Sexuality Research and Social Policy
https://doi.org/10.1007/s13178-025-01189-2

Exploring Educational Messages About Sexual Choking: Results of a Feasibility, Acceptability, and Efficacy Study Among College Students

Debby Herbenick[1,2] · Tsung-chieh Fu[1,2] · Ivanka Simić Stanojević[1,2] · Molly Rosenberg[1,3] · Heather Eastman-Mueller[1,2] · Callie Patterson Perry[1,4] · Keisuke Kawata[5] · Gael Strack[6] · Casey Gwinn[6] · Paul J. Wright[1,7]

Received: 20 January 2025 / Accepted: 25 August 2025

Abstract

Introduction Sexual choking has become prevalent among young adults, including college students, and poses significant health risks; yet, no evidence-based interventions address it. Using data from a campus-representative survey of college students, we examined participants' age at first learning about choking and their views about teaching youth about choking and its risks. We also randomized students to one of three groups and tested the feasibility, acceptability, and preliminary efficacy of educational messages related to choking.

Method This study uses data from a campus-representative confidential online survey of 973 undergraduate students in Fall 2021.

Results On average, students had first learned about sexual choking at 15.3 years old. Also, 61.1% felt that youth should first be taught about choking and its health risks during high school, with an additional 22.1% indicating middle school. Our educational messages had high feasibility and acceptability ratings and showed strong evidence of preliminary efficacy among students who had previously choked or been choked during sexual activities.

Conclusions Most students had first learned about choking as adolescents, highlighting the need for fact-based sexuality education. We found broad student support for learning about choking and its risks from college health professionals, including faculty who teach sexuality- and health-related courses. Our educational messages can be expanded to support student health and safety.

Policy Implications Findings have implications for the development of educational programming to address sexual choking. Public health agencies also have an important role in education.

Keywords Sexual choking · Non-fatal strangulation · College sexual health · Sexual behavior · Rough sex

✉ Debby Herbenick
debby@iu.edu

[1] Center for Sexual Health Promotion, Indiana University School of Public Health-Bloomington, Indiana University, Bloomington, IN, USA

[2] Department of Applied Health Science, Indiana University School of Public Health-Bloomington, Indiana University, Bloomington, IN, USA

[3] Department of Epidemiology and Biostatistics, Indiana University School of Public Health-Bloomington, Indiana University, Bloomington, IN, USA

[4] Department of Public Health, College of Health Sciences, Des Moines University, West Des Moines, IA, USA

[5] Department of Kinesiology, Indiana University School of Public Health-Bloomington, Indiana University, Bloomington, IN, USA

[6] Training Institute on Strangulation Prevention, Alliance for Hope International, San Diego, CA, USA

[7] Communication Science, The Media School, Indiana University-Bloomington, Bloomington, IN, USA

Published online: 20 November 2025

Introduction

Emerging adulthood is a transitional stage from adolescence to adulthood that occurs between ages 18 and 29 (Arnett, 2007; Nelson, 2021). This period involves neurodevelopment that supports the growth of abilities related to emotion regulation, risk calculation, executive function, and recognizing and interpreting social cues (Taber-Thomas & Perez-Edgar, 2015). Emerging adulthood also affords young people opportunities to explore their sexual identities, romantic relationships, and solo and/or partnered sexual experiences and to begin to organize their sexual repertoires (Hensel et al., 2014; Maas & Lefkowitz, 2015; Torkelson, 2012; Vasilenko & Lefkowitz, 2018).

Young adults frequently engage in exploratory health behaviors related to eating, physical activity, substance use, and/or sexual behavior, some of which may solidify into long-term habits (Lawrence et al., 2017; Small et al., 2013). Although many of these behaviors may have short-term health implications, others can exert long-term effects on morbidity and mortality (Lawrence et al., 2017). As such, higher education institutions often invest time and resources to promote the development of healthy behaviors among students, aiming to support both their immediate well-being and long-term health outcomes (Anderson et al., 2016; Bailey et al., 2020; Eastman-Mueller et al., 2019; Fish et al., 1996; Schneider & Hirsch, 2020).

In the area of sexual and reproductive health, public health professionals and policy makers have identified major health issues that are prevalent among young people and warrant attention; these include sexually transmissible infections (STI), unintended pregnancy, and sexual violence (Centers for Disease Control & Prevention, 2024; Secretary's Advisory Committee, 2019; The White House, 2023). To address these health issues, college health professionals (e.g., sexuality educators, clinicians, and faculty who teach health courses) offer information to students about topics such as condoms and other contraceptives, STI prevention and testing, sexual communication, healthy relationships, sexual consent, and intimate partner violence (IPV) (Eastman-Mueller et al., 2022; Oswalt et al., 2015; Stanley et al., 2019). Many campuses also offer clinical services such as gynecological exams, STI testing, STI treatment, pregnancy testing, sexual assault crisis services, and IPV screening (Habel et al., 2018; Halstead et al., 2017; Reeves et al., 2023; Stoner & Cramer, 2019). Although college health professionals often develop their own educational materials, they also rely on evidence-based educational interventions, tailoring these resources to meet the unique needs of their student populations (Eastman-Mueller et al., 2019; Wolitzky-Taylor et al., 2020).

Rough Sex Behaviors Among College Students

Recent shifts in emerging sexual behaviors have challenged college health professionals to consider how to update their sexuality education and violence prevention programming to better support students' health and safety (Hidalgo Bellows, 2022; Rothman, 2019). Specifically, sexual behaviors sometimes described as kinky or as "rough sex" have become prevalent among young adults, including among college students, in the United States (U.S.) and internationally (Daminato et al., 2024; Döring et al., 2024; Herbenick et al., 2020; Sharman et al., 2024a; Vilhjálmsdóttir & Forberg, 2023). The widespread adoption of these sexual practices has been attributed to more easily accessible pornography, social media, erotica, and mainstream media (Barker, 2013; Herbenick et al., 2023c, 2023d; Vogels & O'Sullivan, 2019).

Although there is no single definition of "rough sex," such behaviors tend to include types of sex that may be impactful on the body (e.g., spanking, slapping, choking) and/or psychologically challenging (e.g., being called names such as bitch or slut) (Döring et al., 2024; Gavey & Brewster, 2025; Herbenick et al., 2021a). There is some overlap in what may be considered rough sex and kink/BDSM (bondage and discipline, dominance and submission, sadism, and masochism). However, there are also key differences. First, rough sex always involves sexual contact, whereas this is not always true for kink and BDSM (Döring et al., 2024; Jones, 2020; Joy et al., 2024). Second, people often form communities around kink and BDSM and have created workshops, social spaces, play spaces, and social norms and values to support more positive engagement within the community (Cubbin et al., 2022; Steinmetz & Maginn, 2014; Williams et al., 2014); this does not appear to be the case for rough sex. Third, rough sex seems to focus primarily on sexual *practices*, whereas kink/BDSM communities address both *practices* and *processes* (e.g., education, care, communication, consent, negotiation of boundaries, and aftercare) that are meant to reduce harm and to support more pleasurable experiences (Cardoso, 2022; Williams et al., 2014).

Noting that college students engage in diverse sexual practices, including kink and rough sex (Eastman-Mueller et al., 2023; Rothman, 2019), some college health professionals and student groups have hosted kink or BDSM workshops on their campuses to educate students about consent, communication, negotiation of boundaries, and harm reduction, often with the hope of reducing campus sexual violence (Bednarma, 2017; Henkel & Khan, 2024). Such educational programming has been controversial at times, leading to the cancellation of some kink-related events (Henkel & Khan, 2024; Lewis, 2024; Peters, 2020). These controversies have left some college health educators—who often hold non-tenure track staff

positions—limited in their ability to engage in sexual violence prevention activities that align with the kinds of sex students on their campus may be contemplating or engaged in. Unfortunately, restricting students' access to information about diverse sexual practices—some of which pose risk of injury and even death—may leave students vulnerable to unintentionally harming themselves or others. This concern is heightened because of the information gap left by pornography, social media, and online media, which may present rough sex as normative and erotic yet provide incomplete information—or even misinformation—about safety or how to navigate consent and communication (Barker, 2013; Herbenick et al., 2023c, 2023d; Wright et al., 2023).

Sexual Choking

Of the rough sex behaviors that have recently become mainstream among young people, sexual choking is one of the most prevalent, is among the most consequential in terms of health consequences, and disproportionately affects women as well as transgender and nonbinary (TGNB +) people (Bunzel et al., 2019; Herbenick et al., 2020, 2021a, 2022a, In Press; Schori et al., 2022; Sharman et al., 2024a, 2024b). A campus-representative survey of U.S. college students found that 27% of women and 22% of TGNB + students had been choked during their most recent sexual event (broadly defined) compared to 7% of men (Herbenick et al., 2023b). In a U.S. nationally representative survey of adults, 35% of women ages 18 to 24 as compared to 3% of men ages 18 to 24 reported having been choked during their most recent sexual event (Herbenick et al., 2023a). However, young adults who engage in choking often have little knowledge of its health risks (Herbenick et al., 2022b, 2022c; Sharman et al., 2024a).

Health Consequences of Being "Choked" During Sex

Sexual choking is a form of neck compression or strangulation that is most often performed using one or both hands—and less often with an arm, leg, or ligature— to press against or squeeze a partner's neck during sexual activities (Herbenick et al., 2022a, 2022b, 2022c). Most people who engage in choking report using some level of pressure (Herbenick et al., 2022a, 2022b, 2022c; Sharman et al., 2024a). Indeed, strangulation—which involves external pressure to the neck that restricts blood flow and/or air flow—can lead to brain injury, carotid artery dissection, hyoid fracture, cardiac arrest, stroke, or death (Bichard et al., 2020; De Boos, 2019; Marr & Bugeja, 2024; Schori et al., 2022). More common symptoms that result from being choked/strangled during consensual sex include transient visual changes, neck pain, difficulty breathing, difficulty speaking, and changes to one's voice (Herbenick et al., 2022a). Research on IPV-related strangulation shows that some strangulation injuries may show no external symptoms, which increases the possibility that injuries may go unnoticed and therefore unattended, heightening the risk of more severe consequences (De Boos, 2019; Zilkens et al., 2016).

Emerging evidence suggests the possibility of cumulative effects from repeated choking/strangulation during sex. A recent pilot MRI study involving young adult women who had been choked/strangled four or more times in the prior month, compared to those who had never been choked/strangled, revealed neurological differences between the groups (Hou et al., 2023a, 2023b; Huibregtse et al., 2022). These differences encompassed alterations in brain connectivity, increased cortical thickness, decreased gyrification, and attenuated neural efficiency during visual and verbal working memory tasks. Brain regions exhibiting these structures and physiological alterations are important for emotional regulation, higher-order cognitive function, and motor control.

Survey research has found that young adults who have been choked during sex are significantly more likely to report poorer current mental health (Herbenick et al., 2021b). Although prospective research is needed to understand the directionality of the relationship, this finding aligns with research on IPV strangulation, in which women who had been strangled and experienced at least one alteration in consciousness were at greater risk for long-term poorer mental health and neurocognitive difficulties (Valera et al., 2022).

Sexual Choking and Consent

Sexual choking is usually described as consensual by people who engage in it; however, there is often some ambiguity regarding how people communicate about choking (Conte et al., 2025; Herbenick et al., 2022b, 2022c, 2023b, 2024a; Ólafsdottir & Kjaran, 2019; Sharman, 2024a). Many young adults report not talking with their partner(s) about choking prior to engaging in it, even when they believe that people should do so (Herbenick et al., 2022b, 2022c; Sharman et al., 2024a). Young adults who have choked their sexual partners have described relying on the "vibe" or "energy" between them to infer whether their partner might want, or be willing, to be choked (Herbenick et al., 2022b, 2022c). Using the vibe or feelings between partners to infer consent, however, is not unique to choking and has also been described in relation to a broad range of sexual experiences (Beres, 2010; Schobert et al., 2021).

Although many young adults report that they like to be choked, others have expressed feeling afraid when their partner choked them wit hout prior discussion or in ways that were harder or more aggressive than they expected (Herbenick et al., 2019, 2022c, 2024). Further,

sexual choking/strangulation has become a more common feature of sexual assault reports in recent years, on college campuses and in communities in both the U.S. and Sweden (Cannon et al., 2020; Larsson et al., 2025; Valentine et al., 2023), underscoring the need to educate young people about choking-related consent and clear communication in addition to choking-related health risks. In the absence of sexual consent education, youth may rely on sexual media designed for arousal or entertainment, rather than educational purposes (Rothman et al., 2021). A probability study of U.S. undergraduate men found empirical support for a conceptual path model positing that the more men are exposed to choking in pornography, the less likely they are to think that choking requires consent, and the more likely they are to choke their partner (Wright et al., 2023).

Sexual Choking and the Law

In the past two decades, research on IPV strangulation has increased, with researchers finding that having been strangled is associated with a heightened risk of subsequent attempted and completed homicide (Glass et al., 2008). Historically, strangulation assaults were often not prosecuted, or were charged as misdemeanors rather than felonies, for reasons including lack of physical evidence (as being strangled often does not result in visible marks, bruises, or other evidence of harm) (Laughon, et al, 2009; Pritchard, et al., 2017; Strack, et al, 2001). But today, all 50 states, the Uniform Code of Military Justice, federal law, and at least 20 tribal codes have a felony strangulation law (Stellpflug, et al, 2022; Strack & Gwinn, 2011, 2024). The investigation and prosecution of strangulation cases as misdemeanors and felonies have risen dramatically across the U.S. (Brady, et al, 2022; Pritchard, et al., 2017; Strack & Gwinn, 2011, 2024), and, in most states, consent is not a defense to the infliction of serious injuries or death (Strack & Gwinn, 2024). Prosecutors and law enforcement professionals are now being trained to investigate and prosecute strangulation assaults whether the offender claims consent or not and whether or not the victim wants to participate in the prosecution process (Pritchard, et al., 2017; Strack & Gwinn, 2011, 2024).

As mentioned earlier, even though it is rare, people do become seriously injured and even die from being choked/strangled during sex, even if these cases have been argued to have involved consensual choking and/or consensual sex. When this happens, the person who did the choking/strangling may be criminally charged (BBC, 2021; news.com.au., 2021; Roma et al., 2013; Sauvageau, 2016; Schori et al., 2022; Strack & Gwinn, 2024). People have been sentenced to prison after having unintentionally killed their partner during what they described as consensual sexual choking (BBC, 2021; news.com.au., 2021). In one U.S. case, a judge described a man's behavior as "reckless" for having choked/strangled his partner during sex (the man had been charged with manslaughter) (Fofana, 2023). Most recently, experts are questioning whether the "suicides" of women on college campuses may be staged crime scenes after women have been killed during sexual choking, and specialized protocols are being developed to investigate such cases (Gwinn & Strack, 2024).

