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Exploring the impact of underage sex work among female sex workers in two Mexico-U.S. border cities

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Abstract

Although sex work and younger age increase HIV vulnerability, empirical data regarding the impacts of underage sex work are lacking. We explored associations between features of the risk environment, sex work and drug use history, and underage sex work entry among 624 female sex workers (FSWs) in Tijuana and Ciudad Juarez, Mexico. Forty-one percent (n=253) of women began sex work as minors, among whom HIV and any STI/HIV prevalence were 5.2% and 60.7%. Factors independently associated with increased odds of underage sex work were inhalants as the first drug used, forced first injection, number of drug treatment attempts, and recent receptive syringe-sharing. Number of recent condom negotiation attempts with steady partners and depression as a reason for first injecting were negatively associated with underage entry. These results underscore the importance of efforts to prevent underage sex work and the wider factors contributing to HIV risk among vulnerable youth and underage FSWs.

Keywords

HIV; youth; sex work; risk environment; sexual behavior; substance use

INTRODUCTION

Sex work, defined as selling or trading sex for money, drugs, or other goods, represents a serious health concern among vulnerable youth. The estimated prevalence of runaway and homeless youth who have been involved in sex work in North America ranges from 10-40 percent (1-7). The health and social impacts of youth sex work include HIV infection and AIDS, sexually transmitted infections (STIs), sexual victimization, physical violence and insecurity, substance use, and mental health disorders (2-12).

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Though empirical evidence regarding the experiences of youth engaged in sex work is lacking, available data suggest that younger sex workers experience a disproportionately high risk of HIV/STI infection. Trauma to an immature genital tract increases the risk of HIV/STI transmission(13), and younger age has been independently associated with elevated risk of HIV infection among female sex workers (FSWs) and sex trafficked females(13, 14). Among sex trafficked females in Nepal, those trafficked prior to age 15 years experienced over three and a half times higher odds of HIV infection than those trafficked as adults(13). Youth sex work has also been associated with substance use (especially ‘hard’ drugs such as heroin and methamphetamines) among street-involved, inner-city youth(11, 15-17). The dual risks posed by sex work and substance use during adolescence can have multiplier effects on HIV/STI risk among youths. Among young injection drug users (IDUs) in Vancouver, sex work strongly predicted incident HCV infection, and younger age was associated with sex work, HIV infection, and female gender(12, 18).

Research also suggests that early experiences play an important role in determining exposure to future risks. FSWs often report a history of childhood sexual and physical violence(19-24), which have been shown to increase future risk of HIV/STI infection(24-29). Between 50-100 percent of street-based FSWs report physical, sexual and economic violence(15, 30-33), and consistent associations between past and current victimization indicate a continuing cycle of violence throughout FSWs’ lives (29). However, data regarding the relationship between early experiences and future exposure to HIV risk among younger FSWs are scarce.

Tijuana (pop: 1,483,992) and Cd. Juarez (pop: 1,313,338), bordering San Diego, CA and El Paso, TX, are the largest Mexican cities along the Mexico-U.S. border. Mexico-U.S. border cities are hotspots for child sex tourism, earning Tijuana the nickname, “Bangkok of the Americas”(34-36). Approximately 9000 and 4000 FSWs work in Tijuana and Cd. Juarez, respectively, among whom HIV prevalence has increased from <1% to 6% in the past decade(37). Although Mexico’s 2000 Law for the Protection of the Rights of Children and Adolescents aims to protect minors from abuse, exploitation, and trafficking(38), in cities such as Tijuana and Cd. Juarez, underage sex work is visibly widespread and practiced with the collaboration or knowledge of police. Substance use – especially injection drug use – is also a widespread and serious concern in Tijuana and Cd. Juarez, where approximately 10,000 and 6000 IDUs live, respectively(39, 40). FSWs often use drugs to cope with the stressors of sex work, which can inhibit safer sex considerations, lead to desperation to obtain drugs, and increase the likelihood of acquiescing to unprotected sex(41). Prior research in Mexico-U.S. border cities has linked inhalant use to earlier initiation into sex work(42) and revealed associations between use of substances such as heroin, cocaine, and methamphetamine and HIV/STI infection among FSW and IDU populations(43, 44). FSWs in Tijuana and Cd. Juarez who inject drugs experience disproportionately high rates of HIV/STIs; in 2008, rates of HIV, syphilis, gonorrhea, and Chlamydia among FSWs who inject drugs were measured at 12.3%, 22.7%, 15.2%, and 21.2% in 2008(45). Based on the widespread nature of underage sex work and high rates of HIV infection and substance use among FSWs in Mexico-U.S. border cities, we undertook this analysis to assess the relationship between underage entry into sex work and its impact on early and later HIV risk among FSWs in Tijuana and Cd. Juarez, Mexico.

