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Relationship of Genital Injuries and Age in Adolescent and Young Adult Rape Survivors

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Abstract

Objective—To examine the associations between age and genital injuries in adolescent and young adult women examined following rape.

Design & Setting—A retrospective review of 234 medical records from an emergency department sexual assault program.

Sample—Women aged 14 to 29 years. Fifty percent of the sample was African American, 48% was White, and 2% was either Asian or an "other" race.

Main Outcome Measures—Genital injury was described by injury prevalence, frequency, and anatomical locations of injuries.

Results—Overall genital injury prevalence was 62.8%. Younger age was not significantly associated with the presence or absence of genital injury. However, younger age was significantly associated with an increased number of genital injuries overall and to the thighs, labia minora, periurethral area, fossa navicularis, and vagina.

Conclusion—These findings support the need for further research to determine if the current care provided to rape survivors is age appropriate.

Keywords

genital injury; rape; age; adolescents; young adults

In 2004, approximately 200,000 people were survivors of rape in the United States (Catalano, 2005), with adolescents having the highest rates of reported rapes when compared to all other age groups (American Academy of Pediatrics, 2001; Rennison & Rand, 2003). Adolescent survivors of rape are most often women with a ratio of adolescent females to adolescent males of 13.5:1 (Rennison, 1999). The National Survey of Adolescents found that 13% of girls have experienced rape (Kilpatrick et al., 2000), and approximately 50% to 70% of reported rapes occur in girls younger than 18 years of age (Snyder, 2000; Tjaden & Thoennes, 2000). These statistics suggest that rape is endemic among adolescent females.

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More than half of survivors of rape who reported the crime to the police were treated for their injuries by a health care provider (Rennison, 2002). A key element of health care providers' interaction with rape survivors is the identification, treatment, and documentation of injuries (Ohio Chapter of the International Association of Forensic Nurses, 2002). Even though adolescent females have the highest rates of rape compared to other age groups, there is a scarcity of literature examining injuries among adolescent female rape survivors. In published studies, adolescent survivors are often grouped together with adult survivors, and findings are not reported separately by age (Biggs, Stermac, & Divinsky, 1998; Eckert, Sugar, & Fine, 2004; Riggs, Houry, Long, Markovchick, & Feldhaus, 2000; Sugar, Fine, & Eckert, 2004).

The current study explored the relationship between age and genital injury among adolescent and young adult female survivors of rape. Specifically, it was hypothesized that adolescent females (14–21 years old) would have different genital injuries as compared to young adult females (22–29 years of age) when examined within 72 hours of a rape. The current study examined both genital injury prevalence (defined as the number of survivors with one or more genital injuries divided by the total number of survivors) and genital injury frequency (defined as the count of genital injuries sustained by each woman).

Background

Investigators have reported that injuries occur in 26% to 94% of adolescent rape victims (Adams, Girardin, & Faugno, 2001; Adams & Knudson, 1996; Baker & Sommers, 2004; Emmert & Kohler, 1998; Jones, Rossman, Wynn, Dunnuck, & Schwartz, 2003; Muram, Hostetler, Jones, & Speck, 1995; Peipert & Domagalski, 1994). Four of these studies reported injuries occurring in adolescents but did not include a comparison group of older or younger females (Adams & Knudson; Adams et al., 2001; Baker & Sommers; Emmert & Kohler). Of the remaining studies, two were conducted using only direct visualization to identify genital injury rather than more advanced technologies such as visualization with contrast media or colposcopy (Muram et al., 1995; Peipert & Domagalski). These two studies reported the lowest rates of injury (26% and 27%, respectively) among all the published studies and appear to underreport injury in the adolescent population.

Jones et al. (2003) compared adolescents (13–17 years old) to an adult sample (18–82 years old) of rape survivors and reported a higher genital injury prevalence among adolescents as compared to adults. They reported the most common types (lacerations) and locations (fossa navicularis, hymen, labia minora, and posterior fourchette) of genital injuries among adolescent survivors (Figure 1). This study is the sole report that used current technology, namely colposcopy, to investigate genital injury prevalence and used a comparison group to differentiate the unique characteristics of the adolescent sample from an adult sample. However, the comparison group used by Jones et al. included adults as old as 82 years, and previous studies have reported a significant difference in injuries sustained by adults and those sustained by older adults (Ramin, Satin, Stone, & Wendel, 1992). Therefore, it is possible that the comparison group did not constitute a homogeneous group. In addition, Jones et al. reported results for the entire adolescent population but did not state whether differences in injuries existed based on age within the adolescent sample.