In some jurisdictions, including in many U.S. states, the law prohibits people who caused death or harm by sexual choking/strangulation to defend themselves on the basis of the person having given consent to be choked/strangled (Gwinn & Strack, 2024; United Kingdom Government Home Office, 2024). Furthermore, the act of strangulation has been classified as illegal in some places, regardless of consent (Sharman et al., 2024b). In a convenience survey of Australian undergraduate students, 83% of those surveyed were not aware of these laws, and 9% were unsure if they had heard of them (Sharman et al., 2024b). These findings highlight the need for widespread education about sexual practices such as sexual choking/strangulation that may be illegal in a growing number of jurisdictions across the U.S. and around the world.

Study Aims

Even though sexual choking/strangulation poses serious health risks and has become highly prevalent among young adults, there are no evidence-based interventions to address this consequential behavior. As a step toward intervention development, we conducted a random sample survey of college students to understand their perspectives on educating young people about sexual choking and its risks—including at what ages such information should be given, through what types of delivery platforms, and who they trust to provide such information. Within the survey, we also randomized students to receive a series of educational messages about choking (or to receive none at all). Thus, in the present study, we aimed to examine (a) participants' age at first learning about choking, (b) their views about teaching youth about sexual choking and its risks, (c) participants' familiarity with the information in various educational messages about choking, (d) the acceptability of the educational messages, (e) the relationship of participants' viewing of the messages and their intention to choke and to let a partner choke them during sexual activities in the next six months, and (f) the feasibility and appropriateness of platforms for delivery of the educational messages.

Method

Participants

We analyzed data from the 2021 Campus Sexual Health Survey (CSHS)-Fall Supplement, a campus-representative

random sample survey of undergraduate students at a large Midwestern U.S. public university. The institutional review board at the first author's university reviewed and approved the study protocols. The authors are from a variety of professional backgrounds including sexuality research, sexuality education, public health, epidemiology, neuroscience, disability studies, violence prevention, communication science, and the law.

Campus administrators randomly selected 4000 undergraduate students ages 18 and older and shared these email addresses with research staff at the campus' Center for Survey Research (CSR). During October and November 2021, CSR staff sent invitation emails and up to two reminder emails to these students. Recruitment emails included a brief description of the survey, noting that the confidential online survey pertained to relationships, sexuality, and sexual health. Students who clicked on a link in the email could read a detailed consent form. Individuals could indicate their consent and proceed to complete the survey. Participants could enter their email address for a chance to receive one of 250 gift cards to an online retailer, valued at $20, $50, and $100. The American Association for Public Opinion Research Response Rate 2 was 24.4% (830 complete, 146 partially complete surveys). The CSR staff employed post-stratification adjustment by creating statistical weights based on sex/gender, student class, race/ethnicity, and the type of enrollment (i.e., full-time and part-time) to optimize the campus representation and to maximize generalizability to the undergraduate student population. The CSR de-identified the information in the dataset prior to sending it to the research team.

Measures

The 2021 CSHS-Fall Supplement was comprised of 68 items developed by an interdisciplinary team of investigators with backgrounds in sexual health, public health, epidemiology, college health promotion, and sexual violence prevention (DH, TCF, MR, and HEM).

Background Characteristics We asked participants about their age, gender, sexual orientation identity, and race/ethnicity. For gender, we asked, "People describe their gender in various ways (e.g., woman, man, cisgender woman, transmasculine, non-binary). How would you describe your gender?" with a textbox. We also asked, "When we analyze data by gender/sex, which category should we include you in?" Response options were as follows: women, men, gender nonbinary, transgender women or transfeminine, transgender men or transmasculine, and prefer to describe with a write-in box.

Age at First Learning about Choking We asked, "How old were you when you first learned that some people choke one another during sex?" and provided a numerical textbox.

Perspectives on Educating Young People about Sexual Choking

Age at First Being Educated About Choking We asked, "When do you think people should FIRST be educated about choking during sex so that they can understand any health risks associated with choking?" Response options were as follows: earlier than middle school; middle school (approximately grades 6–8); high school (approximately grades 9–12); college; I do not think sex education should include information about choking; other, with a textbox.

Teaching College Students About Sexual Choking We asked, "How do you think college students should learn about reducing the health risks of choking?" and listed 14 possible sources to which students could indicate yes, no, or not sure for each. The sources were as follows: conversations with parents; text messages; social media (e.g., TikTok videos, YouTube, blog posts, online articles); videos included as part of sexual assault prevention programs; campus-wide health education media campaign (e.g., bathroom posters, etc.); sex education workshops in residence halls; college-level sexuality courses; college-level general health courses (e.g., Women's Health, Men's Health, Personal Health); first-aid course (e.g., how to respond to emergencies, when to call 9–1-1); one-on-one conversations with a healthcare provider or sex educator; peer-led educational programs; videos on the Student Health Center website; brochures, posters, handouts; other, with the option to write in a text response.

Trust We asked, "How much would you trust information about choking during sex from the following people?" and listed seven types of people: a college professor teaching a human sexuality course; a college professor teaching a general health course; a medical provider from the student health center; a counselor from the student health center; a certified sexuality educator working at the students' university; a peer sexual health educator (a college student who is trained by a sexuality educator to deliver sex education messages); celebrities; other, with a textbox. Response options were as follows: trust a lot, trust some, trust a little, don't trust at all.

Educational Messages The exploratory educational messages were developed by the first author (DH), and had been informed by class discussions with undergraduate students who had read research, articles, and/or reviewed research findings about sexual choking. These messages were

revised and fine-tuned through feedback from undergraduate and graduate research assistants, a colleague with expertise in violence prevention, and members of the research team. Although sexual choking is typically done in a way that constitutes neck compression or strangulation, we chose to use the word "choking" in our educational messages because that is the term consistently used by college students who have been interviewed about sexual choking (Herbenick et al., 2022b, 2022c). Also, these students as well as those who provided feedback on the messages indicated that they do not connect with the word "strangulation," which they felt was stigmatizing and associated with violence rather than sexual expression or pleasure. The messages we developed were as follows:

1) "In a 2020 survey, 21% of college students who had been choked during sex said that they had never been asked for consent to be choked. Just because a person has consented to hook up or have sex does not mean that they have consented to be choked. Choking a person without clear consent may be considered sexual misconduct." (Consent message)
2) "Nearly half of college students have been choked during sexual activities. However, even when choking during sex is consensual, if a person is accidentally hurt or killed from being choked, the person who choked them may be held legally and criminally responsible for their injury or death." (Legal consequences message)
3) "Choking during sex decreases blood flow, and thus oxygen, to the brain. Recent research shows that people who have been choked during sex are at greater risk of depression and anxiety. Safer ways to play include role-playing, spanking, and sex toy use." (Health message)
4) "Some people breathe in ways that enhance their sexual arousal or make it easier to experience orgasm, such as by taking long slow breaths or a series of quick breaths during sexual stimulation; this is a safe way to explore 'breath play' during sex. Choking a person during sex, however, is not a safe way to explore 'breath play' because choking reduces blood flow (and therefore oxygen and other nutrients) to the brain, increasing risk for depression, anxiety, and brain injury." (Health message)
5) "Although rare, people sometimes accidentally die when they are being choked during sex. If you like playing with power, there are many safer – and still pleasurable—ways to be dominant or submissive such as through spanking, role playing, light bondage, and even varying the ways you have oral sex or intercourse." (Health message)

To examine the preliminary efficacy of these messages, we randomized students into one of three groups. Participants in Group A were shown all five educational messages, which addressed consent for choking, the health risks of being choked, and the legal consequences of choking one's partner. Participants in Group B were shown the four messages related to consent and health risks, but not the message about legal consequences. Those in Group C were not shown any of the five educational messages (Fig. 1).

Familiarity with Information Using an item created for this study, for each educational message shown, we asked, "How new is this information to you?" Response options were on a scale of 1 to 5 (1 = brand new information; 5 = already completely familiar).

Message Acceptability After each message was displayed, we asked: "Thinking about how this message is worded and its potential to be informative to college students, please indicate how much you agree or disagree with these statements." The statements were from the Acceptability of Intervention Measure (AIM; Weiner et al., 2017): this message meets my approval, this message is appealing to me, I like this message, and I welcome this message. Response options were on a 5-point scale (1 = completely disagree and 5 = completely agree). A mean score of these four items was calculated.

Importance of Information Using an item developed for this study, we provided a fifth statement to the series above:"This is important information for people like me" (1 = completely disagree and 5 = completely agree). Although included in the same series of items in the survey, this item was scored

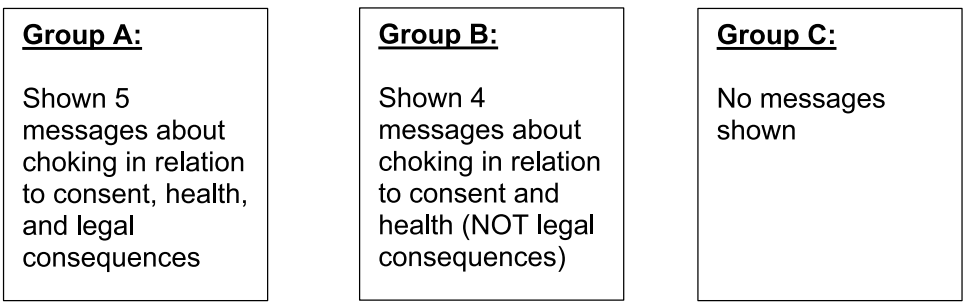

Fig. 1 Educational messages shown in each randomly assigned group of participants

separately and was not included in the mean calculation of the above AIM.

Feedback on Messages We asked, "If you have any other feedback on this message, please share it here," and provided a textbox. This message appeared after the above-listed questions about message acceptability and familiarity with information.

Feasibility and Appropriateness of Message Delivery Platforms After showing the messages to participants, we asked about using various platforms for "sharing short, educational messages about sexual choking (like the sample messages you just read)." These delivery platforms were as follows: through social media videos (e.g., on TikTok or Instagram, etc.), as part of college-level health classes (e.g., Human Sexuality, Women's Health, Men's Health, Personal Health), through text messages sent to people's phones, and from a peer sexual health educator (i.e., a college student who is trained by a sexuality educator to deliver sex education messages). To assess feasibility, we used items from Weiner et al.'s (2017) Feasibility of Intervention Measure, asking about the extent to which each seemed implementable, possible, doable, and easy to use (1 = completely disagree and 5 = completely agree). Using a single item adapted from Weiner's (2017) Intervention Appropriateness Measure, we asked if each felt "like a good match for college students or other young adults" (1 = completely disagree and 5 = completely agree).

Likelihood of Choking or Letting a Partner Choke Them During Sex We asked all participants, "How likely are you to choke a partner during sex in the next 6 months?" and "How likely are you to let someone choke you during sex in the next 6 months?" Response options for each were as follows: extremely likely, very likely, somewhat likely, a little bit likely, not at all likely. Groups A and B were shown this question after they were shown the educational messages and responded to questions about their acceptability. Group C saw this item after the item that assessed the extent to which they trusted different types of people to provide education about choking.

Statistical Analysis

Analyses were conducted using the statistical software Stata version 15 and used *svy* commands to account for the application of survey weights. Demographic and relationship characteristics as well as lifetime experience with sexual choking were presented separately by gender (men/women/TGNB +); chi-squared tests were used to assess differences between gender groups. Descriptive statistics were calculated for participants' age at first having learned about sexual choking. Analysis of variance (ANOVA) was used to examine the age of first learning about choking by participant gender. We presented the questions about educating college students about choking separately for women vs. men (TGNB + individuals were excluded from this analysis due to small sample sizes); chi-squared tests were used to assess statistically significant gender differences for categorical variables and student *t*-tests were used for ordinal variables. For all participants, the mean (SD) as well as percentages (*n*) of each response category were presented for survey items on (1) the methods of sharing educational messages about sexual choking, (2) intervention messages regarding the familiarity of knowledge and beliefs about sexual choking, and (3) the feasibility and acceptability of messages regarding knowledge and beliefs about sexual choking. For the feasibility and acceptability scales, the mean scores (SD) were presented separately by gender, and differences between women and men were assessed using Student *t*-tests. The associations between the three intervention groups (Groups A, B, and C described earlier) and the likelihood of sexual choking in the next 6 months, either choking a partner or letting a partner choke you, respectively, were assessed using ordinal logistic regression, with the group who received no intervention messages as the referent group.

Results

Participant Characteristics

As shown in Table 1, the analytic sample consisted of 973 participants who were 19.8 years old on average (SD = 2.4, with no significant differences by gender) and most described themselves as white (82.5%, $n = 801$). About 42% ($n = 404$) lived on campus, one-third lived in an off-campus apartment (33.3%, $n = 324$), and 17.5% ($n = 171$) in a house. About three-quarters described their sexual orientation identity as heterosexual (78.4%, $n = 763$), with significantly more TGNB + students describing themselves as gay or lesbian, bisexual, pansexual, or asexual as compared with women and men ($p < .001$). Also, 37.3% ($n = 363$) of participants were single, 35.8% ($n = 348$) were in a relationship, and 19.5% (n = 190) reported that they were hooking up with at least one person, with no statistically significant differences by gender.

