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Platform Research Presentation I: Understanding Risk

1.

WEIGHT-BASED DISCRIMINATION AND DISORDERED EATING BEHAVIORS AMONG U.S. SEXUAL MINORITY ADOLESCENTS AND YOUNG ADULTS

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Purpose: Weight-based discrimination is a prevalent but understudied form of discrimination in the U.S. and has been linked to adverse health outcomes, including disordered eating behavior among adolescents and adults. In spite of evidence that sexual minority (e.g., lesbian, gay, bisexual, and mostly heterosexual) males and females are at elevated risk of disordered eating behavior relative to their heterosexual peers, few studies have examined the role of weight discrimination in this elevated risk. This study sought to address this gap by examining associations between weight-based discrimination and disordered eating behaviors over two life periods (before/during high school and since high school) in a cohort of sexual minority adolescents and young adults.

Methods: Analyses include 1,369 sexual minority women and men (ages 18-31 years) who participated in a 2013 supplemental survey for sexual minorities within the ongoing U.S. Growing Up Today Study (GUTS) cohort. GUTS participants are children of nurses and are predominantly middle-income and White race/ethnicity (91% White). We examined the cross-sectional association between self-reported weight discrimination victimization in four categories (no exposure [ref], exposure before/during high school only, exposure since high school only, or exposure in both life periods) and three past-year outcomes: any use of diet pills, laxatives, or vomiting; any overeating; and any binge-eating. We used generalized estimating equations adjusting for age and sex to estimate risk ratios (RRs) and 95% confidence intervals (CIs). We examined whether participant sex and weight status (assessed as BMI classification) modified these associations.

Results: In this sample of sexual minority young adults, 27% of women and 24% of men reported experiencing weight-based discrimination before/during high school; and 20% of women and 13% of men reported discrimination since high school. Sexual minority women and men who reported experiencing weight-based discrimination across both life periods had greater relative risk of diet pill, laxative use, or vomiting ([RR, 95%CI] 2.2, 1.4-3.3), overeating (4.4, 3.0-6.4), and binge eating (5.8, 3.6-9.5), compared to those who reported no weight-based discrimination at either time period. Weight-based discrimination experienced before/during high school only and since high school only was also associated with overeating and binge eating. These associations were attenuated but remained significant after adjusting for weight status. The associations between weight-based discrimination and disordered eating behavior did not differ by participant sex or weight status.

Conclusions: In a cohort of sexual minorities, one in five participants had experienced any weight-based discrimination and weight-based discrimination was reported across sex, sexual orientation identity, and weight status groups. Weight-based discrimination was associated with two to five times greater risk of disordered eating behavior, regardless of weight status. Given the elevated risk of disordered eating behaviors among some groups of sexual minority adolescents and young adults, the effects of weight-

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based discrimination must be considered when developing eating disorders prevention efforts and effective clinical care for this underserved population.

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2.

ESTIMATED PREVALENCE OF ADOLESCENTS AND YOUNG ADULTS WITH INDICATIONS FOR HIV PRE-EXPOSURE PROPHYLAXIS IN THE UNITED STATES, 2011-2015

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Purpose: In 2015, adolescents and young adults (AYA) ages 15-24 years accounted for 22% of newly diagnosed HIV infections in the US. Antiretroviral pre-exposure prophylaxis (PrEP) can greatly decrease the risk of HIV acquisition. The extent to which younger populations may have indications for PrEP has not been characterized. We aim to estimate the prevalence of AYA in the US with indications for PrEP based on US Public Health Services (USPHS) guidelines and to describe this population, including their usual source of health care.

Methods: We analyzed data from the 2011-2013 and 2013-2015 cycles of the National Survey of Family Growth (NSFG), a nationally-representative, population-based survey of civilian, non-institutionalized US men and women aged 15-45 years. We included 17,921 respondents who provided affirmative answers to any of the survey questions related to HIV acquisition risk and could thus be classified as potentially eligible for PrEP based on USPHS criteria. Prevalence and total numbers of persons with indications for PrEP were estimated for heterosexually active (HA) men and women, men who have sex with men (MSM), and persons who inject drugs (PWID). Estimates of PrEP indications were stratified by age (15-17 years, 18-24 years, 25-29 years, and 30-45 years), education, race/ethnicity, and income. We used chi-squared tests to compare differences in PrEP indications by age and to compare respondents' usual source of care by indications for PrEP.