Several investigators have described adolescent samples of rape survivors, but the literature lacks studies that use advanced assessment techniques to compare injuries occurring to adolescent survivors of rape to those occurring to young adult survivors (Adams & Knudson, 1996; Adams et al., 2001; Baker & Sommers, 2004; Emmert & Kohler, 1998; Muram et al., 1995; Peipert & Domagalski, 1994). The one research team that attempted to fill this gap used a comparison group of adults that was not homogenous (Jones et al., 2003).

Additionally, to date, no investigators have reported on the differences in genital injuries by age within an adolescent sample of rape survivors. To fill this gap, the current study compares injuries sustained by female adolescents to those sustained by young adult women and examines differences in injuries by age within the adolescent sample.

Significance

Studying genital injury in adolescent rape survivors has important practice and legal implications (Sommers, 2007). Assessment and treatment of genital injuries are important in providing appropriate health care to survivors. Some injuries may need intervention, whereas other injuries heal without treatment. Research that describes the number, types, and locations of genital injuries resulting from rape helps health care providers conduct thorough, evidence-based examinations.

Investigators have shown that health care findings, specifically the documentation of injuries, are instrumental in the legal outcome of an assault. Injuries have been shown to be important throughout the trajectory of a legal case and are related to a survivor's decision to report the assault, the prosecutor's decision to file charges, and the jury's decision to convict the defendant (Bachman, 1998; Gottfredson & Gottfredson, 1980; Gray-Eurom, Seaberg, & Wears, 2002; McGregor, DuMont, & Myhr, 2002; McGregor, Le, Marion, & Wiebe, 1999; Rambow, Adkinson, Frost, & Peterson, 1992; Sommers, Fisher, & Karjane, 2005). Therefore, when performing forensic examinations, health care providers are in the unique position of affecting both the health outcomes of their patients and the legal outcomes of the cases.

Currently, health care providers conduct the same forensic examination for all adolescent and adult survivors of rape regardless of their age (U.S. Department of Justice, 2004). Because of their incomplete physical maturation, adolescents may sustain different genital injuries than other age groups. Additionally, within the adolescent age group, there may be differences in genital injuries between younger and older adolescents. It is crucial to examine these issues in order to assure that the current protocol is the best practice and that all survivors of rape receive the best evidence-based care following an assault.

Methods

The investigators used a descriptive, comparative, two-group design to explore the association between age and genital injury. Institutional Review Board approval for the study was obtained. The study population was females between the ages of 14 and 29 who were examined within 72 hours of a rape. Data were collected retrospectively through a review of preexisting medical records of rape survivors examined in a sexual assault forensic examiner program at a level 1 trauma emergency department. The hospital is located in an urban city with a population of 330,000 and a rape rate of 100.2/100,000 people (Marchex, Inc., 2007). The data were collected from an emergency department that provides examinations for the majority of the adolescent and adult rape survivors in the county and several surrounding counties. The forensic examiners who conducted these examinations were registered nurses who received additional training in forensic techniques, including completion of a 40-hour didactic course, observation of forensic examinations, and conduct of examinations while under observations of an experienced examiner.

Data collection included a review of the medical records and extraction of the date and time of the examination, the survivor's birth date, the date and time of the assault, digital images captured during the examination, and the examiner's documentation of the number, types, and locations of genital injuries visualized by their unaided eye and through magnification with colposcopy. The number of genital injuries was determined by simply counting each

injury occurrence and totaling the count for each individual. *Genital injury frequency* was the number of genital injuries sustained by each woman. *Genital injury prevalence* was the number of survivors with one or more genital injuries divided by the total number of survivors. Genital injury types were described using the TEARS classification system, which codes injuries as tears, ecchymoses, abrasions, redness, or swelling (Slaughter, Brown, Crowley, & Peck, 1997). Locations of genital injuries included external genitalia (thigh, mons, labia majora, and perineum), internal genitalia (labia minora, periurethral area, posterior fourchette, fossa navicularis, hymen, cervix, and vagina), and anus.

Results

Sample

All medical records of survivors examined between June 2003 and December 2005 were evaluated ($N = 648$). Records were excluded from the review because of missing information: missing age or birth date, missing race/ethnicity, missing injury data, or missing digital images captured during the examination ($N = 203$). Records of patients older than 29 years old ($N = 211$) were excluded. These exclusions resulted in a final sample size of 234. Data were extracted from the medical records, deidentified, and double entered into a password-protected electronic database stored on a secure research server. The two double-entered data sets were compared and no discrepancies were identified. The demographic characteristics of the study sample, stratified by age group, are summarized in Table 1.