The sex work “risk environment”

International research demonstrates that disease outcomes and their associated risk factors represent the product of interactions between individuals and environments(46-48). This study was guided by Rhodes’ “risk environment” framework, which conceptualizes environmental influences on HIV risk according to their level of operation (micro, macro)

and sphere of influence - physical, social, economic, and policy(49). This heuristic draws together broader debates in social epidemiology, political economy, and sociology of health that conceptualize interactions between individuals and environments(49-52), and has been applied to understand the experiences of IDUs(46, 49, 53, 54), FSWs(55-60), and FSWs' male clients(61). Although features of FSWs' risk environment have been previously described(56, 62-67), less is known regarding the risk environment of underage FSWs, whose illicit status and younger age may predispose them to experience disproportionately higher risks than their adult counterparts.

Social influences—Micro-level influences related to the risk environment include social norms and practices related to HIV prevention and substance use, such as prevailing norms related to sex work and substance use (e.g., social acceptability of syringe sharing or unprotected sex with clients) and peer influences (e.g., number and type of clients and injecting partners; forced drug use)(49, 61, 68, 69). Among FSWs, gendered power dynamics also pose challenges to HIV prevention; this is especially true among girls, who are less likely to possess the experience or power to negotiate condom use with male clients or access preventive services(70, 71). Furthermore, client beliefs that sex with younger females minimizes HIV/STI risk result in an increased demand for unprotected sex with girls(13). At the macro-level, stigma, discrimination, and gender-based violence often compromise women and girls' abilities to refuse unsafe sex, and are associated with HIV infection(9, 49, 32). Gender-based violence, which includes child sexual abuse, rape, domestic violence, sexual assault/harassment, and trafficking of women and girls, occurs in Mexico-U.S. border cities with impunity(72-74). FSWs in these cities frequently report rape, assault, threats, extortion, and police displacement(73, 75). Although underage FSWs are believed to experience higher risks related to their social environment than their adult counterparts, few empirical studies have assessed the relationship between these factors (e.g., gender-based violence) and HIV risk among this population.

Economic influences—Poverty and the need to sell/trade sex in order to meet subsistence needs or support children, as well as earnings from sex work and offers of increased pay for unprotected sex by clients, are examples of micro-level economic influences related to the sex work risk environment(41). At the macro-level, markets for commercial sex and drugs are wider economic influences on the risk environment. The role of Mexico-U.S. border cities as popular destinations for child (and adult) sex tourists from the U.S., Mexico, and international locations strongly shape the risk environment they pose(76, 77). Living costs, fees associated with sex work registration, and the cost of HIV prevention resources (e.g., syringes) also influence risk at the macro-level, such as through syringe sharing. FSWs in Tijuana often cite the costs of regular HIV/STI testing and female condoms as barriers to HIV prevention.

Policy influences—At the macro level, laws and law enforcement related to sex work and drug use often displace FSWs to isolated settings, increasing the potential for exploitation, violence, and unsafe injection(53, 56). In settings where sex work is regulated or legalized, young FSWs are typically excluded from the protections offered to adults. Sex work is quasi-legal in *Zona Rojas* (red light districts) in Tijuana and Cd. Juarez. Registered FSWs in Tijuana's *Zona Roja* undergo routine HIV/STI testing to maintain a work permit; many operate without permits, which are costly and unavailable to minors. Cd. Juarez hosts two *Zona Rojas*, where FSWs do not require a permit. To evade persecution by law enforcement, underage FSWs often rely on third parties (e.g., pimps, bar managers) or work in isolated settings, increasing their risk of exploitation(9, 78). Access to harm reduction and HIV prevention programs, including syringe exchange programs (SEPs), condom demonstrations, HIV testing, and drug treatment are important micro-level policy influences on HIV

risk(49). Youth FSWs are reportedly less likely than adults to access such programs due to fears of persecution or regulations excluding them from public services.

Physical influences—The presence and location of drug trafficking routes are a key macro-level feature of the risk environment along the Mexico-U.S. border(49, 61). Tijuana and Cd. Juarez are located along major drug trafficking corridors(79), contributing to high rates of methamphetamine, cocaine, and heroin use(80). Micro-level settings for substance use and sex work and patterns of law enforcement in these spaces are also closely related to HIV risk(49). In many contexts, street-based FSWs are more likely to use drugs and experience client violence, increasing the likelihood of unsafe sexual encounters and injection(62, 65, 66, 81). Street-based FSWs who use drugs are also frequent targets of police harassment, which poses barriers to carrying condoms or clean syringes, since these are often used as evidence of illegal activities(56, 82).

Although these features of the risk environment have been shown to shape HIV risk among FSWs generally, there is a dearth of empirical data regarding their influence among underage FSWs. Whereas prior research has investigated the prevalence and harms of underage sex work in North America, data are lacking in Mexico, where youth are highly vulnerable to sex work, addictions, and violence. Since data regarding underage FSWs' experiences are needed to inform interventions among vulnerable youth and FSWs(10), we undertook this study to assess the relationship between these social, physical, economic, and policy factors, their impacts on HIV risk, and underage entry into sex work in Tijuana and Cd. Juarez, Mexico.