Results: Among adolescents aged 15-17 years, 0.5% (N=62,833 US adolescents) had indications for PrEP, as did 2.2% of young adults aged 18-24 years (N=645,539). Among all AYA (15-24 years), 1.5% of HA men and women (N=417,712), 29.0% of MSM (N=254,431), and 22.9% of PWID (N=124,502) had indications for PrEP. A higher percentage of MSM and PWID had indications for PrEP than did HA youth (both $p < 0.01$). The number of males and females with indications for PrEP varied significantly ($p < 0.05$) by age (highest prevalence among males 18-24 years and females 18-29 years), income (highest prevalence among those with household income $< \$25,000$ per year), and education (highest prevalence among those who have a high school diploma or GED); there were no significant differences based on race/ethnicity. Among AYA with indications for PrEP, 63% reported that they had an appropriate usual source of care, with the most common sources of care being private offices (56.7%) and community health centers (30.1%). The percentage of those with a usual source of care did not differ significantly between AYA with indications for PrEP and those without indications for PrEP.

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Conclusions: A substantial minority of 15- to 24-year-olds in the US engages in risk behaviors for HIV and may benefit from comprehensive prevention services that include PrEP. A higher percentage of AYA who are MSM and PWID have indications for PrEP than those who are heterosexually active, similar to trends observed in adults. Among AYA with indications for PrEP, the majority of individuals have identified a usual source of care, which may provide access to PrEP and other prevention services.

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3.

INDIVIDUAL AND PARTNER-LEVEL CHARACTERISTICS ASSOCIATED WITH VACCINE-TYPE AND NON-VACCINE-TYPE HUMAN PAPILLOMAVIRUS INFECTION IN YOUNG WOMEN AFTER VACCINE

INTRODUCTION

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Purpose: Little is known about the associations between individual-level and partner-level (e.g. sexual concurrency, discordance) factors and HPV infection after vaccine introduction. The aims of this study were to determine factors associated with 4-valent vaccine-type and non-vaccine-type HPV in young women and whether these associations varied by vaccination status.

Methods: Sexually experienced young women 13-26 years of age (N=735) were recruited between 2013 and 2017 from two primary care clinics, completed a survey, and provided a cervicovaginal swab that was tested for 36 HPV genotypes. We determined the prevalence of 4-valent vaccine-type HPV (HPV6, 11, 16, 18) and non-vaccine-type HPV, and determined individual- and partner-level factors associated with HPV, among vaccinated and unvaccinated women using univariable logistic regression.

Results: Participants' mean age was 19.2 years; 76% had received ≥ 1 vaccine dose (91% 4-valent, 9% 9-valent) and 61% all three doses; 7.6% were positive for ≥ 1 4-valent-vaccine-type and 61.7% for ≥ 1 non-vaccine-type HPV. Characteristics associated with vaccine-type HPV in vaccinated women included: 1 vs. 3 vaccine doses (OR=3.23, 95% CI=1.22-8.33), any female partners past 12 months (OR=2.94, CI=1.13-7.65), and partner age discordance (don't know age vs. concordant, OR=4.01, CI=1.07-15.0). Characteristics associated with vaccine-type HPV in unvaccinated women included: history of STI (OR=2.53, CI=1.11-5.78), female partners past 12 months (OR=4.82, CI=1.36-17.10), most recent partner's number of partners past 12 months (2+ vs. 0, OR=5.22, CI=1.45-18.75), and concurrency status of partners in the past 12 months (don't know vs. no, OR=3.07, CI=1.28-7.34). Characteristics associated with non-vaccine-type HPV in vaccinated women included: Black vs. White race (OR=1.98, CI=1.29-3.04), history of STI (OR=3.13, CI=2.20-4.46), recent marijuana use (OR=1.80, CI=1.25-2.60), number of lifetime male partners (2-5 vs. 1, OR=2.65, CI=1.66-4.22; 6+ vs. 1, OR=4.47, CI=2.61-7.64), number of male partners past 3 months (1 vs. 0, OR=2.14, CI=1.17-3.89; 2+ vs. 0, OR=5.28, CI=2.57-10.84), lifetime concurrency (OR=2.27, CI=1.45-3.56), concurrency past 12 months (OR=1.76, CI=1.12-2.76), discordance in number of sex partners past 12 months (don't know partner's number of partners vs. concordant, OR=1.68, 95% CI=1.14-2.46); and partner's number of partners past 12 months (2+ vs. 0, OR=2.73,

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CI=1.62-4.58). Characteristics associated with non-vaccine-type HPV in unvaccinated women included recruitment site (health department vs. teen health center, OR=2.17, CI=1.04-4.55), Black vs. White race (OR=2.28, CI=1.14-4.57), history of STI (OR=1.98, 95% CI=1.01-3.91), number of lifetime male partners (2-5 vs. 1, OR=2.33, CI=1.05-5.12; 6+ vs. 1, OR=4.21, CI=1.64-10.77), most recent partner's number of partners (OR=1.49, CI=1.06-2.1), and discordance in number of sex partners past 12 months (don't know vs. concordant, OR=2.81, CI=1.33-5.93).

