perceptually severe TCEs (Pettker, 2017).

Limitations

There were several limitations to our study, including the design, sampling approach, and measurement. First, the cross-sectional design represents one point in time of clinicians' experiences. As a result, only associations between variables could be explored and not temporal sequences, predictions, or causal relationships. The second limitation was our sampling approach. We sampled only five hospitals with Level 2 or higher NICUs in one metropolitan region, which limits the generalizability of our results. Furthermore, we did not use the "prevent multiple submissions" feature in the software we used because this feature may have hindered multiple participants using a shared computer within a shared workspace. However, it is possible that an individual may have responded to the survey more than once. Finally, our sample was a convenience sample with e-mails sent to potential participants by administrators in the five hospitals. To remain compliant with the University of Maryland institutional review board's requirements, we did not have access to each hospital's mass e-mail list, so we could not verify the accuracy of the list or calculate a response rate. In addition, selection bias may have occurred because maternity care clinicians who perceived their TCE exposure as severe may have been more likely to complete the survey. Also, maternity care clinicians may not recall every TCE they experienced in their career, or they may only recall the most severe or stressful events. The limited participation of individuals in some professional roles resulted in an underrepresentation of some maternity care clinician occupations.

Our data may have measurement limitations in that we did not specify the temporal aspect of TCE exposure. The absence of a temporal specification (e.g., within the last year) may have influenced participants' responses regarding the frequency, perceived severity, effect on practice, and effect on personal life as a result of exposure to TCEs. On reflection, the item "years in practice" should have been worded "years of practice in maternity care," which may have provided more information about participants who reported they had not experienced a TCE.

Conclusion

Maternity care clinicians' occupational exposures to TCEs have been understudied. Our findings contribute to the literature by strengthening the measurement of TCEs to include their perceived severity and effect on the professional practice and personal lives of maternity care clinicians. We found that maternity care clinicians working in hospitals in one metropolitan area with Level 2 or higher NICUs are frequently exposed to TCEs and that if severe, these events are associated with effects on their professional practice and personal life. We demonstrated a modest association of occupational trauma with professional practice and personal life effects. Longitudinal studies with larger sample sizes, a larger array of obstetric care occupations, and more diverse practice settings can strengthen TCE measurement and provide opportunities to better understand the influence of TCE exposure on clinician well-being over time.

CONFLICT OF INTEREST

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