OBJECTIVE

Our objective was to explore the relationship between features of FSWs' risk environment, sex work and drug use history, and selling/trading sex before age 18 among FSWs in Tijuana and Cd. Juarez. Since evidence suggests that both early and future exposure to risks are important to consider, our analysis examined associations between underage entry into sex work and recent (e.g., in the prior month) as well as past (e.g., lifetime) risks. We hypothesized that women who began sex work as minors would be more likely than those who began as adults to report exposure to recent and past risks related to their social (e.g., receptive syringe sharing; client-perpetrated violence), physical (e.g., street-based sex work), policy (e.g., police harassment; low access to harm reduction), and economic (e.g., higher earnings from sex work) environment, as well as to test HIV/STI positive.

METHODS

Data collection

Cross-sectional data were collected during baseline interviews and laboratory testing for an intervention study that aimed to reduce injection and sexual risks associated with HIV/STI acquisition among FSWs who inject drugs, as previously described(41). Eligible women were female, 18 years old, lived in Tijuana or Cd. Juarez, spoke Spanish or English, did not plan to permanently move out of the city in the following 18 months, and reported selling/trading sex, injecting drugs, unprotected sex with clients, and syringe-sharing in the past month. Overall, 624 FSWs in Tijuana ($N=308$) and Cd. Juarez ($N=316$) were recruited between October 2008-July 2010. The study was approved by U.S. and Mexican institutional review boards. All participants provided written informed consent.

Local outreach workers unobtrusively approached women at bars, street corners and motels to assess study interest and eligibility. At baseline and quarterly thereafter, participants completed surveys and biological testing for HIV, syphilis, Gonorrhea, Chlamydia, and

other STIs at study offices(41). This analysis was restricted to baseline data. Women testing HIV/STI positive were treated by medical professionals on-site or referred to municipal clinics. Participants were compensated \$25 USD.

Trained outreach workers administered computer-assisted programmed interview (CAPI) surveys in private offices. Surveys included questions on socio-demographics, sex work and drug use history, and risk environment factors(47, 49). Socio-demographics included age, marital status, birthplace, migration, and income. Questions on sex work and drug use history included age at first sex work and injection drug use and lifetime use of inhalants and 'hard' drugs such as heroin, methamphetamines, and cocaine, as well as recent risks (e.g., number of unprotected sex acts in the last month). Variables covering the risk environment covered social (e.g., syringe sharing; forced entry into injection drug use; number of condom negotiation attempts with clients in the past month), physical (e.g., locations where traded sex in the past month), policy (e.g., police harassment and access to SEPs in the past 6 months; lifetime access to drug treatment), and economic (e.g., income from sex work in the past month; reasons for beginning sex work) influences at the micro and macro levels.

Data analysis

Our dichotomous dependent variable was underage sex work entry, defined as selling/trading sex before 18, the legal age of consent in Mexico. Independent variables of interest included socio-demographic factors (e.g., age, education), sex work and drug use histories (e.g., first drug used), HIV/STI status, and risk environment variables. Risk environment variables of interest included lifetime/early risks (e.g., number of lifetime drug treatment attempts; reasons for beginning sex work and injection drug use, including forced entry into drug use; history of sexual abuse) and recent risks in the social (e.g., receptive syringe sharing and number of condom negotiation attempts in the past month), policy (e.g., police harassment in the past 6 months), physical (e.g., location of sex work in the past month), and economic (e.g., monthly income from sex work) environment.

Statistical analyses compared women who entered sex work before the age of 18 and women who entered sex work at 18 years of age or older. To evaluate differences in HIV/STIs, sexual and drug-related risks, and risk environment factors between the two groups, we used Wilcoxon rank sum tests for continuous outcomes and Pearson's Chi-squared or Fisher's exact test for binary outcomes. The Wilcoxon rank sum test was used for all continuous outcomes, instead of the usual t-test, because these outcomes violated parametric assumptions (e.g., normality). Similarly, for binary outcomes that violated distributional assumptions, the Fisher's exact test was used instead of the usual Pearson's χ^2 test. To control for multiple testing, the raw P values associated with outcomes within each area of interest (e.g., socio-demographics; sex work and substance use history) were adjusted for false discovery rate (FDR) by using the Hochberg and Benjamini method(83). While both raw and FDR Adjusted P-values are listed in Tables 1 and 2, the corresponding statistical inferences are based on FDR Adjusted P-values ($P_{\text{FDR-Adj}}$). To identify factors associated with underage sex entry, we performed univariate and multivariate logistic regressions with robust variance estimation via Generalized Estimating Equations (GEE). We used GEE in order to correct for the presence of over-dispersion in our data(84, 85), since this procedure can be used to produce robust variance estimators for un-correlated data, in order to correct for over- or under-dispersion(86).

