

PATTERNS, PREDICTORS, AND CONSEQUENCES OF SEXUAL INITIATION AMONG
SEXUAL MINORITY YOUTH

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ABSTRACT

Shoshana Kyra Goldberg: Patterns, Predictors, and Consequences of Sexual Initiation Among Sexual Minority Youth
(Under the direction of Carolyn T. Halpern)

Sexual initiation is an often-used predictor of sexual and reproductive health. However, typical operationalization of initiation—age of first vaginal intercourse—may be less applicable to lesbian, gay, and bisexual youth ("sexual minorities" [SM]), for whom the relevance and/or importance of other-sex vaginal encounters may differ from that of heterosexuals. Following, this dissertation devised a new measure of sexual initiation specific to sexual minorities, in order to investigate initiation as part of a broader model of young adult STD risk.

Using latent class analysis, I identified sexual initiation *patterns* (e.g. ‘classes’) among 2,154 SM respondents (526 Males/ 1,628 Females) in the National Longitudinal Study of Adolescent to Adult Health, accounting for timing, sequence, and spacing of first oral, anal, and vaginal sexual experience. Female sexual initiation classes were characterized as ‘typical debut’ (41%; vaginal intercourse debut; short spacing between 1st and 2nd behavior); ‘dual-behavior debut’ (35%; oral sex + vaginal intercourse debut in same year); ‘early sexual debut’ (17%); and ‘delayed debut w/oral sex’ (6%). Male sexual initiation classes were characterized as ‘single behavior debut’ (50%; oral sex initiation; long spacing between 1st and 2nd behaviors); ‘multi-behavior debut’ (32%; debut w/multiple behaviors in same year); ‘early anal sex’ (11%); and ‘very early debut’ (6%). Class membership was associated with race/ethnicity, SES, and

religiosity among females; sexual victimization among males; and biological sex of pre-age 18 sexual partners for both.

Next, structural equation modeling was used to test a model of the pathways from adolescent psychosocial support to sexual initiation class membership to young adult STD risk. In adjusted models, lifetime, but not prior-year, STD risk, significantly differed based on one's sexual initiation class, yet higher parental support and neighborhood connectedness in adolescence significantly predicted lower STD risk in both time periods. Among females, differences in associations further emerged across race/ethnicity (differences not tested for males due to low statistical power).

Findings highlight the importance of considering multiple behaviors when assessing sexual initiation, particularly among SM youth. More so, results suggest STD prevention efforts may benefit from focusing less on delaying sexual initiation, in favor of resiliency-based approaches that aim to improve social support.

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LIST OF ABBREVIATIONS

AI	Anal Intercourse
EH	Exclusively Heterosexual
LCA	Latent Class Analysis
LGB	Lesbian, Gay, and Bisexual
MSM	Men who have sex with men
NH	Non-Hispanic
NSFG	National Survey of Family Growth
OS	Oral Sex
SEM	Structural Equation Modeling
SM	Sexual Minority
SRH	Sexual and Reproductive Health
STD	Sexually Transmitted Disease
VI	Vaginal Intercourse

CHAPTER 1: INTRODUCTION

Introduction

Throughout the sexual health literature, the single indicator of age of sexual debut has been used to link sexual and reproductive health (SRH) outcomes in young adulthood to early-life (sexual) experience. In doing so, studies have focused on the contexts and timing of sexual debut—typically defined as age at first vaginal intercourse—as earlier debut has been found to be predictive of lifetime sexual risk. Most recently, a systematic review found that across 65 studies, earlier age at first vaginal intercourse was directly predictive of negative SRH outcomes (e.g. lifetime diagnosis of sexually transmitted diseases [STD]; teen pregnancy; etc.), as well as predictive of numerous lifetime sexual practices typically associated with increased risk of negative outcomes, including higher lifetime sexual partner counts, concurrent sexual partnering, and engaging in transactional sex.(1) However, despite the frequency with which ‘age of first vaginal intercourse’ has been utilized in the literature, such a narrowly-defined operationalization of ‘sexual debut’ ignores the fact that sexual experience in adolescence often includes oral sex and, to a lesser extent, anal sex, and that the timing and contexts of all three of these behaviors may be important for later life sexual health. More importantly, current measures of sexual debut may have different relevance to different groups of adolescents and young adults. For lesbian, gay, and bisexual youth (i.e., sexual minorities), an operationalization of sexual debut that focuses solely on vaginal intercourse may be limited, if not inappropriate, as such encounters—which presumably only include heterosexual (i.e. with other-sex partners), penis-in-vagina

sexual experiences—may carry different emotional salience, and/or have different implications for future sexual development, both relative to heterosexual peers, and across sexual minority groups (e.g. between bisexuals, for whom a heterosexual encounter is ‘concordant’ with their identity, and lesbians/gays, for whom such an encounter is not).

Evidence suggests that sexual orientation differences may extend well beyond sexual initiation into multiple other dimensions of sexual behavior, as, on average, sexual minorities (SM) have consistently been found to have disproportionately worse measures of sexual and reproductive health than heterosexuals. For example, ‘men who have sex with men’ (MSM)—and young MSM (aged 13-24) in particular—are disproportionately affected by HIV and STDs. In 2010, the most recent year for which data were available, 63% of all newly acquired HIV infections were among gay and bisexual men, with a third of these new cases occurring among adolescent and young adult MSM.(2) In the same year, 72% of all reported syphilis cases (who had information on vector of transmission) and 29.7% all gonorrhea cases nationwide were among MSM.(3)

While equivalent surveillance data are not readily available for SM females as same-sex female sexual partnering is largely not assessed during sexual health screening,(4–7) evidence from both the clinical literature (relying on clinically verified STD diagnoses, often in smaller cohort studies) and nationally representative surveys (relying on self-reported STD diagnoses) indicates that SM-identified women report increased STD incidence and prevalence relative to their heterosexual peers. Using self-reported STD data from the National Longitudinal Study of Adolescent to Young Adult Health, Mojola and Everett (2012) found a mixed effect of sexual orientation, such that, across race/ethnicity groups, women who self-identified as gay were less likely than heterosexuals to have ever been diagnosed with an STD by the time of the survey

(Wave IV, mean age=28.6), whereas those who reported a ‘mixed orientation’ identity (including bisexual and ‘mostly heterosexual’) were *more* likely to have been diagnosed.(8) In a prospective cohort study that administered quarterly STD screens to 300 Australian “women who have sex with women” (WSW; defined as reporting at least one female partner in last <18 months; women who had sex with women and men [WSWM] were included as well), the incident rate of bacterial vaginosis over the 2-year study period was 9.8 cases (/100 women-years), with recent (<90 days) female sexual partner—but not recent male sexual partner—significantly increasing likelihood of diagnosis.(9) In a clinic based study of 163 African-American SM women (defined as reporting sexual partnering with exclusively women, or with women and men) in Alabama undergoing STD testing, 71% of participants tested positive for any STD, with odds of positive diagnosis for WSWM 4.2 times that for WSW (after adjusting for age and current sexual partnering), most commonly bacterial vaginosis (reported by 41% sample, OR for WSWM vs WSW: 2.03 [95% CI: 1.05-3.91]) and genital herpes/HSV-2 (reported by 45% sample; OR for WSWM vs WSW: 5.40 [95% CI: 2.49-11.71]). (10)