Findings

Genital Injury Prevalence—In the total sample, the overall genital injury prevalence was 62.8%. Among the adolescents, the genital injury prevalence was 65.7%, and among the young adults, the genital injury prevalence was 58.5%. To examine the association between age and genital injury prevalence, a simple logistic regression was calculated by regressing presence of genital injury on age modeled continuously. Age was not a significant predictor of genital injury prevalence (odds ratio [OR] = 0.945, 99% confidence interval [CI]: 0.856–1.043, $p = .140$).

Age then was analyzed as a predictor variable in regressions modeling injury prevalence for each anatomical location. For each anatomical location, presence of injury was regressed on age, modeled continuously, using simple logistic regression analysis. To reduce the inflated risk of a type I error that occurs when a large number of statistical analyses are conducted, a correction was applied and $\alpha = .01$ was used as the level of significance. Age was not a statistically significant predictor of injury prevalence in any of the examined anatomical locations.

To examine whether there were differences in genital injury prevalence between adolescents as a group (14–21 years old) when compared to young adults as a group (22–29 years old), ORs were calculated. When considered as a group, adolescents were not any more likely to sustain a genital injury than young adults (OR = 1.418, 99% CI: 0.696–2.891, $p = .206$). When injury prevalence was analyzed separately by anatomical location, none of the locations yielded statistically significant differences in injury prevalence between adolescents and young adults.

Genital Injury Frequency—In addition to the presence or absence of genital injury, counts of genital injuries were analyzed overall and in each anatomical location. Overall genital injury frequency ranged from no injury to 24 distinct injuries in one survivor. The mean number of genital injuries sustained by an individual was 1.81 ($SD = 3.05$). Because

the outcome variables were over-dispersed, a series of zero-inflated Poisson (ZIP) regression analyses were conducted by regressing the frequency of genital injury, overall and at each anatomical location, on age modeled continuously and then on age category. Since multiple ZIP regressions were run, a correction was applied and statistical significance was reported for $\alpha < .01$.

When considering overall genital injury frequency, age, as a continuous variable, was not a significant predictor ($Z = 1.33$, $p = .183$). However, age modeled continuously was a significant predictor in the prediction of frequency of thigh injuries ($Z = -3.63$, $p < .001$) and injuries to the fossa navicularis ($Z = -2.68$, $p = .008$). For both locations, increasing age was associated with a decrease in injury frequency. Age modeled continuously did not have a significant association with injury frequency at any of the other anatomical locations.

In addition to consideration of age as a continuous variable, additional ZIP regression models were run with age modeled as a dichotomous covariate (adolescent vs. young adult). There was a statistically significant association between overall genital injury frequency and age category, with adolescents sustaining more genital injuries than young adults ($Z = -6.19$, $p < .001$). When examining injury frequency for each anatomical location, there were no statistically significant differences in injury frequency between adolescents and young adults when considering injuries to the thighs, labia majora, perineum, posterior fourchette, fossa navicularis, hymen, cervix, or anus. However, adolescents sustained significantly more injuries to the labia minora ($Z = -3.68$, $p < .001$), periurethral area ($Z = -2.70$, $p = .007$), and vagina ($Z = -3.20$, $p < .001$) than young adults.

Locations of Genital Injuries—Locations of genital injuries were examined for the entire sample together and for the adolescent and young adult samples separately. The most common location of genital injury was the cervix with 25.1% of the sample sustaining at least one injury to the cervix and with one woman sustaining four distinct injuries to the cervix. The next most common locations for genital injury were the posterior fourchette (16.2%) and the labia minora (16.2%). Injuries occurred to all anatomical locations assessed; however, injuries to the thighs, labia majora, perineum, periurethral area, fossa navicularis, hymen, vaginal wall, and anus occurred in less than 10% of the sample.

The most common location for genital injury among adolescents was the cervix (26.6%), followed by the labia minora (15.7%) and the posterior fourchette (15%). The same locations of injury were the most common locations among young adults, including the cervix (22.3%), the posterior fourchette (18.1%), and the labia minora (17%) (Table 2).