Multivariate models were restricted to 534 women for whom complete data were available for variables of interest and were developed using a manual procedure whereby variables with a significance level of less than 10% in univariate regressions and which were *a priori* hypothesized to be related to underage sex work (e.g., receptive syringe sharing) were

considered for inclusion in multivariate models. In order to determine the most parsimonious model, nested models were compared using the likelihood ratio statistic. Even though we did not hypothesize any significant interactions, to make sure that the main effects were interpreted correctly, all third and second order interactions between the variables included in the model were checked and ruled out. Also, the presence of multicollinearity between the predictor variables in the final model was ruled out by appropriate values of the largest condition index and of the variance inflation factors.

RESULTS

Overall, 41% (n=253) of women entered sex work as minors. They were more likely than those who began as adults to be younger (median: 30.0 vs. 35.0 years, $P_{FDR-Adj} < 0.001$, $Z=5.62$), married, have fewer years of education, and be non-migrants (table 1). The median age at which respondents who began sex work as minors began to sell/trade sex was 15 years, compared to 22 years among those who entered as adults. They were more likely than adult initiators to report inhalants as the first drug they used, and began drinking alcohol (median: 13.9 vs. 16.4 years, $P_{FDR-Adj} < 0.001$, $Z=7.42$) and injecting drugs (median: 17.0 vs. 22.0 years, $P_{FDR-Adj} < 0.001$, $Z=11.47$) at a younger age than their adult counterparts. Women who began sex work as minors were also significantly more likely to report that their first experiences using any drugs, injecting drugs, or drinking alcohol occurred after beginning sex work.

Early and lifetime risk environment

Women who began sex work as adolescents were less likely than their adult counterparts to report economic factors such as children's needs or daily expenses as reasons for beginning sex work. Regarding social influences on HIV risk, nonconsensual injection was more frequently cited as a reason for beginning to inject drugs by women who entered sex work as minors; adult initiators were more likely to cite depression or stress. Women who began sex work as minors were also more likely to report early gender-based violence than their adult counterparts; however, they were less likely to report that such violence occurred before beginning sex work. Among victims of prior abuse, these women were younger when they were first physically abused or raped than adult initiators. Women who began sex work when they were underage also reported a higher prevalence of risks related to the policy environment, including lower access to HIV prevention (e.g., fewer gynecological checkups or condom demonstrations), although they reported a higher number of attempts to access substance abuse treatment.

Recent risk environment

Women who began sex work as minors on average reported a higher prevalence of recent risks related to their risk environment (table 2). They were more likely to report economic influences on risk, such as earning higher incomes through sex work and having a greater number of clients (mean: 53.86 vs. 46.17, $P_{FDR-Adj} = 0.022$, $Z=2.30$) in the past month. In terms of social influences, women who began sex work as youth were more likely to report fewer condom negotiation attempts with steady partners, a greater number of unprotected sex acts, receptive needle-sharing (i.e., injecting with a syringe someone else had already used), and injecting with more people in the past month. Although they reported greater use of SEPs than their adult counterparts, women who began sex work as minors were also more likely to report risks related to the policy environment, including police abuse and harassment (e.g., sexual abuse to avoid arrest; syringe confiscation by police) in the past six months.

HIV/STI status

Prevalence of HIV and any STI/HIV were 5.2% and 60.7% among women who began sex work as minors, compared to 6.1% and 63.1% among older initiators; these were not significantly different.

After controlling for socio-demographic factors, variables that were independently associated with increased odds of underage sex work included reporting inhalants as the first drug used, nonconsensual injection as the reason they began injecting drugs, number of lifetime drug treatment attempts, and receptive needle sharing in the past month (table 3). Factors negatively associated with underage sex work entry included depression as the reason they began injecting drugs, and number of safer sex negotiation attempts with their steady partner in the past month.

DISCUSSION

In this study of FSWs who inject drugs in Tijuana and Cd. Juarez, 41% entered sex work as minors. An earlier study found this proportion to be 9.8%(42). The current study recruited higher-risk women to participate in an intervention, which provided an opportunity to understand these women's experiences; additional studies among lower-risk FSW populations are needed to assess the impacts of underage sex work more generally.

Women who entered sex work as minors experienced a higher prevalence of sexual and substance-use risks related to their early and recent risk environment than their adult counterparts, suggesting that underage entry confers additional risks than those posed by sex work generally. These data are consistent with qualitative research documenting that concerns regarding survival, poverty, exploitation, and socio-economic mobility often outweigh the perceived harms of sex work among vulnerable youths in Mexico(78).