Beyond increased likelihood of HIV and STD, evidence suggests that SM adolescents and young adults are more likely than their heterosexual peers to engage in sexual behaviors traditionally considered to be high-risk, owing to their strong associations with adverse sexual health outcomes such as HIV, STD, and unwanted/teenage pregnancy, including higher lifetime partner counts, concurrent sexual partnering, inconsistent condom and contraception use, and transactional sex (engaging sex for money/goods, or being paid for sex).(11–16) At the same time, they also report higher rates of numerous behaviors and socio-environmental exposures associated with both earlier, and more risky (without contraception; while intoxicated; etc.), sexual initiation, including substance use,(17–19) smaller available sexual networks (which often

contain high-risk [e.g., HIV and/or STD-positive] sexual partners),(20,21) age-discordant partnering (with youth selecting older partners, and subsequently experiencing less agency to advocate for safe-sex practices),(22,23) and sexual victimization.(13,24–26) Given that sexual orientation differences exist in both sexual risk and sexual risk factors, population-specific measures and models are needed which account for the contexts of SM adolescent sexual behavior.

Sexual Orientation Differences in Content and Complexity of Sexual Debut

Evidence suggests that vaginal, oral, and anal sex are all somewhat common during adolescence, both with same-sex and other-sex sexual partners. However, the timing, frequency, and context of these encounters tend to differ between sexual minority and exclusively heterosexual populations, highlighting the need for a sexual minority-specific measurement of sexual debut that accounts for behaviors beyond simply vaginal intercourse.

Sexual Orientation Differences in Coital Behavior

Available data indicate that vaginal intercourse is common during adolescence, regardless of sexual orientation. In the 2013 Youth Risk Behavior Surveillance System (YRBS), a national school-based survey of US high school students, approximately 47% of adolescents surveyed had ever had vaginal intercourse (47.5% males and 46% females) at the time of the survey.(14) Among the general population, likelihood of coitus increases as adolescents age into their late teens and early twenties. For example, in a retrospective study using cross-sectional data from the 2006-2010 wave of the National Survey of Family Growth (NSFG), a nationally-representative sample of US adolescents and adults aged 15-44, approximately 16% of respondents reported having had vaginal intercourse by their 15th birthday, compared with 41% who had done so by their 17th birthday, and 67% who had done so by age 19.(13,24,26,27)

Among sexual minority adolescents specifically, evidence suggests that heterosexual vaginal intercourse encounters are common, though the likelihood and timing of vaginal intercourse appears to differ as a function of biological sex. While the available literature is sparse, and often suffers from inconsistencies in sexual orientation measurement across surveys, three recent studies have used nationally-representative samples to explore differences in coital encounters across sexual orientation groups: A 2011 analysis of the states and metropolitan areas that assessed sexual orientation during the 2001-2009 waves of the YRBS found that, across all surveys, heterosexual vaginal intercourse was more common in SM than EH respondents, with 37%-81% of gay/lesbian identified respondents (median=67%), and 59-83% of bisexual respondents (median=69%) ever engaging in heterosexual vaginal intercourse, compared with 28-56% of heterosexual respondents (median=44%).(28) While this study is notable for its use of a large representative sample, results were not disaggregated by biological sex, precluding ability to determine whether known sex differences in coital behaviors of heterosexual adolescents extend to and/or differ in sexual minority populations. In addition, as sexual orientation was assessed via a single question added voluntarily by only a small subset of states/metropolitan areas, potential selectivity issues remain.

Addressing both these points, McCabe and colleagues (2011) explored sexual behavior and sexual orientation among a national sample of adolescents and emerging adults (aged 15-21), drawn from the 2002 wave of the NSFG, and further disaggregated results by biological sex and sexual orientation indicator. Lesbian/bisexual identified females were more likely than heterosexual females to have ever had heterosexual vaginal intercourse (83% vs. 63%, respectively), whereas gay/bisexual identified males were *less likely* than heterosexual males to have done so (60% vs. 67%, respectively).(29) Finally, a recent study using the 2009 National

College Health Assessment survey, a sample of 25,000 undergraduate students (aged 18-29) at 2- and 4-year colleges across the United States, further improved upon these analyses by distinguishing between bisexual and gay/lesbian-identified respondents, highlighting key within-sexual minority differences.(30) While heterosexual females were *more likely* than SM females to have ever had heterosexual vaginal intercourse, within sexual minorities, a significantly higher proportion of bisexually-identified than lesbian-identified females had ever done so (reported by 72% heterosexuals vs. 46% lesbians vs. 70% bisexuals), a finding which was replicated for SM males (vaginal intercourse was reported among 67% heterosexual males vs. 2.2% gay males and 39.1% bisexual males).(30)

While these findings highlight that heterosexual vaginal intercourse is common among sexual minority adolescents, limited comparability across samples (and inconsistent patterns where comparability is possible) raise several questions about whether and how its likelihood differs as a function of both biological sex and sexual orientation identity. Further, as none of these studies explicitly tested differences across race/ethnicity, the joint effect of race and sexual orientation on vaginal sex behaviors remains unknown.

Sexual Orientation Differences in Non-Coital Behavior

Though less studied than vaginal intercourse, existing evidence suggests that non-coital sexual behaviors (including both oral sex and anal intercourse) are increasingly common components of both heterosexual and sexual minority adolescent sexual experiences. In the same 2006-2008 NSFG sample discussed above, 44% of females and 48% of males aged 15-19 had ever engaged in heterosexual oral sex, whereas 11% of females and 10% males had ever had heterosexual anal intercourse.(31) Same-sex non-coital encounters were much less frequent in adolescence, with 7.1% of females and 2.2% of males aged 15-19 ever having a same-sex oral

sex encounter (and 1.2% of males ever having a same-sex anal intercourse encounter). However, likelihood increased substantially in emerging adulthood, particularly for males: Whereas the proportion of females aged 20-24 who ever had a same-sex oral sex experience increased to 11.2%, the proportion of males reporting same-sex non-coital behaviors was doubled in the 20-24 cohort, with 5.6% of males ever having a same-sex oral sex experience, and 2.5% ever having same-sex anal intercourse.(31)

Several studies have noted that even among respondents who self-identify as a sexual minority, heterosexual non-coital encounters are common, and, in fact, may be more common than among heterosexual respondents, though differences appear to exist by biological sex. Among respondents aged 18-44 in the NSFG, females who self-identified as lesbian or bisexual were equally likely as heterosexual-identified females to ever have engaged in oral sex with an other-sex partner, and were more likely to have ever had an other-sex anal sex encounter. In contrast, for males, those who self-identified as gay or bisexual were substantially less likely than heterosexual-identified males to ever have an other-sex oral sex encounter, or an other-sex anal sex encounter.(31) In a study of sexually active female high school students in California, sexual minority females were significantly more likely than exclusively heterosexual females to have engaged in oral sex and anal sex, but were significantly less likely to have had heterosexual vaginal intercourse, even after controlling for sociodemographic characteristics.(32) In contrast, in a sample of 200 gay and bisexual adolescent males (aged 15-22) based in Chicago and Miami, heterosexual encounters were significantly *less* common than homosexual ones: 34% of the sample had ever engaged in vaginal intercourse, compared with 89% who had ever had oral sex with a man, 64-72% had ever had anal intercourse with a man (as the receptive and insertive partner, respectively), and 58% had engaged in all three homosexual behaviors.(33) In addition,

among those respondents who had ever engaged in each behavior, 38% of those with a lifetime history of vaginal intercourse had a heterosexual coital encounter in the prior 90 days (with an average of 1.1 partners), 82% had same-sex oral sex encounters (with an average of 2.5 partners), and 66-68% had same-sex anal sex encounters. Taken together, results highlight that non-coital behavior is a common component of early life sexual behavior among sexual minorities. Yet, as suggested by reported differences in the prevalence, sequence, and timing of non-coital behaviors, such occurrences may be driven by different factors for sexual minorities than heterosexuals, necessitating sexual minority-specific indicators/models of sexual initiation.