Age at First Learning About Choking

On average, participants reported that they were 15.3 years old (95% CI, 15.1, 15.4) when they first learned that some people choke one another during sexual activities ($SD = 1.9$; range, 8 to 28 years), with significant differences by gender ($F(2,791) = 4.55$, $p = .01$; data not shown). Post hoc

Table 1 Weighted demographic and relationship characteristics of participants by gender

	Total (N=973)	Women (N=474)	Men (N=473)	TGNB+ (N=27)	
Characteristics	*% (n)*	*% (n)*	*% (n)*	*% (n)*	*p-value*
Age, *Mean (SD)*	19.8 (2.4)	19.8 (3.1)	19.7 (1.8)	20.5 (2.7)	0.450
Year in School					0.421
First year	30.6 (298)	27.7 (131)	34.0 (161)	20.1 (5)	
Sophomore	24.3 (137)	25.4 (120)	23.1 (110)	25.0 (7)	
Junior	20.3 (198)	21.4 (101)	19.1 (90)	22.0 (6)	
Senior	24.8 (242)	25.5 (121)	23.7 (112)	33.0 (9)	
Racial heritage (select all that apply)					
White	82.5 (801)	82.1 (388)	82.9 (391)	83.0 (22)	0.944
Black	6.3 (61)	9.0 (43)	3.4 (16)	11.0 (3)	0.002
American Indian or Alaska Native	1.7 (17)	1.7 (8)	1.7 (8)	3.0 (1)	0.863
Asian Indian	6.5 (63)	4.1 (19)	9.2 (44)	0.0 (0)	0.003
Chinese	2.8 (27)	3.8 (18)	2.0 (9)	0.0 (0)	0.186
Other East Asian	3.3 (32)	3.6 (17)	3.1 (15)	3.0 (1)	0.900
Other	2.8 (28)	2.0 (10)	3.6 (17)	3.0 (1)	0.303
Latine Ethnicity					0.389
Not Latino or Hispanic	92.4 (900)	91.7 (434)	83.4 (442)	87.9 (23)	
Latino or Hispanic	7.6 (74)	8.3 (39)	6.6 (31)	12.1 (3)	
Residence					0.030
On campus	41.6 (404)	40.0 (190)	42.4 (200)	54.1 (14)	
Fraternity or sorority house	5.0 (49)	7.2 (34)	3.1 (15)	0.0 (0)	
Off campus apartment	33.3 (324)	35.1 (166)	31.7 (150)	28.9 (8)	
Off campus house	17.5 (171)	14.6 (69)	20.6 (98)	14.0 (4)	
At home or other	2.7 (26)	3.1 (14)	2.2 (11)	3.0 (1)	
Sexual Orientation Identity					<0.001
Heterosexual or straight	78.4 (763)	72.0 (341)	88.7 (419)	8.0 (2)	
Gay or lesbian	4.8 (46)	2.4 (11)	6.4 (30)	18.1 (5)	
Bisexual	11.5 (112)	17.8 (84)	3.2 (15)	45.1 (12)	
Pansexual	3.0 (30)	4.3 (20)	0.8 (4)	20.9 (6)	
Asexual or other	2.4 (23)	3.6 (17)	0.8 (4)	8.0 (2)	
Current Relationship Status					0.052
Single	37.3 (363)	37.4 (177)	38.2 (181)	20.1 (5)	
Hooking up	19.5 (190)	16.8 (79)	22.6 (107)	14.0 (4)	
Dating	5.5 (53)	4.9 (23)	5.6 (26)	12.9 (3)	
In a relationship	35.8 (348)	39.3 (186)	31.5 (149)	50.0 (13.3)	
Engaged or married	1.9 (19)	1.7 (8)	2.1 (10)	3.0 (1)	
Experience with Sexual Choking					
Ever Been Choked by a Partner	43.4 (385)	56.7 (247)	29.3 (125)	52.6 (13)	<0.001
Ever Choked a Partner	40.5 (358)	30.0 (130)	50.7 (216)	47.4 (12)	<0.001

comparisons using the Tukey HSD test indicated that TGNB + participants reported a significantly younger age at first learning about choking ($M = 14.2$, $SD = 2.0$; 95% CI, 13.3, 15.0) as compared with women ($M = 15.4$, $SD = 1.9$; 95% CI, 15.2, 15.6) and men ($M = 15.3$, $SD = 1.8$, 95% CI, 15.1, 15.4).

In terms of age distribution, 54.0% of the total sample of college students reported that they had first become aware about sexual choking when they were between 8 and 15 years old, with an additional 25.8% of participants learning about choking when they were 16 years old (i.e., for a total of 79.8% having learned about choking by age 16). For women, 53.3% reported having first learned about sexual choking when they were between 9 and 15 years old and 76.4% by age 16. For men, 53.1% reported having first learned about sexual choking by age 15 and 82.3% by age 16. For TGNB + students, 82.7% of the 23 participants reported having first learned about choking by age 15 and 96.5% by age 16.

Educating Young People About Sexual Choking

As shown in Table 2, nearly two-thirds of participants (61.1%, $n=498$) felt that people should first be educated about choking and its health risks during high school, with an additional 22.1% ($n=181$) indicating middle school (which, in the U.S., usually refers to about ages 12 to 14) and just 2.3% ($n=19$) selecting prior to middle school. Only 8.0% ($n=65$) felt that sex education should not include information about choking. There were significant differences by gender, with more women (65.2%, $n=267$) than men (56.9%, $n=231$) endorsing high school (which, in the U.S., includes students of about ages 14 to 18) as when young people should first learn about choking and its risks and more men (12.4%, $n=50$) than women (3.7%, $n=15$) indicating that sex education should not include information about choking. Eight people selected "other" and had the option to write in a response in the textbox. One woman wrote in "9th grade" and the other wrote "probably later years of high school." A third woman wrote, "Please don't bring children into this, whatever you do. I can [sic] imagine being subjected to such disgusting information younger than what I am now. I would just let people figure it out for themselves." A fourth wrote in "I don't know." Three men wrote in responses. One wrote "never"; a second wrote, "it is common sense to not do it hard"; and a third wrote, "Should include the variety of sex. Sex is not just one and done, but sex revolves around intimacy and it's [sic] unknowns with a partner."

Table 2 Perspectives of teaching adolescents and young adults about sexual choking

	Total	Women	Men	
Perspectives	*% (n)*	*% (n)*	*% (n)*	*p-value*
When should people FIRST be educated about sexual choking				<0.001
Earlier than middle school	2.3 (19)	2.2 (9)	2.5 (10)	
Middle school	22.1 (181)	21.2 (87)	23.1 (94)	
High school	61.1 (498)	65.2 (267)	56.9 (231)	
College	5.5 (45)	6.7 (27)	4.2 (17)	
Do not think sex education should include choking	8.0 (65)	3.7 (15)	12.4 (50)	
Other	1.0 (8)	1.0 (4)	1.0 (4)	
How college students should learn about reducing the risks of choking				
Conversations with parents	23.4 (141)	23.3 (74)	23.4 (67)	0.979
Text messages	21.3 (133)	24.2 (78)	18.3 (55)	0.085
Social media	60.7 (411)	72.6 (256)	47.9 (156)	<0.001
Videos that are included as part of sexual assault prevention programs	83.4 (596)	89.8 (340)	76.1 (257)	<0.001
Campus-wide health education media campaign	78.0 (547)	85.4 (310)	70.0 (237)	<0.001
Sex education workshops in residence halls	72.4 (499)	81.7 (292)	62.4 (208)	<0.001
College-level sexuality courses	87.3 (626)	94.7 (357)	79.0 (269)	<0.001
College-level general health courses	82.4 (579)	91.6 (340)	72.2 (240)	<0.001
First-aid courses	71.3 (466)	79.7 (272)	62.0 (193)	<0.001
One-on-one conversations with a healthcare provider or sex educator	82.4 (567)	89.5 (324)	74.6 (244)	<0.001
Peer-led education programs	61.5 (395)	71.8 (240)	50.3 (155)	<0.001
Videos on the Student Health Center website	70.2 (480)	78.0 (277)	61.8 (203)	<0.001
Brochures, posters, handouts	60.6 (399)	68.0 (234)	52.4 (164)	<0.001
Other	9.0 (15)	11.1 (7)	7.6 (8)	0.448
How much you trust information about choking from the following people, *Mean (SD)*				
A college professor teaching a human sexuality course	3.4 (0.8)	3.5 (0.8)	3.3 (0.7)	0.076
A college professor teaching a general health course	3.0 (0.9)	3.0 (0.9)	3.0 (0.8)	0.793
A medical provider from the student health center	3.5 (0.8)	3.6 (0.8)	3.5 (0.7)	0.512
A counselor from the student health center	3.2 (0.9)	3.3 (0.9)	3.2 (0.8)	0.730
A certified sexuality educator working at [redacted university]	3.6 (0.7)	3.7 (0.7)	3.5 (0.7)	0.002
A peer sexual health educator	3.2 (0.9)	3.2 (0.9)	3.1 (0.8)	0.041
Celebrities	1.7 (0.7)	1.6 (0.8)	1.7 (0.7)	0.832
Other	1.7 (1.0)	1.8 (1.3)	1.6 (0.9)	0.252

Teaching College Students About Sexual Choking

In terms of teaching college students about sexual choking and how to reduce its health risks, the top four delivery platforms endorsed were college-level sexuality courses (87.3%, $n = 626$), college-level general health courses (82.4%, $n = 579$), videos included as part of sexual assault prevention programming (83.4%, $n = 596$), and one-on-one conversations with a healthcare provider or sex educator (82.4%, $n = 567$). However, all listed sources were endorsed by at least 60% of participants with two exceptions: conversations with parents (23.4%, $n = 141$) and text messages (21.3%, $n = 133$).

Of the 11 sources of information receiving > 60% endorsement, significantly more women than men selected each of these. For some delivery platforms, the gender-related differences were considerable. For example, 94.7% of women ($n = 357$) as compared to 79.0% of men ($n = 269$) selected sexuality-related courses. Similarly, 91.6% of women ($n = 340$) as compared to 72.2% of men ($n = 240$) endorsed college-level general health courses as a way to share choking-related information with college students. Two men wrote in responses. One said "never" and the second wrote, "middle/high schools when you first learn about sex education and I feel that's a great place to start."

Trust

Students indicated how much they would trust information about choking during sex from seven types of people. The three who received the highest ratings of trust were as follows: a certified sexuality educator at the students' university ($M = 3.6$, SD = 0.7), a medical provider from the university's Student Health Center ($M = 3.5$, SD = 0.8), and a college professor teaching a human sexuality course ($M = 3.4$, SD = 0.8). Students also placed high degrees of trust in receiving information about choking from counselors from the Student Health Center ($M = 3.2$, SD = 0.9), peer sexual health educators ($M = 3.2$, SD = 0.9), and college professors teaching general health courses ($M = 3.0$, SD = 0.9). The lowest trust ratings were related to celebrities ($M = 1.7$, SD = 0.7). There were no statistically significant gender differences in trust ratings, with two exceptions: women reported significantly higher levels of trust in certified sexuality educators ($p = .002$) and peer sexual health educators ($p = .041$) than did men.

Educational Messages: Familiarity with Information, Acceptability, and Perceived Importance

As shown in Tables 3 and 4, all five educational messages included new information for substantial portions of our college student sample and were generally rated as feasible and acceptable. Detailed findings for each message are presented below.

Message 1 Message 1 was consent-focused and viewed by participants who had been randomized to Groups A and B. It read:

> In a 2020 survey, 21% of college students who had been choked during sex said that they had never been asked for consent to be choked. Just because a person has consented to hook up or have sex does not mean that they have consented to be choked. Choking a person without clear consent may be considered sexual misconduct.

As shown in Table 3, one-quarter of participants (24.3%, $n = 129$) reported that this was "brand new information" to them and 22.7% ($n = 120$) were "already completely familiar" with this information. On a scale of 1 to 5 (1 = brand new information, 5 = already completely familiar), the mean rating for Message 1 was 3.0 (SD = 1.5). In terms of acceptability, and as shown in Table 4, the mean acceptability score for Message 1 was 3.6 (SD = 0.9), with women scoring this consent-focused message significantly higher than men (3.7 vs. 3.5, $p = .046$). In terms of perceived importance of the information, the mean rating was 3.7 (SD = 1.0) on a scale of 1 to 5, with women, as compared with men, being significantly more likely to agree that the consent-related message was important to people like them (3.9 vs. 3.5, $p < .001$). Additional item-level detail is provided in Supplementary Table A.

Twenty-two participants provided written feedback on Message 1. A few were not message-related feedback but instead were comments about choking (e.g., "some people like men taking control and vice versa"). A bisexual woman (no age given) expressed surprise about nonconsensual choking happening: "People just start choking people like, out of the blue? No warning, just grabs there [sic] neck?? As a fedish? [sic] Like I know about consenting to choking but the idea that someone just gets 'really into it' and starts choking their partner is… new to me."

Two men pushed back against Message 1. A 20-year-old heterosexual man wrote, "Why the hell is a college trying to teach me about choking. How is this curriculum. You should be ashamed of yourself, re-evaluate your life choices." Additionally, a 19-year-old heterosexual man wrote, "Trying to

Table 3 Familiarity with information about sexual choking

		Brand new information (1)	(2)	(3)	(4)	Already completely familiar (5)
Intervention Message	*Mean (SD)*	*% (n)*	*% (n)*	*% (n)*	*% (n)*	*% (n)*
Message 1 (Group A and B): In a 2020 survey, 21% of college students who had been choked during sex said that they had never been asked for consent to be choked. Just because a person has consented to hook up or have sex does not mean that they have consented to be choked. Choking a person without clear consent may be considered sexual misconduct.	3.0 (1.5)	24.3 (129)	17.6 (93)	19.2 (101)	16.3 (86)	22.7 (120)
Message 2 (Group B only): Nearly half of college students have been choked during sexual activities. However, even when choking during sex is consensual, if a person is accidentally hurt or killed from being choked, the person who choked them may be held legally and criminally responsible for their injury or death.	3.4 (1.5)	18.1 (47)	9.7 (25)	19.7 (51)	17.8 (47)	34.7 (91)
Message 3 (Group A and B): Choking during sex decreases blood flow, and thus oxygen, to the brain. Recent research shows that people who have been choked during sex are at greater risk of depression and anxiety. Safer ways to play include role-playing, spanking, and sex toy use.	2.5 (1.4)	33.6 (171)	18.6 (95)	20.9 (107)	13.5 (69)	13.5 (69)
Message 4 (Group A and B): Some people breathe in ways that enhance their sexual arousal or make it easier to experience orgasm, such as by taking long slow breaths or a series of quick breaths during sexual stimulation; this is a safe way to explore 'breath play' during sex. Choking a person during sex, however, is not a safe way to explore 'breath play' because choking reduces blood flow (and therefore oxygen and other nutrients) to the brain, increasing risk for depression, anxiety, and brain injury.	2.7 (1.4)	27.2 (136)	21.2 (106)	24.6 (123)	11.4 (57)	15.6 (78)
Message 5 (Group A and B): Although rare, people sometimes accidentally die when they are being choked during sex. If you like playing with power, there are many safer – and still pleasurable - ways to be dominant or submissive such as through spanking, role playing, light bondage, and even varying the ways you have oral sex or intercourse.	3.2 (1.5)	18.3 (91)	15.9 (79)	18.6 (93)	19.5 (97)	27.8 (138)

tell college kids what and what isn't sexually correct according to your worldview is silly. Choking is a bit violent and I have only done it when asked, but if anybody doesn't want to be choked, say NO when the hand is coming! Every person I have ever hooked up with is quite clear about what they do and do not want/like." He seemed to suggest that the decision for choking could be made in the moment, when a person is attempting to choke their partner, and that it may be up to the person being choked to stop the choking. In contrast, an 18-year-old heterosexual man expressed support for educating students about choking; he wrote, "This is brand new information to me. Makes me wonder what other events and occurrences have come up. Please, do not quietly mention this. This is very important."