Early and lifetime exposure to risks

Our findings are consistent with prior research illustrating that early abuse shapes future exposure to risks in the lives of adolescent sex workers(23, 87). They also illustrate how youth sex work may exacerbate risks during adulthood, including injection drug use. Females who entered sex work during adolescence began injecting drugs at an earlier age than adult initiators; this occurred a median of 5 years after beginning sex work. They also experienced nearly five-fold higher odds of reporting that they first injected drugs because they were forced, while adult initiators were more likely to cite depression, implicating social relationships as a potential source of harm; similarly, recent qualitative research has demonstrated that FSWs who begin sex work as minors are sometimes coerced or forced into early substance use by intimate partners, family members, and friends(88). Women who began sex work as minors were also more likely to report inhalants as first drug they used, which are typically used by street-entrenched youth lacking kinship ties(89). This is consistent with prior Mexican research and suggests the need to investigate structural drivers of adolescent substance use and sex work (e.g., homelessness; running away)(42, 87). Underage sex work entry was also positively associated with the number of lifetime reported drug treatment attempts. High rates of mistreatment in drug treatment centers and the prohibitive costs of methadone have been reported by IDUs in Mexico(90). Access to effective treatment is imperative to provide realistic options to young females struggling to overcome addiction. Contrary to our hypothesis, women who began sex work as youth were particularly likely to seek drug treatment; therefore, interventions that provide support and opportunities for youth to exit sex work should be considered within treatment programs. These findings suggest that features of women's early risk environment, including social (e.g., forced initial injection drug use) and policy factors (e.g., access to HIV prevention)

play an important role in shaping entry into sex work and its future health and social consequences.

Recent exposure to risks

Underage sex work was independently associated with 27% lower odds of condom negotiation with steady partners. This is consistent with studies reporting increased sexual risks among younger FSWs, which is believed to result from social factors such as younger women's limited control over condom use and client demand for unprotected sex with them(78). Prior research suggesting that the risks experienced as youth are often reproduced during adulthood may explain the persistence of these behaviors into adulthood; for example, it is reasonable to believe that in the absence of effective interventions, adult FSWs who began sex work as minors may be more predisposed to re-engage in the high-risk behavioral patterns established during their adolescence than those who began as adults(91).

Women who entered sex work as adolescents also reported higher substance-related risks than their adult counterparts; these data mirror the findings of recent qualitative research with FSWs who began sex work as minors in Tijuana, which indicate that they often turn to substance use and its associated risks to cope with the impacts of sex work and marginalization(78, 88). Underage sex work entry was associated with three-fold higher odds of receptive needle sharing, which is also shaped by social and policy-related influences in the risk environment, such as social relationships, norms for injecting, the availability of and access to syringes, and policing practices(92-95). Syringe sharing is one of the strongest predictors of HIV and HCV infection among IDUs(96). Interventions that alter social norms and practices related to injection, ensure legal access to sterile injection equipment, and address harmful policing practices related to syringe possession(97-99) are needed to reduce receptive syringe sharing.

Although our findings suggest that underage sex work entry may increase exposure to recent sexual and substance-related risks in the social environment, it was not independently associated with HIV/STI infection, physical features of the risk environment (e.g., sex work location), or gender-based violence. Since HIV prevalence was low in this population, and that many of the STIs we measured are transient, our cross-sectional analysis is limited in its ability to examine a causal association. Despite increased sexual and substance-related risk behaviors among FSWs who began sex work as minors, it is also possible that the lack of an association between underage sex work and HIV/STI infection could be due to an increase in preventive behaviors(100); for example, women who began sex work as minors reported higher access to drug treatment and syringe exchange programs than their adult counterparts. Since the larger study within which these findings are based was not designed specifically to investigate underage sex work, additional studies are needed to gain deeper insights into underage FSWs' wider experiences and their health consequences.

Strengths and limitations

Research with youth sex workers is often limited by their vulnerability, including ethical and reporting considerations associated with research among minors. In Mexico, the absence of programs serving adolescent FSWs led us to conclude that their recruitment was unethical. We retrospectively analyzed FSWs' experiences, which represented the safest way to study underage sex work. Due to its cross-sectional nature, our data cannot indicate causality; longitudinal studies among vulnerable youth or underage FSWs would provide greater evidence of causality. This study aimed to study factors both in the past and present that were associated with underage sex work entry; as such, the variables included in our final model represent different constructs that are individually associated with underage entry into sex work. However, it is possible that early experiences not included in our model, such as

childhood abuse, may mediate the relationship between later experiences and underage sex work. Although this was not the aim of the present study, future analyses that incorporate mediation models could provide an important opportunity to ascertain the nature of the relationship between early and later experiences and HIV infection among underage FSWs. Despite the higher-risk profile of FSWs who began sex work as minors in our sample, it is possible that our sample size was not large enough to capture corresponding differences in HIV/STI prevalence, suggesting the need for large future studies among youth populations engaged in sex work. Our data also may be affected by social desirability bias, which would have underestimated risks. To minimize such bias, interviewers were trained to collect data in a non-judgmental manner, ensure confidentiality, and develop rapport with participants.