Beyond Single Behavior Indicators—Early Sexual Trajectories

Acknowledging the importance of other sexual behaviors, some studies have moved beyond an exclusive focus on age of first vaginal intercourse to instead explore how differences in the *sequence and timing* of multiple sexual behaviors are associated with later life SRH. However, this literature has largely focused on exclusively heterosexual samples (and heterosexual encounters of these samples).

Sexual Trajectories of Heterosexuals

One of the earliest studies to empirically test whether sexual behaviors followed a ‘typical’ trajectory was the work of P.M. Bentler, who examined heterosexual (e.g., with an other-sex partner) sexual behaviors in 350 undergraduate males and females in the 1960s.(34,35) Respondents were asked if they had ever participated in a variety of sexual behaviors, and based on prevalence of results, Bentler found that sexual behaviors adhered to a Guttman scale, meaning that individuals who engaged in any given behavior (e.g., ‘vaginal intercourse’) typically had engaged in all of the more prevalent—and usually less intimate--behaviors (e.g., ‘kissing’). Further, similar trajectories emerged for both males and females, progressing from

kissing to breast contact to vaginal intercourse, and finally to oral sex (received by males/performed by females, then mutual oral sex). More recently, using a sample of ~1600 heterosexual Dutch adolescents, deGraf and colleagues (2007) conducted a similar analysis, and found that 73% respondents followed a sexual initiation trajectory categorized as ‘progressive’-- defined as engaging in less intimate behaviors (kissing) at earlier ages than more intimate behaviors (oral sex) —and that females and males were equally likely to adhere to a progressive trajectory.(36)

Sexual Health Implications of Heterosexual Sexual Trajectories

As with analyses focusing on the single indicator of age of first vaginal sex, evidence suggests that differences in sexual initiation trajectories may have significant implications for later-life sexual and reproductive health (SRH).

In the aforementioned study by deGraff and colleagues, respondents who followed the progressive trajectory were significantly less likely than those who followed a “non-linear” trajectory to have engaged in unprotected/condom-less sexual intercourse (anal or vaginal) with their last sexual partner, and they reported a significantly older age of (vaginal) sexual debut.(36) Using data from Add Health, Reese and colleagues (2013) explored the association between sexual initiation *sequence* and teen pregnancy (pregnancy before the age of 20) and found that, compared with women who had vaginal sex first (55% of the sample), odds of teen pregnancy were significantly lower among women who reported oral-genital sex first and waited a year or more before vaginal sex, as well as among those who reported both behaviors at the same age.(37)

Most directly relevant to the current project, Haydon and colleagues used latent class analysis (LCA) to explore whether a multi-dimensional measure of sexual debut similarly

predicted SRH. Using a sample of exclusively heterosexual respondents (defined as reporting exclusively other-sex partners throughout their lifetime) within the nationally-representative National Longitudinal Study of Adolescent to Young Adult Health (Add Health), LCA identified five unique *patterns* (aka ‘latent classes’; briefly summarized in Table 1) of sexual initiation, incorporating information about age of first oral, anal, and vaginal sex encounter, and the ‘timing’ (chronological age), ‘sequence’ (temporal order of behaviors; overall behavioral count), and ‘spacing’ (years between first instance of each encounter) of these behaviors.(38)

Table 1. Sexual initiation classes among heterosexual respondents in The National Longitudinal Study of Adolescent to Adult Health, Haydon et al. (2012)

Class	Defining characteristics	% of Sample
Vaginal Initiators/ Multiple Behavior	-Earliest sexual behavior= Vaginal Intercourse -1+ year between vaginal intercourse and next behavior	49%
Dual Initiators	-Oral sex and Vaginal Intercourse initiated in same year -Did not have anal sex before age 18	32%
Vaginal Initiator/ Single Behavior	-Only ever engaged in a single behavior, usually vaginal intercourse	8%
Postponers	-Delayed all three sexual behaviors till age 22 or older (oldest age of debut) -After first behavior initiated, progressed through all others within same year	6%
Early/Atypical Initiators	-First behavior initiated early (before age 15) -Anal sex before age 18	6%

Numerous differences emerged in young adult SRH outcomes across classes.

Respondents in the postponers class (who reported the oldest age of debut) reported higher parental relationship quality in adolescence than all other classes, and were less likely than the vaginal initiators/multiple behaviors to have ever been diagnosed with an STI or to report recent concurrent sexual partners, replicating the often observed association between increased parental support and delayed sexual initiation.(39,40) However, other results were less predictable. For

example, there was no significant difference in likelihood of STD diagnosis between the most common vaginal initiator/multiple behavior class and either the early/atypical group (earliest age of debut) or the dual initiator group (older age of debut, more behaviors early on).(39)

In addition, sexual initiation class membership was significantly associated with both individual characteristics and the social environment. Several individual aspects of “psychosocial conventionality,” or behaviors, attitudes, and beliefs more in line with typical pro-social convention, predicted ‘less risky’ class membership (i.e., “postponers,” who had delayed ages of sexual debut): for example, male respondents who never attended religious services, relative to those who attended at least once a week, were significantly more likely to be in the vaginal initiator/multiple behavior class than to be in the postponer class, and those who had ever repeated a grade in school were more likely to be in the vaginal initiator/single behavior class.(40) Among females, those who had higher expectations of achievement (defined as higher perceived likelihood of attending college) were more likely to be in both the vaginal initiator/multiple behavior class or the dual initiator class, relative to being in the postponer class.(40) Environmental factors also predicted initiation, though additional differences emerged by biological sex: female respondents from lower SES households (measured as lower parental educational achievement) were more likely to be either “dual initiators” or “early/atypical” initiators, and those with more positive parental relationship quality were less likely to be so. Among males, parental relationship quality was only associated with membership in the “vaginal initiators /single behavior class,” but maternal attitudes towards education was associated with higher likelihood of “early/atypical” initiation.