Of those that provided specific feedback on Message 1, a 21-year-old lesbian woman felt that the last line of the message got lost in a wordy message and an 18-year-old pansexual man felt that the message "provides a good statistic about choking during sexual activity, but it doesn't seem to provide enough emotion to really make someone think." Several students indicated that the message should be stronger and more direct, given the importance of consent. A 20-year-old woman who described her sexual orientation as "something else" said, "I hope it won't take a death on campus for the school to actively outline consequences and get serious about spreading this information. I had no idea that as many as 20% have been choked without their consent. This is astonishing."

Some students provided specific feedback on how to improve the message, such as a 21-year-old heterosexual woman who encouraged us to "define 'clear consent' – is that strictly verbal consent? What does this consent look like?" A 21-year-old man wrote that "A note on the danger and risks of unexpected choking should be added to the end. A line like 'can cause trauma or harm in the person being choked' would hammer it home." Similarly, a 19-year-old lesbian woman wrote, "The wording could be even stronger and I wouldn't object. Attempting to strangle someone without warning, whether or not it's during sex, is and should be considered assault." However, a 20-year-old heterosexual woman spoke to the complexities of engaging students on the topic of choking and consent:

> Some people may fear of losing the sexual connection they have with a person if they were to say no I don't give you consent to choke me. We should prepare people for

Table 4 Acceptability and perceived importance of educational messages by gender

	Total	Women	Men	
Intervention Message	*Mean (SD)*	*Mean (SD)*	*Mean (SD)*	*p-value*
Message 1: In a 2020 survey, 21% of college students who had been choked during sex said that they had never been asked for consent to be choked. Just because a person has consented to hook up or have sex does not mean that they have consented to be choked. Choking a person without clear consent may be considered sexual misconduct.				
This message meets my approval	3.8 (1.0)	3.9 (1.0)	3.7 (0.9)	0.040
This message is appealing to me	3.4 (1.0)	3.5 (1.1)	3.3 (0.9)	0.069
I like this message	3.5 (1.0)	3.6 (1.1)	3.4 (0.9)	0.090
I welcome this message	3.7 (1.0)	3.8 (1.0)	3.6 (0.9)	0.147
Acceptability score	3.6 (0.9)	3.7 (0.8)	3.5 (0.9)	0.046
This is important information for people like me	3.7 (1.0)	3.9 (1.0)	3.5 (0.9)	<0.001
Message 2: Nearly half of college students have been choked during sexual activities. However, even when choking during sex is consensual, if a person is accidentally hurt or killed from being choked, the person who choked them may be held legally and criminally responsible for their injury or death.				
This message meets my approval	3.9 (0.9)	4.0 (0.9)	3.9 (0.9)	0.985
This message is appealing to me	3.4 (1.0)	3.5 (1.0)	3.3 (0.9)	0.144
I like this message	3.6 (1.0)	3.6 (1.0)	3.5 (0.9)	0.376
I welcome this message	3.7 (1.0)	3.7 (1.0)	3.6 (0.9)	0.543
Acceptability score	3.6 (0.9)	3.7 (0.8)	3.6 (1.0)	0.330
This is important information for people like me	3.8 (1.0)	3.9 (1.1)	3.8 (0.9)	0.580
Message 3: Choking during sex decreases blood flow, and thus oxygen, to the brain. Recent research shows that people who have been choked during sex are at greater risk of depression and anxiety. Safer ways to play include role-playing, spanking, and sex toy use.				
This message meets my approval	3.6 (1.0)	3.8 (1.0)	3.5 (0.9)	0.007
This message is appealing to me	3.3 (1.0)	3.5 (1.1)	3.2 (0.8)	0.023
I like this message	3.4 (1.0)	3.4 (1.1)	3.3 (0.9)	0.309
I welcome this message	3.5 (1.0)	3.6 (1.1)	3.5 (0.8)	0.639
Acceptability score	3.5 (0.9)	3.5 (0.9)	3.4 (0.9)	0.088
This is important information for people like me	3.7 (1.0)	3.9 (1.0)	3.6 (0.8)	0.004
Message 4: Some people breathe in ways that enhance their sexual arousal or make it easier to experience orgasm, such as by taking long slow breaths or a series of quick breaths during sexual stimulation; this is a safe way to explore 'breath play' during sex. Choking a person during sex, however, is not a safe way to explore 'breath play' because choking reduces blood flow (and therefore oxygen and other nutrients) to the brain, increasing risk for depression, anxiety, and brain injury.				
This message meets my approval	3.6 (0.9)	3.7 (1.0)	3.6 (0.8)	0.046
This message is appealing to me	3.4 (0.9)	3.5 (1.0)	3.3 (0.8)	0.031
I like this message	3.4 (0.9)	3.5 (1.0)	3.4 (0.8)	0.108
I welcome this message	3.6 (1.0)	3.6 (1.0)	3.5 (0.8)	0.076
Acceptability score	3.5 (0.9)	3.6 (0.9)	3.4 (0.9)	0.087
This is important information for people like me	3.7 (1.0)	3.7 (1.1)	3.6 (0.8)	0.033
Message 5: Although rare, people sometimes accidentally die when they are being choked during sex. If you like playing with power, there are many safer – and still pleasurable - ways to be dominant or submissive such as through spanking, role playing, light bondage, and even varying the ways you have oral sex or intercourse.				
This message meets my approval	3.7 (1.0)	3.8 (1.0)	3.6 (0.8)	0.047
This message is appealing to me	3.5 (1.0)	3.5 (1.1)	3.4 (0.8)	0.299
I like this message	3.5 (1.0)	3.6 (1.1)	3.4 (0.8)	0.105
I welcome this message	3.6 (0.9)	3.7 (1.0)	3.6 (0.8)	0.257
Acceptability score	3.6 (0.9)	3.6 (0.9)	3.5 (0.9)	.182
This is important information for people like me	3.7 (1.0)	3.8 (1.1)	3.6 (0.8)	0.048

that by letting them know that it is ok to not want certain parts of sex down to the very last detail for example (biting, sniffing, hair-pulling, finger exploring, licking, spitting, ejaculating, etc.). We want to let people know that yes sex is a part of human nature and things can get a little crazy but that doesn't mean we shouldn't be able to say stop or say let's talk about what we just did or let's never do that again or maybe we can try some other time.

> Sex can be beautiful or traumatic depending on who we do it with and I aim for people to have beautiful, magical, sometimes even enlightening experiences.

Another participant—a 22-year-old heterosexual woman—seemed to grapple with several complexities of choking and consent including the timing of consent communication (e.g., prior to sex versus during sex), whether consent is verbal ("a conversation") or non-verbal (referencing tap-outs), and that helping college students navigate these waters will likely take a more involved educational process than a brief message on a poster. She wrote:

> I like the use of statistical data, however I don't think the true point of the message has been made clear enough. Some may be left wondering 'did I assault someone?' and others may be left wondering 'have I been assaulted?' and neither may have thought that way until they read this. For me, choking isn't really my thing, but passion is. So a 'consent' conversation with me would not be definitive. I would say, 'I'm not usually into it unless the vibes are right. You can try it but if I tap you then stop right away.' This seems a bit long for a poster though.

Message 2 This message pertained to potential legal and criminal consequences in the event of accidentally harming or killing someone by choking them during sexual activities. Message 2 was only seen by participants who had been randomized to Group A; it read:

> Nearly half of college students have been choked during sexual activities. However, even when choking during sex is consensual, if a person is accidentally hurt or killed from being choked, the person who choked them may be held legally and criminally responsible for their injury or death.

As shown in Table 3, participants' mean rating for their familiarity with the information in Message 2 was 3.4 (SD = 1.5), with 18.1% ($n = 47$) indicating it was "brand new information" to them and 34.7% ($n = 91$) having been "already completely familiar" with this information. As shown in Table 4, the mean acceptability score for Message 2 was 3.6 (SD = 0.9), with no significant differences by gender. The mean rating for the importance of the information was 3.8 (SD = 1.0), also with no significant differences by gender. Additional item-level detail is provided in Supplementary Table A.

Seven students wrote in responses to Message 2. The same bisexual woman who expressed surprise about non-consensual choking (above, for Message 1) now expressed surprise at how common choking was. She wrote, "I didn't know this was a common kink, I don't get it, 50%? Listen I get I'm inexperienced or whatever but if this figure is actually right then things like these makes me question my sexuality. Maybe I'm not cut out for this whole sex thing guys. Also I have no idea how to feel about this particular statistic its just so outside my frame of reference."

Four students felt that the message provided scary information and/or used fear tactics which a 20-year-old gay man worried could "create shame." A 19-year-old heterosexual woman wrote, "I feel like this message is a little scary but sometimes scare tactics work when trying to educate people." A 22-year-old heterosexual woman wrote, "I think there should be a way to soften this message and not scare people. Educate them on how not to kill their partner seems like a better route. However, this is important information to know." Also commenting on teaching safer ways to choke, a 20-year-old heterosexual man wrote, "I would add to make sure to look up…proper ways to choke someone, or signs that it is hurting someone." An 18-year-old bisexual woman wrote, "This is kind of blunt and obvious that if you hurt someone, you will be responsible. Instead of using fear tactics teach them how to do it right." However, an 18-year-old pansexual man was more positive about Message 2, writing, "This one is better than the prior since it showcases the consequences and provides readers with the notion that they can completely alter the course of their life if they're unsafe."

Message 3 Participants randomized to Groups A and B viewed Message 3, which described choking-related health risks, addressing effects on the brain and potential mental health sequelae. Message 3 read:

> Choking during sex decreases blood flow, and thus oxygen, to the brain. Recent research shows that people who have been choked during sex are at greater risk of depression and anxiety. Safer ways to play include role-playing, spanking, and sex toy use.

As shown in Table 3, 33.6% ($n = 171$) of participants who viewed Message 3 indicated that this was "brand new information" to them, and only 13.5% ($n = 69$) were "already completely familiar" with this information. Participants' mean rating for their familiarity with the information in Message 3 was 2.5 ($SD = 1.4$). As shown in Table 4, the mean acceptability score for Message 3 was 3.5 ($SD = 0.9$), and ratings were not significantly different by gender. However, the mean rating for the importance of the information was 3.7 ($SD = 1.0$), with women, as compared with men, being significantly more likely to agree that this

health-related message was important to people like them (3.9 vs. 3.6, $p = .004$). See Supplementary Table A for additional item-level detail.

Twenty-three students provided feedback in relation to Message 3. While some participants felt that the connection between being choked during sexual activities and subsequent mental health difficulties was "not surprising" (18-year-old heterosexual woman) or "obvious" (20-year-old heterosexual man), others wanted more information. A 21-year-old heterosexual woman said, "there needs to be more context as to why it leads to depression and anxiety." Similarly, a 19-year-old heterosexual man wrote, "I think it might be important to discuss how choking leads to an increased risk for depression and anxiety. I have trouble understanding how this is the case based on the message." A bisexual woman (no age given) was concerned that Message 3 was "twisting facts… it's probably true that long term oxygen deprecation to the brain would cause those symptoms, but I'm guessing doing it in shorter burst is okay, as long as your [sic]not getting constantly choked." Reflecting on her own experiences being choked, a 19-year-old pansexual woman seemed skeptical but also interested to learn more. She wrote, "would like to see more research on this, choking is very normalized in sex and i have never had a bad experience with it, only pleasurable ones. would love to learn more about why it may be bad." A few students suggested that Message 3 be expanded to include statistics about the potential relationship between being choked and mental health and one student also suggested providing "links to mental health centers and studies so people can see the results" (20-year-old heterosexual man).

Two students suggested we remove the last sentence about "safer ways to play," one said it was not needed (18-year-old heterosexual man), and another said, "don't give specific alternatives or you sound like a boomer" (21-year-old lesbian woman). A 20-year-old woman (sexual orientation identity not given) wrote, "I like the inclusion of possible effects to the mental health of those involved in choking, as one deterrent." A 22-year-old heterosexual woman had mixed feelings about Message 3, writing, "I like that it shows a consequence based on factual data and gives other options. However, I still don't think signs should be trying to dissuade people to do what they want. Feels like trying to pressure abstinence."

Highlighting the novelty of the information to participants, a 20-year-old gay man wrote, "I would've never known this if i didn't complete this survey" and a 20-year-old pansexual woman wrote, "This is so sad to hear." Finally, a few students again suggested that we provide information about a "proper choking technique" (21-year-old heterosexual man) and teach "how to do it safely – it's unpreventable, honestly" (19-year-old heterosexual woman).

Message 4 Participants randomized to Groups A and B viewed Message 4, which was health-focused and addressed breath play for sexual enhancement. This message read:

> Some people breathe in ways that enhance their sexual arousal or make it easier to experience orgasm, such as by taking long slow breaths or a series of quick breaths during sexual stimulation; this is a safe way to explore 'breath play' during sex. Choking a person during sex, however, is not a safe way to explore 'breath play' because choking reduces blood flow (and therefore oxygen and other nutrients) to the brain, increasing risk for depression, anxiety, and brain injury.

As shown in Table 3, 27.2% ($n = 136$) of participants who viewed Message 4 reported that this was "brand new information" to them, whereas just 15.6% ($n = 78$) of participants were "already completely familiar" with this information. Participants' mean rating for their familiarity with the information in Message 4 was 2.7 ($SD = 1.4$). As shown in Table 4, the mean acceptability score for Message 4 was 3.5 ($SD = 0.9$), and ratings were not significantly different by gender. However, the mean rating for the importance of the information was 3.7 ($SD = 1.0$), with women rating this message as significantly more important for people like them as compared to men (3.7 vs. 3.6, $p = .033$). See Supplementary Table A for additional item-level detail.