Summary of Findings

In summary, anatomical locations of genital injuries were similar among both adolescents and young adults, with the cervix, labia minora, and posterior fourchette being the most likely areas of injury. Age, considered both as a continuous variable ranging from 14 to 29 years and as a categorical variable differentiating adolescents and young adults, was not significantly associated with genital injury prevalence. Even though age was not significantly associated with the absence or presence of genital injury, age did play a significant role in predicting frequency of genital injury. Age as a continuous variable was a significant predictor of frequency of injury to the thighs and fossa navicularis, with frequency of injuries to these areas decreasing as age increases. As a categorical variable, age was significant in predicting overall genital injury frequency and frequency of injury to the labia minora, periurethral area, and vagina, with adolescents sustaining more injuries than young adults.

Discussion

The current study examined the relationships among genital injury prevalence, genital injury frequency, locations of injury, and age in adolescent and young adult females who are examined within 72 hours of a rape. The overall genital injury prevalence in this sample was 62.8%. Even though the examiners used both visual inspection and colposcopy during the forensic examinations, this percentage is lower than the genital injury prevalence reported in the current literature. Previous investigators reported the highest injury prevalence, 68% to 87%, when colposcopy is used (Slaughter & Brown, 1992; Slaughter et al., 1997). Even though these studies included female survivors across the lifespan and therefore are not directly comparable, genital injury prevalence found in this study is lower than would be expected, given that the examiners were using colposcopy technique.

Several possible explanations exist for the lower genital injury prevalence found in the current study. First, approximately 10 to 12 examiners conducted the forensic examinations, each with different levels of experience and expertise. The less experienced examiners may have missed identification of genital injuries.

A second explanation for the low genital injury prevalence is that during the time of data collection, toluidine blue was not used as part of the forensic examination protocol. Toluidine blue is a nuclear stain that is applied topically to the external genitalia. It is easily wiped off the intact skin; however, it adheres to breaks in the skin's integrity such as abrasions or tears thereby highlighting these areas. During this study, the use of toluidine blue was not standard of care; however, since then, toluidine blue use has been added to the forensic examination protocol at this hospital. Previous investigators have reported increased genital injury prevalence when toluidine blue was used in the examination, so not using this technique may have contributed to the lower genital injury prevalence found (Lauber & Souma, 1982; Sommers et al., 2005).

Not only was the genital injury prevalence in the current study different from the findings of previous investigators but the most common locations of genital injury also differed. The most common locations of genital injury in the current study were the cervix, posterior fourchette, and labia minora. To date, only one investigator reported the cervix as a common location of injury (O'Brien, 1997). Examiner training and experience may have influenced the strategies that examiners used to identify genital injuries and may have dictated the anatomical areas that received the closest scrutiny.

In the current study, there was no statistically significant difference in genital injury prevalence between adolescents and young adults. These findings differ from previous investigators who found higher injury prevalence among adolescents when compared to adult survivors (Jones et al., 2003). There are several possible explanations for these discrepant findings, but the most likely reason is that the current study and the study conducted by Jones et al. used different definitions of adolescence and adulthood. Jones et al. defined adolescents as 13 to 17 years old and the adult comparison group consisted of survivors 18 to 82 years old. In the current study, adolescents were defined as 14 to 21 years olds and young adults were defined as 22 to 29 years olds.

While the use of a wide age range in the comparison group as used by Jones et al. (2003) has its limitations as discussed in the literature review, the current study may have had limitations as a result of the narrow age ranges used. In the current study, the investigator used the National Institutes of Health's (NIH) definition of adolescence that included individuals up to 21 years of age (NIH, 2003). However, this may not have been the best choice. Since younger adolescents may be less physically mature and therefore may be more at risk for sustaining genital injuries, using an older adolescent population may have resulted

in the inclusion of mature females in the adolescent group, thus lessening the differences between the two groups.

In addition to using a high upper limit of 21 years, the lower age limit of adolescence was restricted based on the patient population seen in the sexual assault program that was the source of the data. The program provides care to rape survivors who are 14 years and older, and therefore, the study did not include younger adolescents. Even within the adolescent sample, there were small numbers in the youngest age groups (five participants who were 14 years old [3.6% of the adolescent sample] and three participants who were 15 years old [2.1% of the adolescent sample]). Therefore, only approximately 5% of the adolescent sample was comprised of the youngest adolescents. The mean age in the adolescent sample was 18.45 years, suggesting that the adolescent sample was comprised predominantly of older adolescents who may have been similar in maturity to the young adult subjects.