As these findings suggest, for heterosexuals at least, it may not just be the timing of first vaginal intercourse, but rather where and when vaginal intercourse falls in the *broader sequence*

of sexual initiation, that is crucial for determining later-life SRH. More importantly, explorations of the adolescent predictors of sexual initiation class membership suggest that different initiation sequences may be a function of differences in individual characteristics of the person (e.g. delinquency/problem behaviors [repeating a grade]; achievement orientations) and/or contextual differences in the environment (e.g. parental attitudes and SES), all of which could intersect with timing in important way. Yet, as virtually nothing is known, however, about what is typical or relevant (and, therefore, atypical and potentially indicative of risk) for sexual minority youth, questions remain over whether existing findings from the heterosexual literature are replicable in sexual minority populations, as well as if/how the predictors of sexual initiation, and pathways from initiation to young adult SRH, differ by sexual orientation.

Sexual Trajectories in Sexual Minorities

As early as 1965, Brady and Levitt attempted to use Guttman Scale analyses to determine whether the occurrence of heterosexual and homosexual behavior followed a 'typical' trajectory, surveying 68 male (presumably) heterosexual graduate students on whether they had ever participated in an inventory of 16 sexual behaviors.(41) Results revealed a strongly consistent 'trajectory' that progressed from more frequent heterosexual to less frequent homosexual behaviors, starting with heterosexual 'heavy petting' (contact with female breast, genital touching) as the most common behavior, followed by vaginal intercourse in the missionary position, and oral sex with a female (the least frequently endorsed heterosexual behavior), and finally homosexual genital contact and homosexual oral sex, which were reported by the fewest number of respondents. More recently, Bruce et al. (2012) found initial evidence that gay and bisexual male adolescents may follow a similar progression in sexual debut across multiple behaviors, noting that in their study of 200 self-identified gay and bisexual sexual minority male

adolescents (enrolled between 2004-2005), respondents initiated, on average, with (same-sex) oral sex (mean age=15.0), then progressed to the more intimate behaviors of (other-sex) vaginal sex (mean age=15.5), and receptive and insertive (same-sex) anal sex (mean age=16,5 and 17,0, respectively).(33) Similarly, in a study of 363 HIV+ Black and Hispanic MSM recruited across the country between 2006 and 2009, heterosexual vaginal sex debut occurred, on average, about half a year prior to MSM oral or anal sex debut (mean age=14.1 and 14.5, respectively).(12) In contrast, in a study of approximately 700 sexually active gay and bisexual men in Pennsylvania (recruited in 1984-1985), Lombardi and colleagues (2008) found that across the sample heterosexual vaginal sex debut occurred, on average, one year *after* first same-sex (oral or anal) sexual encounter (mean age=18.8 and 17.6, respectively).(42) However, as none of these studies utilized a nationally-representative sample, questions about generalizability of findings remain. Further, as no such approach has been employed with a female sample, it is unclear if similar sequences exist for sexual minority females.

Though several studies have explored the link between single indicators of sexual initiation, such as age of heterosexual (i.e., vaginal) or same-sex (i.e., oral or anal) sexual debut, and SRH,(12,23) much less is known about patterns of sexual behavior initiation among sexual minorities, and their implication for SRH. Existing studies have often been descriptive in nature, focusing just on detailing prevalence /timing of different behaviors across sexual orientation groups.(29,31) Further, despite differences in heterosexual SRH across racial/ethnic groups, even less information is available on racial/ethnic differences within sexual minorities, as most studies have relied on racially homogenous, often all White or all Black, samples. As a result, research is still needed to both understand the sexual initiation patterns specific to sexual minorities, as

well as to determine if and how within-sexual minority differences in trajectories are associated with later-life SRH outcomes.

Sexual Orientation Differences in Sexual Risk and Emotional Saliency of Debut

Perhaps more importantly to later-life SRH, evidence suggests that sexual initiation and early sexual activity often occurs in higher-risk contexts among sexual minority individuals. In an analysis of the 1995 Massachusetts YRBS, LGB high school students were significantly more likely to have had a recent vaginal intercourse encounter (within last 3 months), and almost twice as likely as EH students to have used alcohol or drugs in their most recent instance of vaginal intercourse.(43) Findings were replicated among SM females and males in studies using the pooled 2005-2007 YRBS sample described above, which found that lesbian and bisexual females were more likely to have used alcohol/drugs, and LGB males and females were less likely to have used a condom or any form of contraception in their most recent sexual encounter.(15,44) In their same-sex encounters, among SM males in particular, sexual debut (and early sexual activity) largely occurred with significantly older partners, often while intoxicated, and without condom use.(33,45)

Similarly, evidence from the teen pregnancy literature, which has repeatedly found that SM females—and bisexual females in particular—report higher rates of teen pregnancy (prior to age 20) than EH peers (13,44,46–49), highlights not only the importance of vaginal intercourse to SM sexual development, but also offers further evidence for sexual orientation differences in the context and consequences of its occurrence. Most recently, an exploration of sexual orientation differences in teen pregnancy risk among female Add Health respondents found that bisexuals were significantly more likely, and lesbians were significantly less likely to report a teen pregnancy than heterosexuals—but among those who *did* experience a teen pregnancy

(n=1,766, out of a sample of 5,972 female Wave IV respondents), both bisexuals and lesbians were more likely than heterosexuals to report an early teen pregnancy (prior to age 18, rather than aged 18-19), and to report multiple teen pregnancies.(50) Further, across sexual orientation, differences emerged in both contextual determinants of sexual risk, and sexual risk taking itself, which offered potential proximal (and, behavioral) explanation for differences in teen pregnancy risk: Relative to heterosexual women, both bisexuals and lesbians reported higher rates of sexual victimization (which has been linked with increased sexual risk),(24,49,51,52) as well as earlier ages of first vaginal intercourse, and, subsequently, higher lifetime (male and female) sexual partner counts.

In addition to occurring in potentially riskier contexts, same- sex and other-sex sexual initiation among sexual minorities may be driven by different motivations, and carry different emotional weight, suggesting that impact of initiation on future sexual development may differ by sexual orientation. Evidence from qualitative studies suggests that the emotional salience of sexual initiation—and definitions of initiation/'virginity loss' itself—differ between sexual minority and heterosexual individuals. In a qualitative study with 124 emerging adults, lesbian women were significantly more likely than heterosexual men and women to consider non-vaginal intercourse encounters (e.g., oral-genital contact) as 'sex. Similarly, across a sample of 61 adults aged 15-35, LGB females and males were significantly more likely than heterosexuals to define virginity loss as first encounter of vaginal, oral, or anal sex with either a same-sex or other-sex partner, whereas lesbian and gay respondents, but not bisexual respondents (or heterosexual respondents), were more likely to identify a non-coital encounter as their *own* experience of virginity loss.(53,54) In this same study, LGB respondents were significantly more likely than EH respondents to view their virginity loss as simply one stage in their overall sexual

‘process,’ whereas, in contrast, heterosexuals were more likely than lesbian and gay—but not bisexual—respondents to describe their virginity loss as an emotionally meaningful and important ‘gift’ they gave to their sexual partner.(54) Finally, findings from a recent focus group with SM adults (n=18) noted that respondents spoke of multiple virginity losses—distinguishing between their first same-sex and other-sex encounters—and that the typical virginity rhetoric (and its emphasis on heterosexual coital encounters) made the concept of virginity difficult to define, if not explicitly irrelevant, to SM populations.(55) Taken together, these findings highlight how the ways sexual minorities view their sexual initiation—and even how they define it—substantially differ from those of exclusively heterosexuals, further necessitating population-specific indicators and models of sexual debut.