Sixteen participants provided feedback on Message 4. One participant challenged the premise of Message 4, noting that "Choking is not always aggressive enough to restrict blood flow" (21-year-old heterosexual woman), and another described the message as "common sense" (18-year-old bisexual woman). However, there were also positive comments. A 19-year-old heterosexual man said, "I like this one best," and a 22-year-old woman wrote, "I like this one because it gives an informative way to meet a goal in a safer way." A 20-year-old heterosexual man wrote, "I think choking doesn't pose as great a risk to the sex-having community as many other things, but I do appreciate the consent-forward and safety approach." A 29-year-old gay man said, "I think that this message is important but that it could be worded differently. I am unsure what would be the best way to do that, but just my two cents." As with the previous message, a few students wanted more information and/or "a statistic" on the association between being choked and a person's mental health. For example, a 19-year-old heterosexual man said that he was "confused as to how decreased blood flow leads to an increased risk for anxiety and depression."

Message 5 Groups A and B were shown Message 5, which addresses the possibility of people dying from being choked during sexual activities as well as safer ways to be dominant or submissive. The message read:

> Although rare, people sometimes accidentally die when they are being choked during sex. If you like playing with power, there are many safer – and still pleasurable - ways to be dominant or submissive such as through spanking, role playing, light bondage, and even varying the ways you have oral sex or intercourse.

As shown in Table 3, 18.3% ($n=91$) of participants who viewed Message 5 reported that this was "brand new information" to them and 27.8% ($n=138$) were "already completely familiar" with this information. Participants' mean rating for their familiarity with the information in Message 5 was 3.2 ($SD=1.5$). As shown in Table 4, the mean acceptability score for Message 5 was 3.6 ($SD=0.9$), with no significant differences by gender. The mean rating for the importance of the information was 3.7 ($SD=1.0$), with women rating this message as significantly more important for people like them as compared to men (3.8 vs. 3.6, $p=.048$). Additional item-level detail is provided in Supplementary Table A.

Thirteen students provided feedback on Message 5. One felt that we should use a "more likely scenario" for the message (19-year-old pansexual woman) and two expressed concern about telling students "how you think they should have sex" (19-year-old heterosexual man) or "to stop doing something" (22-year-old woman). Others were more positive about Message 5. One described this message as "a good one" (19-year-old heterosexual man), and an 18-year-old pansexual man wrote, "This is a good message, despite the lack of a statistic, the possible loss of human life showcases the importance of safe sex."

While one student said, "Thank you for providing alternatives" (18-year-old bisexual woman), two other students took issue with this message. One said, "Playing with POWER?? That's sick" (18-year-old heterosexual woman). Another wrote:

> With some of the things listed (such as light bondage/role play), choking can be present. Especially within light bondage, as the rope can be tied around the people and neck as a restraint. I agree there are much safer ways to experiment and different options, but these two are on the line of safer and not. (20-year-old heterosexual man)

Yet another student suggested some of their own alternatives, writing, "Yes maybe they can bring more toys into play whether they be sex toys, dolls, a stuffed animal a human mannequin, something that's meant to be squeezed if the partner doesn't want to be choked themselves." (20-year-old heterosexual woman).

Educational Messages in Relation to Future Choking Behaviors

As shown in Table 5, for those who reported that they had not previously choked a partner during sexual activities, there were no significant differences by educational group membership and their perceived likelihood of choking a partner in the next six months. However, the pattern was markedly different for those who had previously choked a partner. That is, students in Group A (shown all messages) were nearly 70% less likely to report that they would choke a partner in the next 6 months (OR = 0.33; 95% CI, 0.20–0.53) and students in Group B (health and consent messages but not legal consequence messages) were more than 50% less likely to report that they would do so (OR = 0.47; 95% CI, 0.26–0.84) as compared to those in Group C (who were not shown any educational messages). For women who had previously choked their partners, their general pattern tracked with the overall sample (i.e., those in Groups A and B were significantly less likely to report choking a partner in the next six months). For men, those in Group A (shown all messages) were more than 70% less likely to report that they would choke a partner in the next six months as compared to Group C (no messages shown); there was no difference in reported likelihood of choking a partner for Groups B and C.

For those who had never been choked during sexual activities, there were no significant differences in their perceived likelihood of being choked in the next six months based on educational message group membership. For those who had previously been choked during sexual activities, we found that educational group membership was not significantly related to their likelihood of letting a partner choke them in the next six months for either the overall sample or for the men. However, for women who had previously been choked during sexual activities, those in Groups A and B were more than 40% less likely than those in Group C to report that they would let a partner choke them in the next six months.

Feasibility of Delivery Platforms

Overall, students scored college health classes, social media videos, and peer sexual health educators as highly feasible (mean scores of 4.0, 3.8, and 3.8, respectively, on a scale of 1 to 5) and educational text messages as more moderately feasible ($M=3.2$) ways to deliver choking-related educational messages. See Table 6 for details. There were significant gender differences on the mean feasibility scores for the classes (4.2 vs. 3.9, $p<.001$; data

Table 5 Associations between intervention groups and the likeliness of sexual choking in the next 6 months by gender using ordinal logistic regression

	No prior history of choking a partner			Prior history of choking a partner		
	OR	*95% CI*	*p-value*	*OR*	*95% CI*	*p-value*
TOTAL						
Group A: All messages	0.79	(0.45, 1.38)	0.410	0.33	(0.20, 0.53)	<0.001
Group B: Messages 1, 3, 4, 5	0.70	(0.41, 1.19)	0.188	0.47	(0.26, 0.84)	0.011
Group C: No messages	1.00	--	--	1.00	--	--
WOMEN						
Group A: All messages	0.53	(0.25, 1.13)	0.099	0.33	(0.16, 0.69)	0.003
Group B: Messages 1, 3, 4, 5	0.60	(0.30, 1.20)	0.148	0.35	(0.16, 0.76)	0.008
Group C: No messages	1.00	--	--	1.00	--	--
MEN						
Group A: All messages	1.11	(0.47, 2.61)	0.818	0.27	(0.14, 0.54)	<0.001
Group B: Messages 1, 3, 4, 5	0.91	(0.40, 2.06)	0.817	0.58	(0.26, 1.28)	0.178
Group C: No messages	1.00	--	--	1.00	--	--
	No prior history of being choked			Prior history of being choked		
	OR	*95% CI*	*p-value*	*OR*	*95% CI*	*p-value*
TOTAL						
Group A: All messages	0.80	(0.47, 1.36)	0.414	0.63	(0.38, 1.04)	0.070
Group B: Messages 1, 3, 4, 5	1.11	(0.67, 1.85)	0.681	0.72	(0.45, 1.15)	0.172
Group C: No messages	1.00	--	--	1.00	--	--
WOMEN						
Group A: All messages	0.51	(0.23, 1.11)	0.091	0.56	(0.32, 0.98)	0.044
Group B: Messages 1, 3, 4, 5	0.86	(0.43, 1.72)	0.670	0.55	(0.32, 0.93)	0.027
Group C: No messages	1.00	--	--	1.00	--	--
MEN						
Group A: All messages	1.04	(0.50, 2.16)	0.915	0.62	(0.22, 1.74)	0.367
Group B: Messages 1, 3, 4, 5	1.32	(0.64, 2.74)	0.452	1.24	(0.49, 3.18)	0.648
Group C: No messages	1.00	--	--	1.00	--	--

not shown), videos (4.0 vs. 3.7, $p < .001$; data not shown), and peer sexual health educators (3.92 vs. 3.7, $p < .007$; data not shown), with women rating each of these as more feasible than did men. However, there were no significant gender differences for mean feasibility ratings for the text message system.

Appropriateness of Delivery Platforms

As shown in Table 5, sharing educational messages through social media videos, courses, and via peer sexual health educators were all rated as "good matches" (means of 3.8, 4.0, and 3.8, respectively). Text messages were rated lower ($M = 2.6$). Women were significantly more likely than men to agree that the following were good matches for sharing educational messages about choking, resulting in higher ratings: videos (3.97 vs. 3.34, $p < .001$), classes (4.1 vs. 3.8, $p < .001$), peer sexual health educators (3.7 vs. 3.5, $p = .006$).

Discussion

Although there have been calls for college student sexuality education to be updated to address health- and consent-issues related to sexual choking and rough sex (Eastman-Mueller et al., 2023; Herbenick et al., 2021a, 2022a; Rothman et al., 2021; Sharman et al., 2024a), we are not aware of any evidence-based interventions that address sexual choking, whether for college students or other populations. As a step toward intervention development, we conducted a random sample survey of college students to better understand their perspectives on educating young people about sexual choking and its risks—including at what ages such information should be given, through what types of delivery platforms, and who they trust to provide such information. We also examined the acceptability and perceived importance of educational messages about sexual choking in relation to consent, health, and legal consequences with a randomized design. There are several notable findings from our research.

Table 6 Feasibility and appropriateness of delivery platforms for educational messages

Methods of Sharing Messages	*Mean (SD)*	Completely disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Completely agree (5)
		% (n)	*% (n)*	*% (n)*	*% (n)*	*% (n)*
Social Media Videos						
Implementable	3.8 (1.0)	3.8 (19)	6.9 (34)	19.1 (93)	50.9 (250)	19.3 (95)
Possible	3.9 (0.9)	3.0 (15)	3.7 (18)	12.7 (62)	57.4 (280)	23.3 (114)
Doable	3.9 (0.9)	2.7 (13)	3.1 (15)	15.6 (76)	56.9 (279)	21.8 (107)
Easy to use	3.9 (0.9)	2.5 (12)	4.3 (21)	21.5 (105)	48.4 (237)	23.3 (114)
Feasibility Score	3.8 (0.8)					
Like a good match	3.7 (1.1)	4.9 (24)	9.6 (47)	22.0 (107)	40.0 (195)	23.5 (115)
College Health Classes						
Implementable	4.1 (0.9)	1.6 (8)	3.0 (15)	14.6 (71)	48.7 (236)	32.0 (155)
Possible	4.1 (0.8)	1.1 (5)	1.5 (7)	12.4 (60)	52.4 (255)	32.6 (159)
Doable	4.1 (0.8)	1.4 (7)	2.0 (10)	14.1 (69)	50.7 (246)	31.9 (155)
Easy to use	3.9 (0.9)	1.8 (9)	6.6 (32)	20.1 (97)	44.9 (217)	26.6 (129)
Feasibility Score	4.0 (0.8)					
Like a good match	3.9 (1.0)	1.9 (9)	6.0 (29)	19.3 (93)	42.1 (204)	30.7 (149)
Text Messages						
Implementable	3.1 (1.2)	10.8 (53)	21.8 (106)	22.5 (110)	33.5 (163)	11.5 (56)
Possible	3.4 (1.1)	8.5 (41)	14.7 (71)	22.0 (107)	42.5 (207)	12.3 (60)
Doable	3.3 (1.1)	8.8 (43)	16.4 (80)	23.2 (113)	41.3 (201)	10.3 (50)
Easy to use	3.2 (1.2)	10.0 (48)	21.5 (105)	22.0 (107)	36.1 (176)	10.4 (50)
Feasibility Score	3.2 (1.1)					
Like a good match	2.6 (1.2)	21.4 (104)	32.1 (156)	22.1 (107)	17.5 (85)	7.0 (34)
Peer Sexual Health Educators						
Implementable	3.9 (0.8)	1.6 (8)	3.8 (18)	21.0 (102)	52.8 (257)	20.9 (102)
Possible	3.9 (0.8)	1.5 (7)	3.1 (15)	17.6 (86)	55.2 (269)	22.6 (110)
Doable	3.9 (0.8)	1.6 (8)	4.1 (20)	20.7 (101)	52.1 (253)	21.5 (104)
Easy to use	3.6 (1.0)	2.4 (12)	10.0 (49)	25.4 (124)	45.0 (219)	17.2 (84)
Feasibility Score	3.8 (0.8)					
Like a good match	3.6 (1.0)	3.4 (16)	7.9 (38)	29.8 (143)	40.7 (196)	18.2 (87)

First, more than 90% of these randomly sampled U.S. college students felt that young people should be taught about sexual choking and its health risks, and most students believed this should first occur in high school. We found that more women than men thought that choking and its risks should be taught about during adolescence, perhaps reflecting the fact that women are more often the ones who are choked and thus more vulnerable to assault as well as health risks from being choked/strangled. However, given that U.S. sexuality education is already limited in terms of the topics it covers (Goldfarb & Lieberman, 2021; Schmidt et al., 2015), it is unlikely that many school-based sexuality education programs will be able to address sexual choking. We also expect that many healthcare providers may hesitate to address sexual choking with middle school or high school students, due to stigma related to non-normative sexual practices (Sprott & Randall, 2017; Waldura et al., 2016). Also, prior research shows that pediatricians do not consistently discuss sexuality topics with teenagers and, when they do, such conversations are limited to an average of just 36 seconds (Alexander et al., 2014).

Yet, given how widespread sexual choking has become and the serious implications it has for young people's short-term and long-term health, it is critical to listen to youth voices and to act. After all, most participants in this sample reported that they had first learned about sexual choking by age 15. Other research shows that—among college students who have ever choked or been choked—one-quarter had first engaged in choking between ages 12 and 17 (Herbenick et al., 2022a). Qualitative research from the U.S., Australia, Sweden, and Iceland shows that teenagers are aware of choking and are sometimes already engaging in it or have experienced a partner choking them without first discussing it (Herbenick et al., 2022b, 2022c; Ólafsdottir & Kjaran, 2019; Rothman et al., 2015; Tholander et al., 2022; Woodley & Jaunzems, 2024). In other words, young people

are already learning about sexual choking from peers, partners, pornography, social media, online articles, memes, and other sources that may provide incomplete or inaccurate information (Balle et al., In Press; Herbenick et al., 2022b, 2022c, 2023c, 2023d), which may increase risks to young people and their partners. Therefore, it is critical for health educators, sexuality educators, and clinicians to develop and test age- and developmentally appropriate education about sexual choking.

A second major finding is that the college students we sampled seemed open to a variety of ways in which information about sexual choking could be delivered. They endorsed diverse avenues for college student education including faculty-engaged, campus-led, and peer-led programming. Most supported sharing such information as part of human sexuality and health-related courses as well as through mechanisms that have a broader reach, such as campus-wide health education media campaigns, videos in sexual assault prevention programs, videos on the Student Health Center website, and sexuality education workshops in residence halls. However, more women than men endorsed significantly more of the avenues of dissemination, potentially due to their being more likely to be choked. More women may prefer learning about choking in certain venues, such as college human sexuality courses, since—at least in the U.S.—far more women tend to enroll in sexuality courses as compared with men (King et al., 2020).