Even though these findings demonstrated that adolescents and young adults were equally as likely to sustain a genital injury after a rape, adolescents had an increased chance of sustaining more genital injuries when compared to young adults. Not only were adolescents as a group at an increased risk for sustaining more genital injuries but also the expected number of genital injuries increased as age decreased, both within the adolescent sample and within the young adult sample.

Previous investigators reported age differences in injury prevalence, but little is known about genital injury frequency. When the nature of the injury data is considered, it is surprising that previous investigators reported only injury prevalence. Injury data are count data and in its purest form is expressed as frequencies. When investigators do not report both prevalence (proportion of survivors injured) and frequency (injury counts), understanding of the pattern of injury and the differences between groups is limited. Using only prevalence data largely reduces the variability in the data and requires more power to detect significant differences. In the current study results, differences by age were found when examining genital injury frequency, but there may not have been enough power to detect these age-related differences in genital injury prevalence.

The clinical significance of these findings is important. While the forensic rape examination consists of many assessments and interventions including a history of the incident, psychological support, advocacy and counseling, injury care, and pregnancy prevention, the assessment and documentation of physical injury is an essential component. In the current study, adolescents did not have comparable genital injury frequency to adult women. As injury science develops with more published studies of larger numbers of adolescent rape survivors, in addition to these findings about frequency, differences in the locations and prevalence of genital injury in adolescents may be found.

Thus, the forensic examination may need to vary depending on the age of the survivor. Just as we know that children are not small adults, when it comes to the forensic rape examination, adolescents are not middle-sized adults. It is crucial that examiners are aware of expected differences in adolescent survivors and that they are fully prepared to provide the best evidence-based examination to young rape survivors.

Further research is needed that examines genital injury patterns stratified by age and based on physiologically known maturation patterns across adolescence. Without this work, we will not know how best to differentiate the patterns of genital injury in these subpopulations, nor will we know the meaning of genital injury frequency and prevalence both for adolescent health and within the criminal justice system. Further work that examines the unique injuries of adolescent rape survivors are crucial to provide the foundation of knowledge needed so that practitioners can provide the best health care to these young

survivors and so that criminal justice professionals have the best evidence to be legal advocates for adolescents.

Conclusions

The findings of the current study suggest that there are age-related differences in the genital injuries sustained during a rape and that adolescents experience a higher frequency of genital injuries that their young adult counterparts. This phenomenon could be explored further by research that includes stratification of adolescents into more specific age ranges that are developmentally driven. Collection of data from a site that provides examinations for adults, adolescents, and children would result in a more representative sample of younger adolescents. Additionally, since this was a retrospective study and data on maturity and pubertal status were not available, age was used as a proxy measure of maturity.

A prospective study that involves collection of data on developmental level, pubertal status, and menarche status could address the association between maturity and genital injuries more precisely. A prospective study would allow investigators to collect data about current genital injury as well as past sexual abuse. While we used data from those individuals examined within 72 hours of a rape, children and adolescents also are survivors of chronic sexual abuse, and the reported rapes that were included in the current study could have been a single episode in a larger history of chronic abuse.

The findings of the current study have important implications for nursing practice, especially for nurses practicing as sexual assault forensic examiners. These findings suggest that genital injuries are common in both adolescents and young adults following a rape, and that the frequency of genital injuries is higher among adolescents. Since adolescents often are examined at programs housed in settings that predominantly serve adult patient populations, it is important that nurse examiners are aware of the increased frequency of genital injuries expected when they examine adolescent survivors. The similarities in genital injury locations and prevalence among adolescent and young adult survivors suggest that adolescents can be appropriately cared for in adult programs. There just may need to be a heightened awareness about the increased injury frequency among adolescent survivors.