In summary, though research on sexual development has focused historically on vaginal intercourse, there is growing interest in expanding the repertoire of sexual behaviors examined and exploring their possible differential implications for later health. Though this expanded focus has been seen in the heterosexual literature, these questions have not yet been adequately explored among sexual minorities, despite preliminary evidence suggesting that the patterns and timing of individual sexual behaviors, as well as their relevance and meaning, likely differ by sexual orientation.

Study Overview

Following, my dissertation will aim to address these limitations in the literature, while exploring the following research questions:

Paper 1: What are the ‘typical’ sexual initiation patterns among US sexual minority males and females, with regards to oral, anal, and vaginal sex? Within-biological sex, are

there differences in sexual initiation by sociodemographic characteristics (race/ethnicity, socioeconomic status, religiosity, etc.)?

Paper 2: What are the adolescent psychosocial determinants of sexual initiation? What are the implications of sexual initiation pattern on SRH in young adulthood (particularly lifetime STD diagnosis and sexual partnering history)? Is there a SM-specific model of the pathways from adolescent psychosocial processes (e.g., perceived interpersonal support and self esteem) to young adult sexual and reproductive health that occurs through sexual initiation experience? And if so, does it differ by race/ethnicity?

CHAPTER 2: THEORETICAL FRAMEWORK

In devising and testing a sexual minority-specific model of the adolescent antecedents, and young adult SRH outcomes, of sexual initiation class membership, my dissertation is largely informed by the two theoretical frameworks of life course theory and minority stress theory/psychological mediation framework.

Life Course Theory

Much of the research on the importance of age/timing of sexual initiation to later life SRH is informed by **life course theory**, which holds that adult attitudes, beliefs, and behaviors—including health behaviors—are determined not just by concurrent exposures, but rather by the accumulation of experiences across one's lifetime, as well as the timing and contexts of personally and developmentally significant milestones and transitions.(56,57) A key component of life course theory is the principle of 'timing in lives,' which holds that "the developmental impact of a succession of life transitions or events is contingent on when they occur in a person's life.”(56) First vaginal intercourse has therefore been viewed in the developmental literature as a critical 'life transition' *event*, dichotomized as transitioning between traditionally defined virginity (never having penis-in-vaginal vaginal intercourse) and becoming sexually active, such that a non-normative 'off-time' debut— debut that occurs earlier or later than typical—can have substantial implications for when and how the rest of one's sexual history and development unfolds.(1,58) A corollary hypothesis—which I will aim to support in my dissertation—is that sexual debut is best modeled as a 'multiphasic' *succession of events*, with the timing and context

of first instance of *multiple* sexual behaviors (both individually, and in relation to each other) that is more important for future sexual development and trajectories.

While sexual orientation differences in the likelihood of different sexual behaviors, as well as the timing of sexual behavior initiation, are likely sufficient to warrant sexual minority-specific explorations of debut, studies must also account for the broader socio-environmental context within which sexual minority adolescents live, and how this environment influences sexual debut. An additional tenant of life course theory is that of “historical time and place,” or that individuals are “embedded in and shaped by the historical times and places they experience over their lifetime.”(56) For sexual minorities this is particularly relevant, as this population has historically encountered numerous macro-level sources of stigma and discrimination, many of which have rapidly begun to change in the past decade. For example, a potentially relevant historical factor at the policy level is a same-sex marriage ban, which, when in place, has been conceptualized in the literature as a ‘fundamental cause’ of health inequity, operating as a structural determinant that impacts health by affecting distal exposures such as power, resource access, and social status.(59–61) Following, prior research has found that sexual minorities report worse mental and physical health when living in a state with an existing (and/or recently enacted) same-sex marriage ban.(62–65) At the social/interpersonal level, ‘historical’ context can also be conceptualized as the prevailing social opinion and acceptance towards sexual minorities.

Minority Stress Theory and the Psychological Mediation Framework

Beyond life course theory, two complementary theories, minority stress theory and the psychological mediation framework, have been offered which explicitly focus on unpacking the determinants of (sexual) minority health disparities. Both theories move beyond a focus on individual motivations and risk behaviors, and instead situate health disparities within a socio-

environmental (and historical) context. The initial theoretical framework was Ilan Meyer's **minority stress theory**, which is largely focused on between-group differences in exposures and encounters to 'stressors', and how these differences lead to between-group health disparities. Broadly, the theory holds that SM individuals experience higher numbers of repeated, lifelong stressors than majority individuals as a result of the stigma, lowered social position, and lack of power/status associated with that identity in the social environment. Stressors include both 'general life stressors'—traditional stressful life events like death of a loved one, losing a job, etc. that are not necessarily directly related to minority identity—and 'minority stressors,' or stressors that occur as a result of being a sexual minority, such as prejudice/discrimination, violence, and victimization. In turn, these increased stress exposures are hypothesized to increase the risk for adverse health both directly, and through a more proximal stress process wherein stressors bias perceptions of one's self and/or their 'place' in the social environment, reducing access to resources and coping mechanisms such as social support and self-esteem.(66)

As a complement to minority stress theory, Mark Hatzenbuehler proposed the **psychological mediation framework**, which focuses more explicitly on elucidating the mediating pathways through which stressors impact mental health.(67) As stated by Hatzenbuehler (2009), whereas the minority stress model holds that

“stress is a mediator in the relationship between social status/illness...[the psychological mediation framework] takes stress as an initial starting point in the casual chain...then focuses on isolating ...the processes that stigma-related stress causes.”(67)

The primary components of the model include three types of mediators (i.e., 'processes'): (A) emotional regulation, which holds that stress can lead to maladaptive strategies for handling emotions and/or stress exposure, increasing risk of adverse mental health; (B) social/interpersonal processes, which holds that stress reduces access to social support and/or decreases

willingness to engage in social situations, increasing risk for social isolation and subsequent psychopathology; and (C) cognitive processes, which include how individuals conceive of themselves (e.g., self-esteem and self worth) and/or the world (e.g., pessimistic or hopeless ‘schematics’ about the world and future). From here, it is hypothesized that it is *individual and within-group differences in the psychological processes* through which stressors “get under the skin” and are internalized that impact health.

Both theories were initially devised to offer explanations of mental health and mental health associated-‘psychopathology’ (operationalized as alcohol use disorders in the psychological mediation framework), and empirical support for these frameworks has therefore largely focused on the positive associations between stress (e.g., bullying, peer victimization, parental rejection, etc.), psychosocial stress processes (e.g., self-esteem, perceived social support, etc.) and mental health and well-being measures such as suicidal ideation,(68–72) tobacco use, (73–76) and depressive symptomology(77–80)among SM youth and adolescents.

How these stressors and stress processors contribute to sexual behavior remains understudied, though existing evidence suggests they may similarly be realized as differences in adolescent and/or later-life sexual risk. For example, using YRBS data from 2005-2007, Rosario and colleagues (2014) found that while SM respondents were significantly more likely to report numerous measures of sexual risk (including earlier age of first vaginal intercourse, more lifetime sexual partners, and unprotected sexual encounters), this association was significantly attenuated when models adjusted for peer victimization experiences. In my models, therefore, I will explore whether psychosocial stress processes are equally important determinants of sexual initiation behaviors among SM youth.