Most also felt that such information could be shared through conversations with a healthcare provider or sex educator or through peer-led education programs. Indeed, peer education programs have been effective for a variety of sexual health and communication (Hunter et al., 2019; Latkin & Knowlton, 2015) and could be developed to address sexual choking. Further, students generally reported high levels of trust in receiving such information from certified sexuality educators, college professors teaching sexuality courses, and medical providers at the campus Student Health Center. Overall, these data show that our college student sample was highly supportive of learning about choking from university faculty and staff, whether through health-related courses or campus programming.

Third, our findings showed that the educational messages we developed and tested included novel information that the students were open to receiving and that felt important to students, making these messages good candidates to be included in subsequent interventions. In this exploratory study that used a randomized design to test educational messages, we found that the messages also showed preliminary evidence of efficacy, though that varied by gender and students' prior experience with choking and/or being choked during sexual activities. The magnitude of effect was sizable for students with prior histories of choking or being choked, suggesting that these are key messages to build upon in college student education. Consistent with other research (Herbenick et al., 2022a; Sharman et al., 2024b), we found that sexual choking was highly gendered, with more women and TGNB + students reporting being choked as compared with men and more men and TGNB + students reporting that they had choked their partner(s) as compared with women. While each of our educational messages was rated as acceptable, women more so than men tended to approve of the messages (whether related to consent, health, or legal consequences). Given that women are more often on the receiving end of being choked as compared with men, this may explain why they were especially responsive to messages about health, safety, and consent. As men are more often the ones choking their partner(s) as compared with women, this may explain why men were more responsive to the messages about potential legal and criminal consequences as compared with their ratings to the health, safety, and consent messages. Further, women with a prior history of choking/being choked and who viewed the educational messages (whether in Group A which saw health/consent messages or in Group B which saw health/consent/legal messages) reported a significantly lower likelihood that they would choke a partner (or allow a partner to choke them) in the next six months, as compared with those who had not been shown any of the educational messages. For men, we found that those who had previously choked a partner and who had been shown all of the messages (including the one about legal consequences) were significantly less likely to indicate that they would choke a partner in the next six months. In other words, viewing only the health- and consent-related messages was not significantly related to men's reported likelihood of choking a partner in the coming months, but the addition of viewing the legal consequences was; however, the odds ratio was still quite strong for even the health/consent message-only group, suggesting some influence of even the health and consent messages.

Indeed, our idea to create a message focused on legal consequences (and then to vary the group messages by the inclusion or omission of this message) was inspired by comments from male students in the first author's (DH) college human sexuality course. That is, some men—after having read an assigned news article about a man who had been sentenced to prison after unintentionally killing his partner via sexual choking—expressed surprise about the man's sentencing, because they shared that they had not known that people could be held legally responsible for someone's injury or death if the choking had been consensual. The men in the class had urged the first author to share the article with students, or at least that information, in future semesters.

Although the messages showed some preliminary evidence of efficacy for students who had prior histories of engaging in choking, this was not the case for students who had no prior history of choking or being choked. This may be as a result of the question we asked, which was about the likelihood of choking a partner in the next six months; this may not be as

relevant for those with no choking histories. Further, as the existing qualitative research on choking has focused on people who have experienced choking or being choked (Herbenick et al., 2022b, 2022c, 2024a), little is known about young people who have not previously engaged in choking. We need to understand what proportion of those who have never engaged in choking have not done so because they are firmly against it versus those who might want to engage in choking but have simply not yet had the opportunity to do so, or else have not engaged in choking because they are abstaining from all forms of partnered sexual activities. Because some percentage of students who have not yet engaged in choking will likely one day become choking-experienced, more information is needed about how young people navigate this decision-making process. While our exploratory study suggests some ways forward for creating interventions that might reduce people's likelihood of continuing to choke their partner(s) or to allow a partner to choke them, they point to the need to identify messages to keep people from engaging in choking in the first place.

Implications

Our study has implications for researchers, educators, and clinicians. First, it should be noted that these messages were developed in 2021 when there had been relatively little published research on sexual choking. Since that time, there have been more than two dozen studies on choking/strangulation that have been published across several countries, including neurological research related to strangulation in the contexts of consensual sex (Hou et al., 2023a, 2023b; Huibregtse et al., 2022) as well as violence (Valera et al., 2022). Thus, these exploratory educational messages should be reviewed and updated to reflect current knowledge and understanding of choking/strangulation, its health risks, and people's reasons for engaging in choking. Students provided valuable feedback that can help to shape the revision of existing messages and development of new messages, including suggestions to include data in the messages, to cite relevant studies, and to avoid fear tactics. The latter is especially the case given that young people often report positive experiences with choking, including pleasure (Herbenick et al., 2022b, 2022c; Sharman et al., 2024b).

We were encouraged to see a great deal of support from students about choking-related education, as they endorsed a wide variety of delivery platforms, found the messages to be acceptable, and highlighted messages that they especially liked. Overall, this tells us that college students want to be educated about sexual choking and are open to this information coming through a variety of channels. In other words, there are viable options available to college health professionals, which supports the possibility of using multiple messages and ways of sharing information (e.g., shorter messages for bathroom posters vs. more detailed information provided in health-related courses or on the student health center website). That said (and as noted earlier), those in non-tenured positions may be more vulnerable in addressing what some may feel is a controversial sexual topic. Thus, it will be important for leaders in college health to identify how they can support both faculty and staff in delivering up-to-date and critically needed health education—even when controversial—without fear of reprimand or job loss.

Strengths and Limitations

Our research had several strengths including that we used random sampling for recruitment (thus facilitating generalizability of findings to students at our campus), we randomized participants to receive specific sets of educational messages, used established measures of acceptability and feasibility, and benefitted from the expertise of an interdisciplinary team. Our research was also subject to several limitations. First, students were recruited from just one campus; thus, findings may not be generalizable to students at other universities or to non-college students. Second, our university has many sexuality researchers and educators on its faculty/staff and offers a diverse range of sexual health-related courses across multiple departments, each of which may have influenced students' high levels of trust in our faculty and staff to share information about sexual choking; students' trust in campus faculty/staff may differ at other colleges or universities or in community settings and subsequent research should explore this. Given prior research showing that faith-based institutions may be less likely to make certain sexual health services available to college students (Butler et al., 2012; McKinley et al., 2015), it may also be the case that students at faith-based institutions have different needs or preferences for information about sexual choking and its health risks. A third limitation is that our list of potential delivery platforms was not comprehensive; subsequent research might also assess the feasibility and acceptability of sharing messages through chatbots and kink workshops. Fourth, although we did not show specific messages to people randomly assigned to Group C, they did complete a survey about choking that referenced there being health risks to choking and that asked all participants at what age people should receive information about choking; subsequent research on educational messages might include a control group that does not receive any information about choking. Finally, our study was cross-sectional; longitudinal research is needed to determine whether and to what extent being exposed to educational messages about choking is associated with actual behavior change over time. Such research could also explore outcomes beyond intention to choke/be choked such as self-efficacy related to being able to engage in explicit communication/consent related to choking and/or knowledge related to harm reduction strategies.

Policy Implications

To our knowledge, there are few available youth- or college student-focused educational materials about sexual choking even though there is clearly a pressing need. Of those of which we are aware, online educational materials from the New Zealand-based organization, The Light Project, are among the earliest that were developed (The Light Project, n.d., b). Their online fact sheet and videos for adolescents and young adults were created in 2021 through a collaborative process involving youth and health professionals (The Light Project, n.d., a). Subsequent research should examine the feasibility, acceptability, and efficacy of these messages among youth who reside within as well as outside of New Zealand. We are also aware of a few public-facing messages and materials that have been developed since our 2021 study. As one example, messages developed in 2022 and that focus on strangulation-related injuries and death were presented to a convenience sample of Australian undergraduates; in this study, students' positive perceptions of being "strangled/choked" decreased after exposure to the messages (Sharman et al., 2024b). As a second example, in 2023, the first author (DH) published a book that includes information to support parents in talking with their teenagers about sexual choking (Herbenick et al., 2023a, 2023b, 2023c, 2023d). As a third example, the Australia-based Breathless Campaign (2024) features online information and videos focused on strangulation and its health risks. As a fourth example, Women's Health NSW—also based in Australia—released, in 2024, a public-facing brochure on "sexual choking" through its "It Left No Marks" campaign, which addresses both consensual and non-consensual forms of strangulation (Women's Health NSW, 2024). Subsequent research should examine the acceptability and efficacy of each of these messages and campaigns. As research on sexual choking and its health effects and consent processes is still emerging, all of these campaigns and messages (including our educational messages) will need to be reviewed and potentially updated, where appropriate, to reflect current knowledge.

Given that many young people learn about sexual choking as older children or younger adolescents, public health professionals and policy makers will also need to consider what age- and developmentally appropriate messages about choking/strangulation in the context of kissing or sexual expression might look like. Although this may feel daunting to some professionals, it is the case that public health professionals have—from time to time—needed to educate young people about the dangers of choking/strangulation, though usually in non-sexual contexts. For example, in 2008, the U.S. Centers for Disease Control and Prevention issued guidance about the child/adolescent "Choking Game" which involved youth choking/strangling themselves or peers, which resulted in deaths (Centers for Disease Control and Prevention, 2010). Recognizing these risks, educational programs for adolescents were developed and evaluated (Ramowski et al., 2012), and in one study, it was found that more than 90% of parents surveyed felt that information about the choking game and its risks should be included in school-based health curricula (Bernacki & Davies, 2012). When TikTok videos about choking/strangulation became popular more recently, news media warned parents about the so-called "blackout challenge" (Levenson & Rubin, 2022). For children, educational messages might focus on the importance of brain health and avoiding pressure on the neck, without addressing the sexual practice itself. For adolescents, it may be more important to address sexual choking more directly, given how widespread this practice has become. College student-focused education about choking will also be needed to reinforce messaging and to reach students who may reach college without prior choking education.

Conclusion

In conclusion, the college students we surveyed were highly supportive of choking-related education for adolescents and college students. They were open to a range of delivery platforms, but especially rated college-affiliated platforms highly and placed high levels of trust in college faculty and college health professionals. Overall, the educational messages we examined were acceptable to students and felt important to them; the messages also showed some preliminary evidence of efficacy for students with prior histories of choking and/or being choked. College health professionals have an opportunity to counter misinformation about sexual choking and to help college students establish positive sexual health behaviors that will support college students' short-term and long-term health.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s13178-025-01189-2.

Data Availability A limited data set is available upon request to qualified researchers.

Declarations

Competing Interests The authors declare no competing interests.

References

Alexander, S. C., Fortenberry, J. D., Pollak, K. I., Bravender, T., Davis, J. K., Østbye, T., Tulsky, J. A., Dolor, R. J., & Shields, C. G. (2014). Sexuality talk during adolescent health maintenance visits. *JAMA Pediatrics, 168*(2), 163–169. https://doi.org/10.1001/jamapediatrics.2013.4338

Anderson, E. A., Eastman-Mueller, H. P., Henderson, S., & Even, S. (2016). Man up monday: An integrated public health approach to increase sexually transmitted infection awareness and testing among male students at a Midwest university. *Journal of American College Health, 64*(2), 147–151. https://doi.org/10.1080/07448481.2015.1062768

Arnett, J. J. (2007). Emerging adulthood: What is it, and what is it good for? *Child Development Perspectives, 1*(2), 68–73. https://doi.org/10.1111/j.1750-8606.2007.00016.x

Bailey, C. P., Sharma, S., Economos, C. D., Hennessy, E., Simon, C., & Hatfield, D. P. (2020). College campuses' influence on student weight and related behaviours: A review of observational and intervention research. *Obesity Science & Practice, 6*(6), 694–707. https://doi.org/10.1002/osp4.445

Balle, M., Brandenburg, D., Valdez, D., & Herbenick, D. (In press). Choking on TikTok: Memetic content and CRAAP analysis of educative and entertaining #Chokekink videos. *The Journal of Sex Research.*

Barker, M. (2013). Consent is a grey area? A comparison of understandings of consent in Fifty Shades of Grey and on the BDSM blogosphere. *Sexualities, 16*(8), 896–914.

BBC. (2021, September 8). Sophie Moss death: MP says strangling sentence too lenient. *BBC News.* https://www.bbc.com/news/uk-england-tees-58492328

Bednarma. (2017). Sex ed and healthy relationships week. Published on October 27, 2017. Retrieved on November 24, 2024 from: https://www.vanderbilt.edu/womenscenter/news/sex-ed-healthy-relationships-week

Beres, M. (2010). Sexual miscommunication? Untangling assumptions about sexual communication between casual sex partners. *Culture, Health & Sexuality, 12*(1), 1–14. https://doi.org/10.1080/13691050903075226

Bernacki, J. M., & Davies, W. (2012). Prevention of the choking game: Parent perspectives. *Journal of Injury and Violence Research, 4*(2), 73. https://doi.org/10.5249/jivr.v4i2.119

Bichard, H., Byrne, C., Saville, C. W. N., & Coetzer, R. (2020). The neuropsychological outcomes of non-fatal strangulation in domestic and sexual violence: A systematic review. *Neuropsychological Rehabilitation*, *32*(6), 1164–1192. https://doi.org/10.31234/osf.io/c6zbv

Brady, P. Q., Fansher, A. K., & Zedaker, S. B. (2022). How victims of strangulation survived: Enhancing the admissibility of victim statements to the police when survivors are reluctant to cooperate. *Violence Against Women, 28*(5), 1098–1123. https://doi.org/10.1177/10778012211022772

Bunzel, L., Koelzer, S. C., Zedler, B., Verhoff, M. A., & Parzeller, M. (2019). Non-natural death associated with sexual activity: Results of a 25-year medicolegal postmortem study. *The Journal of Sexual Medicine, 16*(10), 1547–1556. https://doi.org/10.1016/j.jsxm.2019.07.008

Butler, S. M., Black, D. R., & Avery, G. (2012). Emergency contraceptive pill, contraceptive, and sexually transmitted infection service availability among US college health centers. *Electronic Journal of Human Sexuality.*

Breathless Campaign (2024). Published in 2024. Retrieved on December 14, 2024 from: https://www.breathlesscampaign.com

Cannon, L. M., Bailey, J. M., Ernst, S. D., St. Ivany, A., Bevilacqua, K. G., Scheiman, L., & Munro-Kramer, M. L. (2020). Examining trends in non-fatal strangulation among sexual assault survivors seeking Sexual Assault Nurse Examiner care from 2002 to 2017. *International Journal of Gynecology and Obstetrics, 149*(1), 106–107. https://doi.org/10.1002/ijgo.13058

Cardoso, D. (2022). Choking autoerotic asphyxiation: For a reconfiguration of discourses around breath play. *The Journal of Sexual Medicine, 19*(7), 1069–1072. https://doi.org/10.1016/j.jsxm.2022.03.535

Centers for Disease Control and Prevention (CDC. (2010). 'Choking game' awareness and participation among 8th graders--Oregon, 2008. *MMWR: Morbidity & Mortality Weekly Report*, *59*(1).