Recommended interventions

Frohlich and Potvin define *vulnerable population* as groups that are commonly exposed to social and structural conditions that increase exposure to risks across the lifecourse(101, 102). We argue that females who enter sex work as adolescents are a *vulnerable population* who experience multiple, accumulating risks as youth and adults, including violence, forced and unsafe substance use, and unprotected sex. Since vulnerable populations often experience fewer opportunities than groups with more resources to derive benefits from population-based interventions, targeted interventions for vulnerable youth and younger FSWs are needed(101, 102).

Due to their inter-related nature and tendency to cluster, substance use, violence, and HIV/AIDS risk often manifest as *syndemics*(103, 105). Syndemics are “two or more afflictions, interacting synergistically, contributing to excess burden of disease in a population”(105). Since wider social and structural conditions (e.g., homelessness; gender-based violence; poverty) typically generate syndemics of HIV/STIs, substance use, and violence(104, 105, 106), interventions with vulnerable populations must address structural as well as individual-level factors(9, 79, 107).

Mexico currently lacks an effective system to protect and assist exploited or trafficked youth(108). In border cities, services for vulnerable youth are under-resourced and are not designed for FSWs’ use. Services that address the wider risk environment, including integrated, youth-focused HIV prevention and care, drug treatment, shelter, vocational training, and psychological support are needed to prevent sex work among vulnerable youth and protect the health of younger FSWs. Wider efforts to prevent exploitation of vulnerable women and girls are also needed, including community-based interventions that engage police (e.g., trainings on HIV prevention, trafficking and FSWs’ rights), intimate partners, managers/bar owners, and clients in HIV prevention(57, 109, 110).

Changes in the policy environment are also imperative to prevent youth sex work and reduce its health and social impacts. In Mexico (and often internationally), underage FSWs are made ‘doubly vulnerable’ by policies limiting their access to services available to adults(78), displacing them from care and increasing their risk of exploitation and HIV/STIs(56, 78). While current criminal justice interventions do not address the factors rendering youth vulnerable to sex work(78), programs that increase youths’ abilities to meet their needs (e.g., shelter; counseling) could reduce their dependence on sex work and enhance their capacity to prevent abuse, substance use, and HIV.

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Socio-demographic factors and early/lifetime risk environment among female sex workers (N=624) in Tijuana and Cd. Juarez, Mexico, 2010

Table 1

Variable	Began sex work as a minor (n=253)	Began sex work as an adult (n=371)	Total	Test Statistic	P-value	FDR Adjusted P-value
Socio-demographic factors						
Age (median, IQR, years)	30.0 (25.0-37.0)	35.0 (29.0-41.0)	33.0 (27.5-40.0)	Z=5.62	<0.001	<0.001
Education (median, IQR, years)	6.0 (4.0-8.0)	7.0 (6.0-9.0)	6.0 (5.0-9.0)	Z=4.85	<0.001	<0.001
# of children (mean, IQR)	2.71 (1.0, 4.0)	2.98 (2.0, 4.0)	2.87 (2.0, 4.0)	Z=1.84	0.066	0.083
Married	111 (43.9%)	126 (34.0%)	237 (38.0%)	$\chi^2=6.27$	0.012	0.020
Non-migrant	119 (47.0%)	151 (40.7%)	270 (43.3%)	$\chi^2=2.46$	0.117	0.117
Sex work and substance use history						
Age when first sold or traded sex (median, IQR, years)	15.0 (14.0-16.0)	22.0 (19.0-28.0)	19.0 (15.0-24.0)	Z=21.23	<0.001	<0.001
Age when began to work regularly as a sex worker (median, IQR, years)	16.0 (15.0-17.0)	23.0 (20.0-28.0)	19.0 (16.0-25.0)	Z=18.62	<0.001	<0.001
Age when first drank alcohol, among those who ever drank alcohol (median, IQR, years)	13.9 (12.0-15.0)	16.4 (14.0-18.0)	15.4 (13.0-17.0)	Z=7.42	<0.001	<0.001
Used alcohol before starting sex work	114 (45.1%)	289 (77.9%)	403 (64.6%)	$\chi^2=70.92$	<0.001	<0.001
Age when first injected drugs (median, IQR, years)	17.0 (15.0-20.0)	22.0 (19.0-29.0)	20.0 (17.0-26.0)	Z=11.47	<0.001	<0.001
Used injection drugs before starting sex work	42 (16.6%)	136 (36.7%)	178 (28.5%)	$\chi^2=29.68$	<0.001	<0.001
Used any drugs before starting sex work	142 (56.1%)	271 (73.0%)	413 (66.2%)	$\chi^2=19.24$	<0.001	<0.001
First drug used						
<i>Inhalants</i>	38 (15.0%)	32 (8.7%)	70 (11.3%)	$\chi^2=6.00$	0.014	0.017
<i>Cocaine</i>	119 (47.0%)	183 (49.7%)	302 (48.6%)	$\chi^2=0.44$	0.510	0.510
<i>Methamphetamine</i>	37 (14.6%)	66 (17.9%)	103 (16.6%)	$\chi^2=1.19$	0.276	0.304
Ever used inhalants	94 (37.2%)	64(17.3%)	158 (25.3%)	$\chi^2=31.51$	<0.001	<0.001
Economic factors						