Rather than view these two theories in parallel, my dissertation aims to integrate them into a single model, by modeling sexual initiation class membership (M) as a mediator, offering a plausible mechanism for how adolescent psychosocial process (X) leads to SRH (Y). Namely, whereas life course theory suggests that sexual initiation could be a critical determinant of later life SRH owing to its developmental significance as a ‘life transition’ (M->Y), and minority stress/psychological mediation suggests that there are psychological, psychosocial, and environmental contexts—and subsequent differences in psychological and psychosocial processing—specific to sexual minorities that lead to health (X->Y), my model hypothesizes the differences in adolescent psychosocial processing will be realized as differences in the timing, sequence, spacing, etc. of sexual initiation (X->M), which itself will have significant implications for future sexual development and sexual risk (M->X). In addition, by comparing differences across race/ethnicity, my model offers a more nuanced approach towards understanding SM health by focusing on within-SM differences. Together, results from my analyses further offer the potential to inform multiple points of intervention to prevent between-group, and within-group, SRH disparities.

Intersectionality: Exploration of Within-Sexual Minority Differences

No one theory can capture *every* aspect of the broader social environment. While minority stress theory and the psychological mediation framework are notable in that they explore structural, social, and contextual determinants, to date, these theories have often been used to explore health disparities across a single dimension of minority status, despite the fact that identity (and the lived experience of one’s identity) can rarely be reduced to a single facet. In response, intersectionality frameworks prioritize understanding and accounting for social determinants of health among vulnerable populations who exist at the intersection of multiple

minority identities (e.g., race, gender, sexual orientation). Rather than view the impact of these identities as additive, intersectionality acknowledges that, in the words of Lisa Bowleg, one of the preeminent intersectional public health scholars,

“social identities are not independent and unidimensional but multiple and intersecting...[and these] multiple social identities at the micro level (i.e., intersections of race, gender and SES) intersect with macrolevel structural factors (i.e., poverty, racism, and sexism) to illustrate or produce disparate health outcomes.”(81)

Following, this dissertation will incorporate an intersectional lens throughout by focusing on an analytic sample that exclusively includes sexual minorities, and exploring *within*-sexual minority differences, primarily by biological sex and race/ethnicity (such as sex-stratified latent class analyses in Chapter 3, and multi-group SEM in Chapter 4). To date, the majority of sexual orientation research has focused on comparisons between sexual minority and heterosexual majority respondents, precluding more in-depth explorations of health disparities. My dissertation will therefore not only expand understanding of sexual minority health by addressing this gap in the literature, but also help to direct future interventions towards those populations most at need and those factors that mostly closely contribute to within-sexual minority disparities.

CHAPTER 3: SEXUAL INITIATION PATTERNS OF US SEXUAL MINORITY YOUTH: A LATENT CLASS ANALYSIS¹

Introduction

Throughout the sexual health literature, the single indicator ‘age of sexual debut,’ typically defined as age at first vaginal intercourse, has been used to link sexual and reproductive health (SRH) outcomes in young adulthood to early-life (sexual) experience and sexual risk. One recent review of 65 studies found that earlier first vaginal intercourse was predictive of numerous lifetime risky sexual practices, including higher sexual partner counts, concurrent sexual partners, diagnosis of sexually transmitted diseases (STD), and transactional sex.(1) Informed by life course theory, which holds that adult attitudes, beliefs, and behaviors—including health behaviors—are determined not just by concurrent exposures, but by the accumulation of experiences across one’s lifetime, and the timing and contexts of personally and developmentally significant milestones and transitions,(56,57) this approach hypothesizes that sexual debut is one such critical ‘life transition’ *event*. The timing of the “critical transition” of first vaginal intercourse, dichotomized as transitioning from never having penis-in-vagina intercourse to having had this experience, is therefore theorized to have substantial implications for when and how the rest of one's sexual history and development unfolds.(1,58)

For lesbian, gay, and bisexual sexual minority [SM] youth, however, penis-in-vagina intercourse may be less relevant to future sexual development. Though vaginal intercourse is

¹ This chapter is currently under review at *Perspectives on Sexual and Reproductive Health* under the following citation: Goldberg S, Halpern CT. “Sexual Initiation of (original submission: December 2015; Revise-and-Resubmit submission: May 2016)

common among SM adolescents,(28,29) evidence from the qualitative literature suggests it might not carry the same emotional salience for SM and heterosexual individuals. Previous studies have noted that gay and lesbian respondents were significantly more likely than heterosexual peers to consider non-vaginal intercourse encounters (e.g., oral-genital contact) as ‘sex,’(53) identify a non-coital encounter as their *own* experience of virginity loss, or view vaginal virginity loss as just one stage in their overall sexual process, rather than as an emotionally meaningful ‘gift’ to a partner.(54) Most relevant to the present study, one focus group of SM adults (n=18) spoke of multiple virginity losses—distinguishing between first same-sex and other-sex encounters—and noted that typical virginity rhetoric (and its emphasis on heterosexual coitus) made the concept of virginity difficult to define, if not explicitly irrelevant, to SM populations.(55)

Evidence suggests that the *determinants* of sexual initiation (and early life sexual risk) may also be quite different across sexual orientation. For example, among the general [heterosexual] population, adolescents who score higher on various measures of religiosity at initial interviews typically report older age at first vaginal intercourse or a higher likelihood of remaining a virgin than their less religious peers (see Cotton [2006](82)), yet the opposite has been seen in SM samples, among whom religiosity has been found to be predictive of increased sexual risk.(83–85) SM youth also report higher rates of behaviors and socio-environmental exposures associated with both earlier and riskier (without contraception; while intoxicated; etc.) sexual initiation, including sexual victimization.(13,24–26) Given that across-sexual orientation differences exist in both sexual risk and sexual risk factors, population-specific measures and models are needed which account for the contexts of SM adolescent sexual behavior, as well as utilize SM-specific measures of adolescent sexual initiation.

The narrowly-defined operationalization of ‘sexual debut’ as the singular experience of vaginal intercourse further ignores the fact that adolescent sexual experience often includes oral sex and, to a lesser extent, anal sex, and that timing and contexts of all of these behaviors may be important for later sexual health. An alternate life course-informed approach would be to conceptualize sexual debut as a ‘multiphasic’ *succession of events* that, together, are important for future sexual development and trajectories. Recent studies have adopted this broader interpretation and explored how differences in the sequence and timing of multiple sexual behaviors are associated with later life SRH. Haydon and colleagues conducted a latent class analysis (LCA) to empirically derive *patterns* of sexual initiation, incorporating information about age of first oral, anal, and vaginal sex encounter, and the ‘timing’ (chronological age), ‘sequence’ (temporal order of behaviors; overall behavioral count), and ‘spacing’ (years between first instance of each encounter) of these behaviors, among a sample of exclusively heterosexual respondents (defined as reporting exclusively other-sex partners throughout their lifetime) within the nationally-representative National Longitudinal Study of Adolescent to Young Adult Health (Add Health).(38) Respondents were characterized into one of five different ‘classes,’ each reflecting a distinct sexual initiation pattern incorporating all of the aforementioned information. Numerous differences in adolescent characteristics predicting class membership, and young adulthood SRH outcomes associated with membership, emerged. Respondents in the “postponers” class (defined partly by reporting the oldest age of debut of any behavior) reported higher parental relationship quality in adolescence than all other classes, and were less likely than “vaginal initiators/multiple behaviors” (the largest class, initiated with vaginal intercourse, also engaged with multiple other behaviors in the same year) to have ever been diagnosed with an STD or to report recent concurrent sexual partners.(39,40)