Centers for Disease Control and Prevention (2024). *Sexually transmitted infections surveillance 2023.* Atlanta: U.S. Department of Health and Human Services. Retrieved on December 14, 2024 from: https://www.cdc.gov/sti-statistics/annual/slides.html

Conte, I., Sharman, L. S., & Douglas, H. (2025). Choking/strangulation during sex: Understanding and negotiating "safety" among 18–35 year old Australians. *Archives of Sexual Behavior, 54*(2), 483–494. https://doi.org/10.1007/s10508-025-03097-3

Cubbin, T. (2022). Building the sex dungeon: Gay leather culture and the development of spaces for recreational sex at home. *Interiors, 12*(1), 75–99. https://doi.org/10.1080/20419112.2022.2047527

Daminato, L., Riboli, G., Nese, M., Brighetti, G., Giunti, D., & Borlimi, R. (2024). How Italians transgress: A survey on rough sexual behaviors in a sample of Italians. *Sexes, 5*(2), 58–70. https://doi.org/10.3390/sexes5020005

De Boos, J. (2019). Review article: Non-fatal strangulation: Hidden injuries, hidden risks. *Emergency Medicine Australasia, 31*(3), 302–308. https://doi.org/10.1111/1742-6723.13243

Döring, N., Mohseni, M. R., Pietras, L., Dekker, A., & Briken, P. (2024). Research in brief: How prevalent is rough sex? Results from a national online sample of adults in Germany. *Perspectives on Sexual and Reproductive Health, 56*(2), 90–97. https://doi.org/10.1111/psrh.12267

Eastman-Mueller, H., Fu, T. C., Dodge, B. M., & Herbenick, D. (2022). The relationship between college students' campus sexual health resource utilization and self-reported STI testing: Findings from an undergraduate probability survey. *Journal of American College Health, 70*(3), 843–851. https://doi.org/10.1080/07448481.2020.1775607

Eastman-Mueller, H. P., Habel, M. A., Oswalt, S. B., & Liddon, N. (2019). Get yourself tested (GYT) campaign: Investigating campaign awareness and behaviors among high school and college students. *Health Education & Behavior, 46*(1), 63–71. https://doi.org/10.1177/1090198118788617

Eastman-Mueller, H., Oswalt, S. B., & Nevers, J. M. (2023). Sexual diversity on college campuses: Using a BDSM framework to discuss consent. *Journal of American College Health, 71*(3), 660–664. https://doi.org/10.1080/07448481.2021.1905649

Fish, C., & Nies (formerly Albrecht), M. A. (1996). Health promotion needs of students in a college environment. *Public Health Nursing*, *13*(2), 104–111. https://doi.org/10.1111/j.1525-1446.1996.tb00227.x

Fofana, O. (2023, March 24). Texas man has strangled his girlfriend to death during sex. REVOLT. https://www.revolt.tv/article/2023-03-24/282325/texas-man-confesses-to-strangling-girlfriend-during-sex. Accessed 14 Dec 2024.

Gavey, N., & Brewster, O. (2025). Is "rough sex" *a* thing? A survey of meaning. *The Journal of Sex Research*, 1–17. https://doi.org/10.1080/00224499.2024.2438711

Glass, N., Laughon, K., Campbell, J., Block, C. R., Hanson, G., Sharps, P. W., & Taliaferro, E. (2008). Non-fatal strangulation is an important risk factor for homicide of women. *The Journal of Emergency Medicine, 35*(3), 329–335. https://doi.org/10.1016/j.jemermed.2007.02.065

Goldfarb, E. S., & Lieberman, L. D. (2021). Three decades of research: The case for comprehensive sex education. *Journal of Adolescent Health, 68*(1), 13–27. https://doi.org/10.1016/j.jadohealth.2020.07.036

Gwinn, C., & Strack, G. B. (2024). Missed and emerging issues: The link between strangulation, children, sex, and homicides. *Domestic Violence Report, 30*(2), 19–36.

Habel, M. A., Brookmeyer, K. A., Oliver-Veronesi, R., & Haffner, M. M. (2018). Creating innovative sexually transmitted infection testing options for university students: The impact of an STI self-testing program. *Sexually Transmitted Diseases, 45*(4), 272–277. https://doi.org/10.1097/OLQ.0000000000000733

Halstead, V., Williams, J. R., Gattamorta, K., & Gonzalez-Guarda, R. (2017). Sexual violence screening practices of student health centers located on universities in Florida. *Journal of American College Health, 65*(8), 548–557. https://doi.org/10.1080/07448481.2017.1351447

Henkel, M. & Khan, Y. (2024). What is Harvard Sex Week trying to teach us? Fifteen Minutes. The Harvard Crimson. Published on November 9, 2024. Retrieved from: https://www.thecrimson.com/article/2024/11/9/harvard-sex-week-explained/. Accessed 14 Dec 2024.

Hensel, D. J., & Fortenberry, J. D. (2014). Life-span sexuality through a sexual health perspective. In D. L. Tolman, L. M. Diamond, J. A. Bauermeister, W. H. George, J. G. Pfaus, & L. M. Ward (Eds.), *APA handbook of sexuality and psychology, Vol. 1. Person-based approaches* (pp. 385–413). American Psychological Association. https://doi.org/10.1037/14193-013

Herbenick, D., Bartelt, E., Fu, T. C., Paul, B., Gradus, R., Bauer, J., & Jones, R. (2019). Feeling scared during sex: Findings from a US probability sample of women and men ages 14 to 60. *Journal of Sex & Marital Therapy, 45*(5), 424–439. https://doi.org/10.1080/0092623X.2018.1549634

Herbenick, D., Fu, T. C., Chen, X., Ali, S., Simić Stanojević, I., Hensel, D., Wright, P. J., Peterson, Z. D., Harezlak, J., & Fortenberry, J. D. (In press). Prevalence and demographic correlates of "rough sex" behaviors: Findings from a U.S. nationally representative survey of adults ages 18 to 94. *Archives of Sexual Behavior*.

Herbenick, D., Fu, T., Eastman-Mueller, H., Thomas, S., Svetina Valdivia, D., Rosenberg, M., Guerra-Reyes, L., Wright, P. J., Kawata, K., & Feiner, J. R. (2022a). Frequency, method, intensity, and health sequelae of sexual choking among U.S. undergraduate and graduate students. *Archives of Sexual Behavior, 51*(6), 3121–3139. https://doi.org/10.1007/s10508-022-02347-y

Herbenick, D., Fu, T., Kawata, K., Eastman-Mueller, H., Guerra-Reyes, L., Rosenberg, M., & Valdivia, D. S. (2021a). Non-fatal strangulation/choking during sex and its associations with mental health: Findings from an undergraduate probability survey. *Journal of Sex & Marital Therapy, 48*(3), 238–250. https://doi.org/10.1080/0092623x.2021.1985025

Herbenick, D., Fu, T. C., & Patterson, C. (2023a). Sexual repertoire, duration of partnered sex, sexual pleasure, and orgasm: Findings from a US nationally representative survey of adults. *Journal of Sex & Marital Therapy, 49*(4), 369–390. https://doi.org/10.1080/0092623X.2022.2126417

Herbenick, D., Fu, T., Patterson, C., Rosenstock Gonzalez, Y. R., Luetke, M., Svetina Valdivia, D., Eastman-Mueller, H., Guerra-Reyes, L., & Rosenberg, M. (2023b). Prevalence and characteristics of choking/strangulation during sex: Findings from a probability survey of undergraduate students. *Journal of American College Health, 71*(4), 1059–1073. https://doi.org/10.1080/07448481.2021.1920599

Herbenick, D., Fu, T. C., Wright, P., Paul, B., Gradus, R., Bauer, J., & Jones, R. (2020). Diverse sexual behaviors and pornography use: Findings from a nationally representative probability survey of Americans aged 18 to 60 years. *The Journal of Sexual Medicine, 17*(4), 623–633. https://doi.org/10.1016/j.jsxm.2020.01.013

Herbenick, D., Guerra-Reyes, L., Patterson, C., Rosenstock Gonzalez, Y. R., Wagner, C., & Zounlome, N. O. O. (2022b). "If their face starts turning purple, you are probably doing something wrong": Young men's experiences with choking during sex. *Journal of Sex & Marital Therapy, 48*(5), 502–519. https://doi.org/10.1080/0092623x.2021.2009607

Herbenick, D., Guerra-Reyes, L., Patterson, C., Rosenstock Gonzalez, Y. R., Wagner, C., & Zounlome, N. (2022c). "It was scary, but then it was kind of exciting": Young women's experiences with choking during sex. *Archives of Sexual Behavior, 51*(2), 1103–1123. https://doi.org/10.1007/s10508-021-02049-x

Herbenick, D., Guerra-Reyes, L., Patterson, C., Wilson, J., Rosenstock Gonzalez, Y. R., Voorheis, E., Whitcomb, M., Kump, R., Theis, E., Rothman, E. F., Nelson, K. N., & Maas, M. K. (2023c). #ChokeMeDaddy: A content analysis of memes related to choking/strangulation during sex. *Archives of Sexual Behavior, 52*(3), 1299–1315. https://doi.org/10.1007/s10508-022-02502-5

Herbenick, D., Guerra-Reyes, L., Perry, C. P., Gonzalez, Y. R. R., Khan, S., Zounlomè, N. O. O., & Jozkowski, K. N. (2024). Navigating consent in the context of sexual choking/strangulation: Findings from qualitative interviews with young adults. *Sexuality Research & Social Policy*. https://doi.org/10.1007/s13178-024-01004-4

Herbenick, D., Patterson, C., Beckmeyer, J., Gonzalez, Y. R. R., Luetke, M., Guerra-Reyes, L., Eastman-Mueller, H., Valdivia, D. S., & Rosenberg, M. (2021b). Diverse sexual behaviors in undergraduate students: Findings from a campus probability survey. *The Journal of Sexual Medicine, 18*(6), 1024–1041. https://doi.org/10.1016/j.jsxm.2021.03.006

Herbenick, D., Patterson, C., Khan, S., Voorheis, E., Sullivan, A., Wright, P., & Keene, S. (2023d). "Don't just randomly grab someone's neck during intercourse!" An analysis of internet articles about choking/strangulation during sex. *Journal of Sex & Marital Therapy, 49*(1), 41–55. https://doi.org/10.1080/0092623X.2022.2065392

Hidalgo Bellows, K. (2022). Colleges rely on outdated consent education. Experts say they need to get with the times. Chronicle of Higher Education. Published on August 8, 2022. Retrieved from: https://www.chronicle.com/article/colleges-rely-on-outdated-consent-education-experts-say-they-need-to-get-with-the-times. Accessed 14 Dec 2024.

Hou, J., Huibregtse, M. E., Alexander, I. L., Klemsz, L. M., Fu, T.-C., Fortenberry, J. D., Herbenick, D., & Kawata, K. (2023b). Association of frequent sexual choking/strangulation with neurophysiological responses: A pilot resting-state fMRI study. *Journal of Neurotrauma, 40*(13–14), 1339–1351. https://doi.org/10.1089/neu.2022.0146

Hou, J., Huibregtse, M. E., Alexander, I. L., Klemsz, L. M., Fu, T., Rosenberg, M., Fortenberry, J. D., Herbenick, D., & Kawata, K. (2023a). Structural brain morphology in young adult women who have been choked/strangled during sex: A whole-brain surface morphometry study. *Brain and Behavior*. https://doi.org/10.1002/brb3.3160

Huibregtse, M. E., Alexander, I. L., Klemsz, L. M., Fu, T. C., Fortenberry, J. D., Herbenick, D., & Kawata, K. (2022). Frequent and recent non-fatal strangulation/choking during sex and its association with fMRI activation during working memory tasks. *Frontiers in Behavioral Neuroscience, 16*, Article 881678. https://doi.org/10.3389/fnbeh.2022.881678

Hunter, R. F., de la Haye, K., Murray, J. M., Badham, J., Valente, T. W., Clarke, M., & Kee, F. (2019). Social network interventions for health behaviours and outcomes: A systematic review and meta-analysis. *PLoS Medicine, 16*(9), Article e1002890. https://doi.org/10.1371/journal.pmed.1002890

Jones, Z. (2020). *Pleasure, community, and marginalization in rope bondage: A qualitative investigation into a BDSM subculture* (Doctoral dissertation). Carleton University

Joy, P., Hammond, B., Hammond, C., Wassef, K., & Ferlatte, O. (2024). Being a good boy: Pup play, body image, and the self for gay, bi, trans, and queer men. *Culture, Health & Sexuality*27:94:115. https://doi.org/10.1080/13691058.2024.2356610

King, B. M., Scott, A. E., Van Doorn, E. M., Abele, E. E., & McDevitt, M. E. (2020). Reasons students at a U.S. university do or do not enroll in a human sexuality course. *Sex Education, 20*(1), 101–109. https://doi.org/10.1080/14681811.2019.1606793

Larsson, F. M., Nielsen, A., Zeebari, Z., Salazar, M., Ekström, A. M., & Möller, A. (2025). Changes in physical violence and injury during sexual assaults over time among females 16–29 years. *Acta Obstetricia et Gynecologica Scandinavica*. https://doi.org/10.1111/aogs.70012

Latkin, C. A., & Knowlton, A. R. (2015). Social network assessments and interventions for health behavior change: A critical review. *Behavioral Medicine, 41*(3), 90–97. https://doi.org/10.1080/08964289.2015.1034645

Laughon, K., Glass, N., & Worrell, C. (2009). Review and analysis of laws related to strangulation in 50 states. *Evaluation Review, 33*(4), 358–369. https://doi.org/10.1177/0193841X09337481

Lawrence, E. M., Mollborn, S., & Hummer, R. A. (2017). Health lifestyles across the transition to adulthood: Implications for health. *Social Science & Medicine, 193*, 23–32. https://doi.org/10.1016/j.socscimed.2017.09.041