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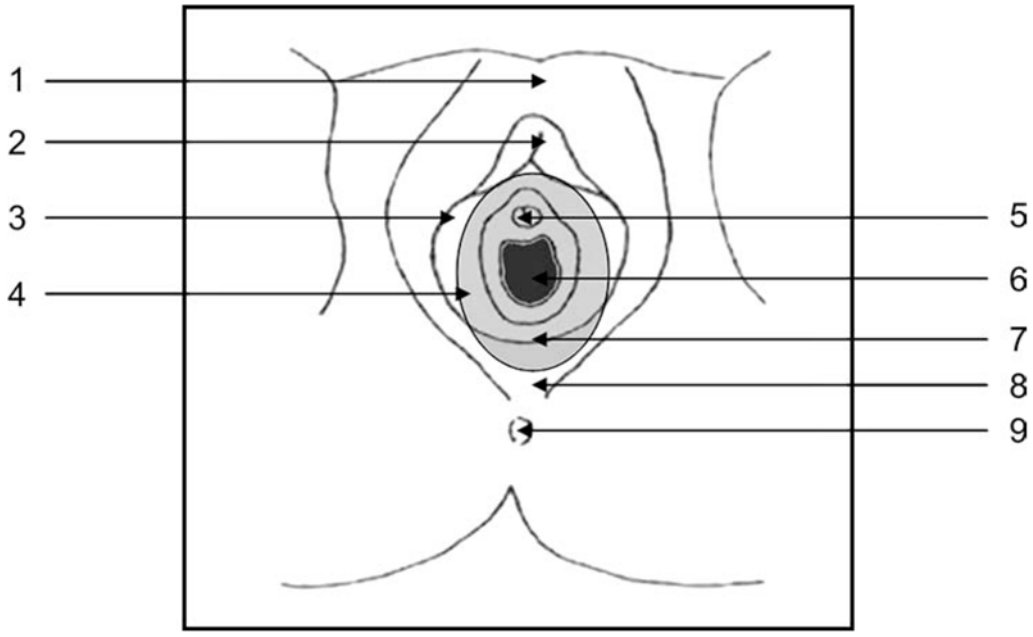

Figure 1.
External female genitalia. The vestibule is the gray shaded area that extends above the posterior fourchette and below the clitoris. The external urethral meatus (urinary opening) is located within the vestibule. 1 = mons pubis; 2 = clitoral hood; 3 = labia majora; 4 = labia minora; 5 = urethral orifice; 6 = hymenal orifice (vagina); 7 = fossa navicularis; 8 = posterior fourchette; and 9 = anus.

Table 1

Demographic Characteristics of Study Sample

	Adolescent (*n* = 140)	Young Adult (*n* = 94)	Total Sample (*n* = 234)
Age, mean (*SD*), years	18.45 (1.79)	24.59 (2.08)	20.91 (3.57)
Race/ethnicity [a], *n* (%)			
African American	70 (50)	30 (31.9)	100 (42.7)
White	68 (48.6)	64 (68.1)	132 (56.9)
Asian	1 (0.7)		1 (0.4)
Other	1 (0.7)		1 (0.4)
Time between assault and examination, mean (*SD*), hr	15.35 (15.09)	15.49 (13.63)	15.41 (14.49)

[a]Significant differences ($p < .05$) between adolescent and young adult subgroup proportions.

Table 2

Most Common Anatomical Locations of Genital Injuries Following Rape

Anatomical Location	Injury Type	Adolescent (*n* = 140)	Young Adult (*n* = 94)	Total Sample (*n* = 234)
Cervix [a]	Any injury	37 (26.6)	21 (22.3)	58 (25.1)
	Tears	2 (1.4)	2 (2.1)	4 (1.7)
	Ecchymoses	7 (5)	5 (5.3)	12 (5.2)
	Abrasions	7 (5)	2 (2.1)	9 (3.9)
	Redness	26 (18.7)	18 (19.1)	44 (19)
	Swelling	8 (5.8)	3 (3.2)	11 (4.8)
Posterior fourchette	Any injury	21 (15)	17 (18.1)	38 (16.2)
	Tears	14 (10)	10 (10.6)	24 (10.3)
	Ecchymoses	3 (2.1)	0 (0)	3 (1.3)
	Abrasions	3 (2.1)	1 (1.1)	4 (1.7)
	Redness	5 (3.6)	8 (8.5)	13 (5.6)
	Swelling	1 (0.7)	1 (1.1)	2 (0.9)
Labia minora	Any injury	22 (15.7)	16 (17)	38 (16.2)
	Tears	8 (5.7)	6 (6.4)	14 (6)
	Ecchymoses	5 (3.6)	1 (1.1)	6 (2.6)
	Abrasions	3 (2.1)	2 (2.1)	5 (2.1)
	Redness	14 (10)	11 (11.7)	25 (10.7)
	Swelling	3 (2.1)	4 (4.3)	7 (3)

Note. Values represent number (and percent) of cases with at least one injury within age group or entire sample.

[a]Missing data for cervix injuries: adolescents (*n* = 139), young adults (*n* = 92), total (*n* = 231).