Variable	Began sex work as a minor (n=253)	Began sex work as an adult (n=371)	Total	Test Statistic	P-value	FDR Adjusted P-value
Reasons for trading sex for the first time *						
<i>Needed money for bills and food</i>	88 (39.6%)	135 (42.2%)	223 (41.1%)	$\chi^2=0.35$	0.553	0.830
<i>Needed money for drugs</i>	159 (71.6%)	229 (71.6%)	388 (71.6%)	$\chi^2=0.0002$	0.988	0.988
<i>Needed money for children</i>	26 (11.7%)	58 (18.1%)	84 (15.5%)	$\chi^2=4.12$	0.043	0.129
Social factors						
Reasons for injecting drugs for the first time *						
<i>Depressed</i>	42 (19.1%)	95 (29.8%)	137 (25.4%)	$\chi^2=7.85$	0.005	0.013
<i>To deal with stress</i>	5 (2.3%)	30 (9.4%)	35 (6.5%)	$\chi^2=10.91$	<0.001	<0.001
<i>Someone injected me without my consent</i>	10 (4.5%)	4 (1.3%)	14 (2.6%)	NA	0.026**	0.043
<i>I was curious about the high</i>	134 (60.9%)	175 (54.9%)	309 (57.3%)	$\chi^2=1.95$	0.163	0.204
Ever physically abused	131 (52.8%)	173 (47.0%)	304 (49.4%)	$\chi^2=2.00$	0.157	0.204
<i>Physically abused before starting sex work (among ever physically abused)</i>	31 (23.8%)	90 (52.0%)	121 (39.9%)	$\chi^2=24.57$	<0.001	<0.001
Ever raped	132 (53.2%)	181 (48.9%)	313 (50.6%)	$\chi^2=1.10$	0.294	0.327
<i>Age at first rape^{††} (median, IQR, years)</i>	14.0 (10.0-18.0)	17.0 (12.0-25.0)	15.0 (11.0-22.0)	Z=3.31	<0.001	<0.001
<i>Raped before starting sex work (among ever raped)</i>	62 (48.1%)	114 (63.3%)	176 (57.0%)	$\chi^2=7.15$	0.008	0.016
<i>The first time raped, physical force/violence was used^{††}</i>	114 (87.7%)	149 (83.7%)	263 (85.4%)	$\chi^2=0.96$	0.330	0.330
Policy factors						
Ever taught how to put on a condom	103 (40.7%)	176 (47.4%)	279 (44.7%)	$\chi^2=2.75$	0.097	0.129
Ever had a gynecological checkup	24 (9.5%)	97(26.4%)	121 (19.5%)	$\chi^2=27.37$	<0.001	<0.001
Ever had an HIV test	126 (50.0%)	201 (54.2%)	327 (52.5%)	$\chi^2=1.05$	0.305	0.305
# of times received drug treatment (mean, IQR)	2.31 (0.0-3.0)	1.40 (0.0-2.0)	1.77 (0.0-2.0)	Z=2.28	0.022	0.044

NOTE: Data are N (%) of women, unless otherwise indicated. Certain percentages may reflect denominators smaller than the n value give in the column head. Except as specifically noted, these discrepancies are due to missing data.

◦ IQR: Inter-quartile range

* Among respondents to a supplementary survey (n=542)

** Fisher's exact test was used to evaluate differences between women who began sex work as minor versus adults. The Chi-Squared test was used for all other binary variables and the Wilcoxon Rank Sum test was used for continuous variables.

Table 2
Recent risk environment and HIV/STI status among female sex workers (N=624) in Tijuana and Cd. Juarez, Mexico, 2010