Conclusions: In vaccinated women, higher number of vaccine doses was associated with reduced risk of vaccine-type HPV. In vaccinated and unvaccinated women, number of female partners was associated with vaccine-type HPV, whereas number of male partners was associated with non-vaccine-type HPV. Several partner-level characteristics (including concurrency and discordance) were associated with HPV, and not knowing one's partner's age or number of partners was a distinct risk category. These findings have important implications for educational interventions, vaccination policies, and cervical cancer screening recommendations.

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4.

FACTORS ASSOCIATED WITH SEXUAL VIOLENCE AMONG HIGH SCHOOL STUDENTS IN THE US: RESULTS FROM A POPULATION BASED STUDY

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Purpose: The purpose of this study was to examine the association between sociodemographics, health risk factors and behaviors, and sexual violence among adolescents.

Methods: A population based secondary data analysis was conducted using national data from the 2015 Youth Risk Behavior Surveillance System (YRBSS). The study population included 15,624 high school adolescents. SAS v. 9.4 was used for data management and analyses, and to account for the complex survey design of YRBSS. Descriptive statistics including frequencies and percentages, using the SURVEYFREQ procedure in SAS, were used to determine the sample demographic and behavioral characteristics. Logistic regression analysis was performed using the SURVEYLOGISTIC procedure in SAS to examine the association of sexual violence and other covariates.

Results: Approximately 1,769 (11%) of the students reported experiencing sexual violence, being physically forced to have sexual intercourse (when they did not want to) or experienced sexual dating violence (one or more time during the past 12 months before the survey). Logistic regression analyses showed that students who experienced sexual violence were 10 times more likely to also experience physical dating violence (OR=10.4; 95% CI 8.7-12.5). These student were also significantly more likely to be depressed (OR=4.2; 95% CI 3.6-4.9), have suicidal thoughts (OR=4.4; 95% CI 3.8-5.1), have attempted suicide one or more times in the past 12 months (OR=6.2; 95% CI 5.0-7.7), current cigarette smokers (OR=3.7; 95% CI 3.0-4.5), binge drinkers (OR=2.5; 95% CI 2.1-3.2), current marijuana users (OR=2.4; 95% CI 2.0-2.9), use prescription drugs without a prescription (OR=3.1; 95% CI 2.6-3.6). Results also indicated that students who experienced sexual violence were more likely to not use condoms (OR=1.6; 95% CI 1.3-1.9), less likely to use birth control pills (OR=0.72; 95% CI 0.5-0.9), and significantly more likely to

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have had sexual intercourse with four or more persons during their life (OR=3.4; 95% CI 2.9-4.0). Students who identified as gay, lesbian, bisexual, or questioning (LGBQ) were significantly more likely to experience sexual violence (OR=3.1; 95% CI 2.5-3.8).

Conclusions: Identifying factors associated with sexual violence can aid health care providers and public health professionals in developing strategies that address multiple risk behaviors. Experiences of sexual violence disproportionately affect the LGBTQ population compared to heterosexual youth; thus, the use of public health strategies for sexual violence prevention should also take into account the needs of these adolescents to help ensure all young people achieve healthy, safe, and meaningful lives.

Sources of Support: Internal support from Altarum.

5.

COST-EFFECTIVENESS OF ALTERNATIVE HIV SCREENING STRATEGIES FOR YOUNG MEN WHO HAVE SEX WITH MEN IN THE UNITED STATES

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Purpose: Of new HIV diagnoses among adolescent and young adults in the US, 81% occur among young men who have sex with men (YMSM). National and professional organization recommendations for HIV screening in this population vary from every 3-6 months to every 3-5 years. Using data from Adolescent Medicine Trials Network (ATN) studies 110 and 113 of high-risk US YMSM ages 15-22, we examined the clinical impact, cost, and cost-effectiveness of alternative HIV screening strategies for YMSM at high-risk for HIV starting at age 15.

Methods: We simulated a cohort of high-risk HIV-uninfected 14-year-old MSM in the US who faced age-specific risks of HIV infection (0.91-6.41/100,000PY, peak incidence ages 15-18) based on ATN 110/113 (observational study; incident infections despite PrEP use with adherence 34-56%) and published sources. We modeled HIV screening (\$36/test) every 3 years, annually, biannually, and quarterly beginning at age 15, each in addition to current US screening practices for YMSM (16-53% screened at least once by ages 15-22). We used published data on the HIV care continuum among YMSM, including screen acceptance (80%), linkage to care and antiretroviral therapy (ART) initiation (76%), disease progression, ART response, and HIV care costs. Modeled outcomes included CD4 count at diagnosis, HIV care continuum outcomes (proportions HIV-diagnosed, linked-to-care, retained-in-care, and virologically suppressed), one generation of secondary HIV transmissions, life expectancy, lifetime costs, and incremental cost-effectiveness ratios in \$/year-of-life saved (YLS) from the healthcare system perspective. In sensitivity analyses, we varied HIV incidence, screening and linkage rates, and costs.