Though these findings suggest that broader approaches to measuring sexual initiation may be necessary, the utility of Haydon and colleagues' sexual initiation classes for sexual minority-focused analyses remains unclear, particularly as their model collapsed classes across biological sex. Several studies have noted that SM adolescents engage in non-coital encounters (e.g., oral and anal sex), at different times, and in different sequences, than heterosexual peers, yet preliminary evidence suggests notable differences exist in sexual initiation between SM males and females: One study of sexually active female high school students in California, found that SM females were significantly more likely than exclusively heterosexual females to have engaged in oral sex and anal sex, but were significantly less likely to have had heterosexual vaginal intercourse,(32) whereas a study of gay and bisexual adolescent males (aged 15-22) based in Chicago and Miami found that respondents were significantly more likely to have engaged in oral and/or anal sex with a male partner, than vaginal intercourse with a female partner.(33) As these studies have exclusively drawn from small, non-representative, single-sex samples, it is difficult to draw final conclusions, necessitating additional explorations that rely on nationally representative samples.

A related limitation of the existing data on SM sexual initiation is the lack of explorations of within-SM differences by characteristics such as race/ethnicity and socioeconomic status. Though numerous studies have identified demographic differences in timing and prevalence of oral, anal, and vaginal sex among heterosexual adolescents and young adults, comprehensive studies of within-SM demographic differences are rare. Understanding differences in sexual initiation patterns may be critical to understanding later life SRH disparities, as well as reflect key contextual determinants of sexual decision-making. For example, race/ethnicity seems to strongly moderate the stressors SM youth encounter: prior studies have found that SM

adolescents of color report higher rates of bullying, skipping school due to safety concerns, and suicidal ideation than their white SM peers,(68) as well as higher rates of STDs in young adulthood.(86) Understanding the intersecting influence of multiple demographic characteristics on sexual initiation may therefore elucidate potential points of intervention, as well as further understanding of the social determinants of later-life SRH.

The present study will address these gaps by replicating the sexual initiation LCA conducted by Haydon and colleagues among an exclusively sexual minority population, stratified by biological sex, using data from the nationally representative National Longitudinal Study of Adolescent to Adult Health. In addition, this study will explore sociodemographic differences of resulting classes, addressing a major gap in the sexual minority adolescent literature, which to date, has predominantly relied on small, homogenous, convenience samples. In doing so, this will be the first study to develop a model of sexual initiation specific to lesbian, gay, and bisexual SM adolescents, as well as the first to utilize a large, racially and socioeconomically diverse, nationally representative sample to explore differences between and within biological sex.

Methods

Data and Sample

This project uses data from The National Longitudinal Study of Adolescent to Adult Health (“Add Health”), an ongoing prospective study of a nationally representative probability sample of 20,745 adolescents in grades 7-12 during the 1994-1995 school year. To date, four waves of in-home interviews have been completed, most recently in 2008 (n=15,170), when respondents were aged 24-32. Detailed information on the Add Health study design is reported elsewhere.(87)

Inclusion in the present analysis was limited to sexual minority respondents who participated in Waves I and IV, had a valid sampling weight, provided non-missing data on all sexual initiation indicators and model covariates. Following approaches utilized elsewhere,(15,45,88) a respondent was considered a sexual minority if they self-identified as anything other than 100% heterosexual (including "mostly heterosexual," "bisexual," "mostly homosexual," and "100% homosexual"), and/or self-reported a lifetime history of one or more same-sex sexual partners at the Wave IV interview (cross-tab of sexual orientation indicators [identity endorsement and lifetime partnering history] among included SM sample reported in Appendix A). As analyses focused on sexual initiation, the sample only included sexually experienced respondents—defined as engaging in at least one sexual behavior (oral, anal, or vaginal sex) as of the Wave IV interview—excluding those respondents who had never engaged in any behavior (n=67; 28 females/39 males).

Measures

Sexual Initiation Indicators (class components): Five separate indicators of sexual initiation were constructed based on self-reports from the Wave IV interview. Respondents were asked (in separate questions) if they had ever had vaginal intercourse (“*when a man inserts his penis into a woman’s vagina*”), oral sex (“*a partner put his/her mouth on your sex organs or you put your moth on his/her sex organs*”), and anal intercourse (“*when a man inserts his penis into his partner’s anus or butt hole*”), and, if answered in the affirmative, “*how old were you the very first time?*” Using these answers, the following indicators were constructed, paralleling the coding schemes used in the heterosexual sample, unless otherwise indicated: **Timing of First Sexual Behavior**, continuously coded as initiation age of earliest sexual behavior (oral, anal, vaginal; range: $\leq 10-29$ [all ages reported as less than 10 years old were coded as 10]); **First**

Sexual Behavior, (Vaginal Intercourse only/ Oral Sex only/ Vaginal Intercourse + Oral Sex in same year/ Anal Intercourse without Vaginal Intercourse [includes anal intercourse-only & anal intercourse + oral sex in same year]/ Anal Intercourse + Vaginal Intercourse in same year [with or without oral sex in same year]) categorized in the interest of parsimony, with the two anal intercourse categories included as unique categories for the present analysis, reflecting common patterns seen in the SM sample; **Spacing Between 1st and 2nd Behavior**, (1 year/2 years/ 3-5 years/6+ years/ Single Lifetime Behavior/ Multi-Behavior debut) reflecting number of years between initiating first and second sexual behavior; **Anal Sex Before Age 18**, dichotomized (yes/no); and **Number of Types of Sexual Behaviors**, a count variable (range 1-3) defined as the number of behaviors, of the three assessed, the respondent had ever engaged in over their lifetime

Sociodemographic Predictors: Several sociodemographic characteristics (measured at Wave I/adolescence, unless otherwise indicated) were included as predictors of sexual initiation, based on their strong associations in the general adolescent literature with timing of sexual debut and adolescent sexual risk (89,90): Demographic characteristics included **Wave IV Age** (categorized as 24-26/ 27-29 [*Referent*]/ 30-34); **Race/Ethnicity** (Hispanic Ethnicity-any Race/ Non-Hispanic (NH) –White [*Referent*]/ NH-Black/ NH-Asian) based on respondents' self-report at Wave I, with supplemental self-reported race/ethnicity from Wave III used as needed;

Parental Educational Attainment (Less than High School [HS]/ HS diploma or GED/ Some college or post-HS education/Bachelor's Degree or Higher [*Referent*]), a proxy measure for Wave I socioeconomic status, was defined based on parental self-report (at Wave I) of the highest educational level obtained by ≥ 1 respondent's parent/guardian; and **Neighborhood poverty**, reflecting the proportion of families in the respondents' Census block group with

dependents younger than 18 years and income below the federal poverty level (FPL) in 1989, categorized as low (<11.6% of families below FPL; referent), medium (between 11.6% and 23.9% below FPL), and high (>23.9% below FPL).(91)

Two measures of religiosity were included, based on evidence that sexual orientation may moderate the association between religiosity and sexual initiation.(84) **Past year public religious participation**, was constructed by summing responses (4-item Likert scale, 0=never; 3= once/week) to two measures, '*frequency of attending religious services*' and '*frequency of participating in religious youth activities*' (standardized Cronbach's $\alpha=.77$). Possible scores ranged from 0-6. **Private religiosity** was constructed by summing responses to two measures (standardized Cronbach's $\alpha=.86$): "*how important religion is to you*" (4-item Likert scale; 0= not important at all; 3=very important), and "*how often do you pray*" (5-item Likert scale; 0= never; 4=once/day). Possible scores ranged from 0-7. For both measures, higher scores indicated stronger religiosity.