Levenson, M. & Rubin, A. (2022). Parents sue TikTok, saying children died after viewing 'blackout challenge.' New York Times. Published on July 6, 2022. Retrieved on December 14, 2024 from: https://www.nytimes.com/2022/07/06/technology/tiktok-blackout-challenge-deaths.html

Lewis, R. (2024). Public university offers 'bondage workshop,' sparking social media outrage: 'Needs to end.' ABC 33/40. Retrieved on November 24, 2024 from: https://abc3340.com/news/nation-world/public-university-offers-bondage-workshop-sparking-social-media-outrage-needs-to-end-indiana-university-purdue-university-indianapolis-midwest-kink-sex-sexual-college-higher-education-woke-libs-of-tiktik-gender-lgbtq-straight-fynch-bond-rope-

Maas, M. K., & Lefkowitz, E. S. (2015). Sexual esteem in emerging adulthood: Associations with sexual behavior, contraception use, and romantic relationships. *The Journal of Sex Research, 52*(7), 795–806. https://doi.org/10.1080/00224499.2014.945112

Marr, R., & Bugeja, L. (2024). Hyoid fracture: Consensual sex-play or non-consensual nonfatal strangulation: A case report. *International Journal of Legal Medicine*. https://doi.org/10.1007/s00414-024-03353-6

McKinley, C. J., Luo, Y., Wright, P. J., & Kraus, A. (2015). Reexamining LGBT resources on college counseling center websites: An over-time and cross-country analysis. *Journal of Applied Communication Research, 43*(1), 112–129. https://doi.org/10.1080/00909882.2014.982681

Nelson, L. J. (2021). The theory of emerging adulthood 20 years later: A look at where it has taken us, what we know now, and where we need to go. *Emerging Adulthood, 9*(3), 179–188. https://doi.org/10.1177/216769682095088

news.com.au. (2021, March 29). Judge admits error, jails RAAF corporal for choking girlfriend to death. *news.com.au*. https://www.news.com.au/national/nsw-act/courts-law/raaf-corporal-jailed-for-choking-girlfriend-to-death-after-judge-admits-error/news-story/3340c36ec0eb9ba0b746564f07607148. Accessed 14 Dec 2024.

Ólafsdottir & Kjaran J. I. (2019). "Boys in power": Consent and gendered power dynamics in sex. *Boyhood Studies*, *12*(1), 38–56. https://doi.org/10.3167/bhs.2019.120104

Oswalt, S. B., Wagner, L. M., Eastman-Mueller, H. P., & Nevers, J. M. (2015). Pedagogy and content in sexuality education courses in US colleges and universities. *Sex Education, 15*(2), 172–187. https://doi.org/10.1080/14681811.2014.991958

Peters, C. (2020). IU SexFest BDSM event canceled after videos posted to conservative websites. Indiana Daily Student. Published on February 9, 2020. Retrieved on November 24, 2024 from: https://www.idsnews.com/article/2020/02/iu-sexfest-bdsm-event-canceled-after-videos-posted-to-conservative-websites

Pritchard, A. J., Reckdenwald, A., & Nordham, C. (2017). Nonfatal strangulation as part of domestic violence: A review of research. *Trauma, Violence, & Abuse, 18*(4), 407–424. https://doi.org/10.1177/1524838015622439

Ramowski, S. K., Nystrom, R. J., Rosenberg, K. D., Gilchrist, J., & Chaumeton, N. R. (2012). Health risks of Oregon eighth-grade participants in the "choking game": Results from a population-based survey. *Pediatrics, 129*(5), 846–851. https://doi.org/10.1542/peds.2011-2482

Reeves, B., Rojas-Guyler, L., Brown, J., Bennett, K., & Bennett, S. (2023). Attitudes toward health care needs and utilization of a university health center among LGBT and non-LGBT college students. *Journal of American College Health, 71*(2), 513–521. https://doi.org/10.1080/07448481.2021.1898400

Roma, P., Pazzelli, F., Pompili, M., Girardi, P., & Ferracuti, S. (2013). Shibari: Double hanging during consensual sexual asphyxia. *Archives of Sexual Behavior, 42*(5), 895–900. https://doi.org/10.1007/s10508-012-0035-33

Rothman, E. F. (2019). Preventing sexual violence on campus in the US: Four thought experiments. *Journal of Family Violence, 34*(3), 177–184. https://doi.org/10.1007/s10896-018-9982-3

Rothman, E. F., Beckmeyer, J. J., Herbenick, D., Fu, T. C., Dodge, B., & Fortenberry, J. D. (2021). The prevalence of using pornography for information about how to have sex: Findings from a nationally representative survey of US adolescents and young adults. *Archives of Sexual Behavior, 50*, 629–646. https://doi.org/10.1007/s10508-020-01877-7

Rothman, E. F., Kaczmarsky, C., Burke, N., Jansen, E., & Baughman, A. (2015). "Without porn… I wouldn't know half the things I know now": A qualitative study of pornography use among a sample of urban, low-income, Black and Hispanic youth. *The Journal of Sex Research, 52*(7), 736–746. https://doi.org/10.1080/00224499.2014.960908

Sauvageau, A. (2016). Autoerotic deaths. In J.A.M. Gall and J.J. Payne-James (Eds.), *Current Practice in Forensic Medicine* (pp. 81–96). https://doi.org/10.1002/9781118456026.ch5

Schmidt, S. C., Wandersman, A., & Hills, K. J. (2015). Evidence-based sexuality education programs in schools: Do they align with the national sexuality education standards? *American Journal of Sexuality Education, 10*(2), 177–195. https://doi.org/10.1080/15546128.2015.1025937

Schneider, M., & Hirsch, J. S. (2020). Comprehensive sexuality education as a primary prevention strategy for sexual violence perpetration. *Trauma, Violence & Abuse, 21*(3), 439–455. https://doi.org/10.1177/1524838018772855

Schobert, K., Cooper, S., Fries, N., & Sonia Chervillil, M. (2021). I thought we were vibin': A qualitative exploration of sexual agency and consent in young people. *Sexualities, 24*(7), 906–921. https://doi.org/10.1177/13634607211026457

Schori, A., Jackowski, C., & Schön, C. A. (2022). How safe is BDSM? A literature review on fatal outcome in BDSM play. *International Journal of Legal Medicine, 136*(1), 287–295. https://doi.org/10.1007/s00414-021-02674-0

Secretary's Advisory Committee. (2019). Secretary's advisory committee on national health promotion and disease prevention objectives for 2030. Report #7: Assessment and recommendations for proposed objectives for Healthy People 2030. Secretary's Advisory Committee for Healthy People 2030. Published in April 2019. Retrieved from: https://odphp.health.gov/sites/default/files/2021-09/Report%207_Reviewing%20Assessing%20Set%20of%20HP2030%20Objectives_Formatted%20EO_508_05.21.pdf. Accessed 14 Dec 2024.

Sharman, L. S., Fitzgerald, R., & Douglas, H. (2024a). Prevalence of sexual strangulation/choking among Australian 18–35 year-olds. *Archives of Sexual Behavior*. https://doi.org/10.1007/s10508-024-02937-y

Sharman, L. S., Fitzgerald, R., & Douglas, H. (2024b). Strangulation during sex among undergraduate students in Australia: Toward understanding participation, harms, and education. *Sexuality Research & Social Policy*. https://doi.org/10.1007/s13178-024-00941-4

Small, M., Bailey-Davis, L., Morgan, N., & Maggs, J. (2013). Changes in eating and physical activity behaviors across seven semesters of college: Living on or off campus matters. *Health Education & Behavior, 40*(4), 435–441.

Sprott, R., & Randall, A. (2017). Health disparities among kinky sex practitioners. *Current Sexual Health Reports, 9*, 104–108. https://doi.org/10.1007/s11930-017-0113-6

Stanley, S. J., Yan, K., Jiao, J., Lutovsky, B. R., Aubrey, J. S., & Pitts, M. J. (2019). Communicating about sex when it matters: A content analytic investigation of sexual health information on college student health center websites. *Journal of Applied Communication Research, 47*(5), 591–610. https://doi.org/10.1080/00909882.2019.1675895

Steinmetz, C., & Maginn, P. J. (2014). The landscape of BDSM venues: A view from down under. In *(Sub) Urban Sexscapes* (pp. 117–137). Routledge.

Stellpflug, S. J., Weber, W., Dietrich, A., Springer, B., Polansky, R., Sachs, C., Hsu, A., McGuire, S., Gwinn, C., Strack, G., & Riviello, R. (2022). Approach considerations for the management of strangulation in the emergency department. *JACEP Open, 3*(2), Article e12711. https://doi.org/10.1002/emp2.12711

Stoner, J. E., & Cramer, R. J. (2019). Sexual violence victimization among college females: A systematic review of rates, barriers, and facilitators of health service utilization on campus. *Trauma, Violence, & Abuse, 20*(4), 520–533.

Strack, G. B., & Gwinn, C. (2011). On the edge of homicide: Strangulation as a prelude. *Criminal Justice, 26*, 32–37.

Strack, G. B. & Gwinn, C. (2024). 10 years later—What did we learn about strangulation assaults? *Domestic Violence Report*, *30*(2), 17, 35–36.

Strack, G. B., McClane, G. E., & Hawley, D. (2001). A review of 300 attempted strangulation cases part I: Criminal legal issues. *The Journal of Emergency Medicine, 21*(3), 303–309. https://doi.org/10.1016/s0736-4679(01)00399-7

Taber-Thomas, B., & Pérez-Edgar, K. (2015). Emerging adulthood brain development. *The Oxford Handbook of Emerging Adulthood*, 126–141.

The Light Project (n.d., a). About us. The Light Project. Retrieved on December 9, 2024 from: https://www.intheknow.co.nz/about-us/

The Light Project (n.d., b). #Choking. The Light Project. Retrieved on December 9, 2024 from: https://www.intheknow.co.nz/choking/

The White House (2023). *U.S. national plan to end gender-based violence: Strategies for action.* May 2023. Retrived on September 10, 2025 from https://bidenwhitehouse.archives.gov/wp-content/uploads/2023/05/National-Plan-to-End-GBV.pdf

Tholander, M., Johansson, S., Thunell, K., & Dahlström, Ö. (2022). Traces of pornography: Shame, scripted action, and agency in narratives of young Swedish women. *Sexuality & Culture, 26*(5), 1819–1839. https://doi.org/10.1007/s12119-022-09973-7

Torkelson, J. (2012). A queer vision of emerging adulthood: Seeing sexuality in the transition to adulthood. *Sexuality Research & Social Policy, 9*, 132–142. https://doi.org/10.1007/s13178-011-0078-6

United Kingdom Government Home Office. (2024). Strangulation and suffocation. Retrieved from: https://www.gov.uk/government/publications/domestic-abuse-bill-2020-factsheets/strangulation-and-suffocation. Accessed 14 Dec 2024.

Valentine, J. L., Miles, L. W., Mella Hamblin, K., & Worthen Gibbons, A. (2023). Dating app facilitated sexual assault: A retrospective review of sexual assault medical forensic examination charts. *Journal of Interpersonal Violence, 38*(9–10), 6298–6322. https://doi.org/10.1177/08862605221130390

Valera, E. M., Daugherty, J. C., Scott, O. C., & Berenbaum, H. (2022). Strangulation as an acquired brain injury in intimate–partner violence and its relationship to cognitive and psychological functioning: A preliminary study. *Journal of Head Trauma Rehabilitation, 37*(1), 15–23. https://doi.org/10.1097/HTR.0000000000000755

Vasilenko, S. A., & Lefkowitz, E. S. (2018). Sexual behavior and daily affect in emerging adulthood. *Emerging Adulthood, 6*(3), 191–199. https://doi.org/10.1177/2167696818767503

Vilhjálmsdóttir, A., & Forberg, T. M. (2023). *Sexual asphyxia: The state of choking during sex in Iceland* (Thesis). Reykjavik University. Iceland

Vogels, E. A., & O'Sullivan, L. F. (2019). The relationship among online sexually explicit material exposure to, desire for, and participation in rough sex. *Archives of Sexual Behavior, 48*(2), 653–665. https://doi.org/10.1007/s10508-018-1290-8

Waldura, J. F., Arora, I., Randall, A. M., Farala, J. P., & Sprott, R. A. (2016). Fifty shades of stigma: Exploring the health care experiences of kink-oriented patients. *The Journal of Sexual Medicine, 13*(12), 1918–1929. https://doi.org/10.1016/j.jsxm.2016.09.019

Weiner, B. J., Lewis, C. C., Stanick, C., Powell, B. J., Dorsey, C. N., Clary, A. S., Boynton, M. H., & Halko, H. (2017). Psychometric assessment of three newly developed implementation outcome measures. *Implementation Science, 12*, Article 108. https://doi.org/10.1186/s13012-017-0635-3

Williams, D. J., Thomas, J. N., Prior, E. E., & Christensen, M. C. (2014). From "SSC" and "RACK" to the "4Cs": Introducing a new framework for negotiating BDSM participation. *Electronic Journal of Human Sexuality, 17*(5), 1–10.

Wolitzky-Taylor, K., LeBeau, R. T., Perez, M., Gong-Guy, E., & Fong, T. (2020). Suicide prevention on college campuses: What works and what are the existing gaps? A systematic review and meta-analysis. *Journal of American College Health, 68*(4), 419–429. https://doi.org/10.1080/07448481.2019.1577861

Women's Health NSW (2024). It left no marks: Brochure for women. Retrieved on December 24, 2024 from: https://www.itleftnomarks.com.au/resources/it-left-no-marks-brochure-for-women/

Woodley, G., & Jaunzems, K. (2024). Minimising the risk: Teen perspectives on sexual choking in pornography. *M/C Journal*, *27*(4). https://doi.org/0000-0001-7007-4871

Wright, P. J., Herbenick, D., & Tokunaga, R. S. (2023). Pornography consumption and sexual choking: An evaluation of theoretical mechanisms. *Health Communication, 38*(6), 1099–1110. https://doi.org/10.1080/10410236.2021.1991641

Zilkens, R. R., Phillips, M. A., Kelly, M. C., Mukhtar, S. A., Semmens, J. B., & Smith, D. A. (2016). Non-fatal strangulation in sexual assault: A study of clinical and assault characteristics highlighting the role of intimate partner violence. *Journal of Forensic and Legal Medicine, 43*, 1–7. https://doi.org/10.1016/j.jflm.2016.06.005