Results: Screening every 3 years, annually, biannually, and quarterly beginning at age 15 in addition to current practice diagnosed greater proportions of lifetime infections compared to current practice alone (81-99% vs. 35%). Quarterly screening compared to current practice provided the greatest improvements in the proportions of HIV-infected being diagnosed via opportunistic infection (<1% vs. 50%) and never being diagnosed (<1% vs. 15%) during their lifetimes. Compared to current practice,

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quarterly screening also led to the most favorable care continuum outcomes at age 25: proportion diagnosed (100% vs. 65%), linked (98% vs. 65%), retained (78% vs. 54%) and virologically suppressed (65% vs. 46%). Compared to the next most effective strategy, quarterly screening beginning at age 15 was cost-effective (\$84,000/YLS) by US standards (<\$100,000/YLS). Including just first-generation HIV transmissions averted, the ICER was markedly lower (\$20,900/YLS). These results were most sensitive to rates of current US HIV screening practice and linkage-to-care/ART. In sensitivity analyses, if HIV incidence peaked at older ages, an older starting age for HIV screening had more favorable cost-effectiveness outcomes; if absolute HIV incidence was lower, less frequent screening was more favorable.

Conclusions: For high-risk US YMSM, quarterly HIV screening beginning at age 15 compared to less frequent screening beginning at age 15, would improve clinical outcomes and be cost-effective. To optimize clinical outcomes, screening should begin at or after the peak of population-specific HIV incidence.

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6.

USING INTEGRATIVE DATA ANALYSIS AND TIME-VARYING EFFECT MODELS TO EXAMINE SEXUAL RISK FROM ADOLESCENCE THROUGH EMERGING ADULTHOOD AMONG AFRICAN AMERICAN FEMALES IN THE SOUTH

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Purpose: Young African American women have disproportionate risk for HIV and sexually transmitted infections (STIs). The goal of this study was to describe age-related changes in sexual risk behavior and STI acquisition using existing data from three HIV/STI prevention trials which enrolled young African American women. Two novel data analysis techniques were used: integrative data analysis (IDA) and time-varying effect models (TVEM).

Methods: Each trial collected self-reported behavioral data and vaginal swab specimens assayed for chlamydia, gonorrhea, and trichomonas. Baseline data from all participants and follow-up data among participants not randomized to an active intervention arm were integrated in a pooled dataset using an IDA approach. The pooled dataset included observations for 1,976 individuals and spanned ages 14-25 years for behavioral outcomes and 15-25 years for STI outcomes. We used TVEM to describe age-related changes in the monthly frequency of vaginal sex, condom use at last sex, having multiple sex partners in the past month, bacterial STI acquisition, and trichomoniasis acquisition, adjusting for the fixed effect of trial.

Results: The expected number of vaginal sex episodes per month was lowest at less than 2 at age 14 and then steeply increased to a peak of approximately 6 at age 21 before steadily declining to about 5.25 at

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age 25. The expected probability of having multiple sex partners steadily increased from a low of less than 2% at age 14 to a peak of about 13% at age 19 years and then stayed steady around 10% through age 25. The expected probability of condom use was highest at 60% at age 14 and steadily declined to approximately 35% through age 25. The expected probability of acquiring a bacterial STI was highest at age 15 at about 40%, decreased to about 22% at age 15.5, and thereafter showed a variable pattern with small increases reaching 27%, 16%, and 10% at ages 16.25, 18.25, and 22, respectively. The expected probability of trichomoniasis was highest at 31% at age 15, declined to about 18% at age 16 and 8% by age 18, and then reached about 10% at age 23 before declining to about 7% at age 25.

Conclusions: This study demonstrates the feasibility and utility of new methodological techniques to address novel questions related to development during adolescence and emerging adulthood using existing data from multiple trials. As expected, patterns of sexual risk changed dramatically during adolescence and emerging adulthood. Sexual risk behavior increased during adolescence and emerging adulthood, whereas the probability of STI acquisition was highest among the youngest adolescents. The results suggest that early adolescence and the early 20s may be periods of particular risk. The findings may also be useful for better understanding healthy development and optimal timing of prevention interventions for young African American women in the South. Interventions in early adolescence may be useful for addressing high probabilities of STI acquisition and preventing escalation of sexual risk behaviors. Interventions to address high levels of sexual risk behavior in emerging adulthood may also be warranted.

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