Variable	Began sex work as a minor (n=253)	Began sex work as an adult (n=371)	Total	Test Statistic	P-value	FDR Adjusted P-value
Economic factors						
Monthly income from sex work (mean, IQR, USD) ¹	\$1551.76 (480-2070)	\$1353.01 (334-1570)	\$1434.19 (390.00-1770.00)	Z=2.38	0.018	0.022
# of clients (mean, IQR) ¹	53.86 (10.0-86.0)	46.17 (10.0-68.0)	49.31 (10.0-80.0)	Z=2.30	0.022	0.022
Social factors						
# of times tried to talk spouse/steady partner into condom use (mean) ¹	0.17	0.86	0.57	Z=0.15	0.878	0.878
# of unprotected sex acts (mean, IQR) ¹	35.65 (0.0-56.0)	29.49 (0.0-41.0)	31.99 (0.0-45.0)	Z=2.16	0.031	0.083
# of people usually injects with (mean, IQR) ¹	5.08 (2.0-6.0)	4.72 (1.0-5.0)	4.87 (1.0, 5.0)	Z=2.84	0.005	0.020
Receptive needle sharing ¹	246 (97.2%)	348 (94.1%)	594(95.3%)	$\chi^2=3.42$	0.064	0.128
Often/always had more than 5 drinks when drinking ¹	183 (72.3%)	274 (74.1%)	457 (73.4%)	$\chi^2=0.23$	0.633	0.723
Client violence						
Ever raped by a client	65 (26.1%)	74 (20.4%)	139 (22.7%)	$\chi^2=2.75$	0.097	0.129
Age when first raped by a client (median, IQR, years) ^{†††}	23.0 (18.0-26.0)	26.8 (22.0-30.0)	25.0 (19.0-30.0)	Z=3.58	<0.001	<0.001
Ever physically abused by a client	58 (23.2%)	65 (17.6%)	123 (19.8%)	Z=2.98	0.085	0.129
Policy factors						
When injecting drugs, got syringe from a syringe exchange program ²	31 (12.3%)	37 (10.0%)	68(10.9%)	$\chi^2=0.78$	0.376	0.376
Policing experiences						
A police officer asked you for sexual favors ²	100 (39.7%)	103 (27.8%)	203 (32.6%)	$\chi^2=9.57$	0.002	0.003

Variable	Began sex work as a minor (n=253)	Began sex work as an adult (n=371)	Total	Test Statistic	P-value	FDR Adjusted P-value
<i>A police officer sexually abused you in exchange for not arresting you²</i>	56 (22.2%)	43 (11.6%)	99 (15.9%)	NA	<0.001**	<0.001
<i>A police officer confiscated your syringes²</i>	144 (57.1%)	156 (42.2%)	300 (48.2%)	$\chi^2=13.47$	<0.001	<0.001
<i>A police officer forcibly took your money²</i>	125 (49.6%)	141 (38.1%)	266 (42.8%)	$\chi^2=8.09$	0.004	0.005
Physical factors						
Sex work venue ¹						
<i>Worked on the street</i>	203(80.6%)	297(80.3%)	500 (80.4%)	$\chi^2=0.008$	0.930	0.930
<i>Worked in a brothel</i>	11 (4.4%)	7 (1.9%)	18 (2.9%)	NA	0.088**	0.264
<i>Worked in a bar/cantina</i>	54(21.4%)	77(20.8%)	131 (21.1%)	$\chi^2=0.03$	0.853	0.930
HIV/STI Test results						
Positive HIV test	13 (5.2%)	22 (6.1%)	35 (5.7%)	NA	0.725**	0.725
Positive for any STI/HIV	145 (60.7%)	221 (63.1%)	366 (62.1%)	$\chi^2=.37$	0.543	0.725

NOTE: Data are N (%) of women, unless otherwise indicated. Certain percentages may reflect denominators smaller than the n value give in the column head. Except as specifically noted, these discrepancies are due to missing data.

¹ Refers to past month

² Refers to past 6 months

^o IQR: Inter-quartile range

[†] Among those abused (n=303)

^{††} Among those raped (n=311)

^{†††} Among those raped by a client (n=139)

* Among respondents to a supplementary survey (n=539)

** Fisher's exact test was used to evaluate differences between women who began sex work as minor versus adults. The Chi-Squared test was used for all other binary variables and the Wilcoxon Rank Sum test was used for continuous

Table 3

Variables independently associated with underage sex work entry among female sex workers in Tijuana and Cd. Juarez, Mexico, 2010

Variable	Adjusted [†] OR	Adjusted 95% CI	Adjusted Z-Test Statistic	Adjusted P-value
Age	0.94	0.91, 0.96	4.96	<0.001
Years of education	0.89	0.84, 0.94	3.89	0.014
Married	1.66	1.13, 2.44	2.60	0.009
Early/lifetime exposure to risks				
First drug used				
<i>Inhalants</i>	1.99	1.09, 3.62	2.24	0.025
Reasons for injecting drugs for the first time				
<i>Depressed</i>	0.59	0.37, 0.95	2.16	0.031
<i>Someone injected me without my consent</i>	4.73	1.28, 17.42	2.34	0.020
# of times received drug treatment	1.07	1.01, 1.13	2.38	0.017
Recent exposure to risks				
# times tried to talk steady partner into condom use ¹	0.73	0.60, 0.89	3.04	0.002
Receptive needle sharing ¹	3.02	1.25, 7.32	2.45	0.014

¹ Refers to past month

² Refers to past 6 months

[†] Adjusted odds ratios reflect associations after controlling for all other variables that were included in the model