Three measures of 'pre-debut' sexual victimization were included (all reported at Wave IV), to assess how victimization may influence debut, as well as control for non-consensual initiation experiences: **Childhood sexual abuse** (CSA) defined as "*a parent or adult caregiver touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations*" before age 18; **Physically forced sex** ("*forced physically to have any type of sexual activity against your will*"); and **Coerced sex** ("*forced non-physically*"), the latter two explicitly defined to have occurred with a non-parent/caregiver. Respondents further reported the age at which the event first occurred; only those encounters which first occurred at an age younger or equal to the respondent's age at their earliest debut experience were included.

Finally, **Pre-18 Sexual Partners** (None; Other-sex only [*Referent*]; Other-sex + Same-Sex; Same-Sex only), constructed from summing Wave IV retrospective self-reports of the number of male and female sexual partners—“*considering all types of sexual activity*”—the respondent had prior to age 18, was included to place initiation in the context of overall early-life sexual history.

Approach

The present aim is to develop a broader measure of sexual initiation that accounts for timing, sequence, and spacing of oral, anal, and vaginal sexual initiation using the person-centered approach of latent class analysis (LCA). In LCA, multiple observable variables (‘indicators’) are used to capture a single unobservable (latent) construct, and *respondents* who are highly similar to each other, but highly distinct from other respondents on indicator variables, are grouped together in a class.(92)

Sexual initiation indicator variables were first constructed in STATA (v. 13.0),(93) and then output to Latent Gold, a specialized latent class software package, to conduct the LCA. LatentGold was selected for its ability to handle survey weights, categorical and continuous indicator variables, and ease of use.(94) Within biological sex, parallel solutions ranging from 1 to 9 classes were fit and compared, incorporating survey weights, adjusting for the complex Add Health survey design, and utilizing 250 iterations/250 start values to avoid producing a local solution. No a priori hypotheses were made about the number or structure of the resulting classes; determination of the final number of classes was based on interpretability of solutions, size of resultant classes, goodness-of-fit-tests (AIC, BIC, CAIC, and entropy; lower AIC/BIC/CAIC, and higher entropy, indicate better fit), and violations of local independence.(95)

Once the solution was selected, respondents were ‘assigned’ to the single class for which their posterior probability of membership was highest, and class membership assignment was output to STATA for subsequent analyses: Descriptive bivariate analyses (chi²-test [categorical variables], F-tests [continuous variables]) were conducted to explore within-class distributions of sociodemographic characteristics, as well as test for significant differences between classes (within biological sex). Finally, multinomial logistic regression models, regressing class membership on all predictors, were fit to assess if sociodemographic characteristics predicted likelihood of class membership (e.g., if Black males were more likely than White males to be assigned to class i).

Results

Sample Characteristics

A total of 2,154 sexual minority respondents were included for analysis, the majority of whom were Non-Hispanic White, aged 27-29, and spent adolescence in a moderately educated (some college or Bachelor’s degree or higher) household in a low poverty neighborhood (Table 2). The sample was majority female (n=1,628 vs. 526 males), largely due to differences in the number of respondents self-identifying as mostly heterosexual, which was reported by significantly more females than males (endorsed by 65.7% females vs. 41.8%, respectively, $p < .001$; Table 3), conforming to prevailing theories of greater flexibility and fluidity in how women (relative to men) conceive of their sexual identity.(96–100)

In addition to differences in identity, there were notable significant differences in sexual initiation by biological sex (Table 3): For example, females reported an age of first sexual encounter approximately half a year earlier than males (15.5 vs. 16.2, respectively; $p < .05$), a higher proportion of males than females had engaged in only a single behavior over their lifetime

(16% vs. 4%; $p < .001$), and the most common initiation behavior was vaginal intercourse for females and oral sex for males.

Patterns of Sexual Initiation

After comparing the 1-9 class solutions (Table 4), fit statistics indicated that either a 4- or 5-class solution was the best fit for both males and females. For females the 5-class solution produced a class that was indistinguishable from others, and for males, the 5-class solution produced two classes with small cell sizes (< 40), so the 4-class solution was selected for both. Local independence violations were considered by examining bivariate residuals (BVR) between each of the indicators; BVR greater than 1.0 were considered indicative of a violation. Two indicator pairs were above this threshold for females (first sexual act/ anal sex prior to age 18; Spacing between 1st and 2nd behavior/anal sex prior to age 18). To account for this violation, a local dependent model was fit, conditioning on first the former pair, which had the larger BVR of the two pairs, then on second pair as well, until no further BVR violations were noted. For males, one indicator pair was above this threshold (Spacing between 1st and 2nd behavior/anal sex prior to age 18); conditioning on this pair resulted in no further violations. As the 4-class, local dependent solutions explained approximately 84% of the variance in sexual initiation indicators for females, and approximately 97% of the variance for males; as well as produced low classification errors for both (8% for females; 1% for males), these solutions were retained as the final models.

Distributions of sexual initiation indicators (Table 5) and sexual identity /partnering history (Table 6) across sexual initiation class were explored to determine the defining characteristics of each class. As respondents were assigned to the class for which they had the

highest probability of membership, there was some within-class variability in sexual initiation patterns; following, labels for each class are based on the modal distribution for the class.

For SM females, **the largest class, “typical debut”** (41%; n=655) was characterized by an initiation pattern similar to that of the whole female sample (e.g., timing of first sexual encounter [15.3 years] close to average age for all females [15.5 years]; Table 4). Females in this class reported the shortest spacing between their 1st and 2nd sexual behavior (>69% had spacing of 1-2 years), and largely initiated with vaginal intercourse (58%), though approximately 15% debuted with multiple behaviors. This class also contained the highest proportion of females reporting early-life (e.g., pre-age 18) bisexual sexual partnering (reported by 17%, relative to 11%-16% in other classes).

All females assigned to the **second-largest class, “dual behavior debut”** initiated with multiple behaviors, ~96% of whom did so with vaginal intercourse and oral sex. Females in this class were largely ‘minority-identified/heterosexually experienced;’ relative to other classes, they had the highest probability of identifying as mostly heterosexual, yet also had highest probability of lifetime partnering exclusively with men.

Females in **the third class, “early sexual debut,”** reported the youngest timing of first behavior (mean age=13.3), but the longest spacing between 1st and 2nd behaviors (21% waited 6+ years). All respondents reported a single-behavior debut (88% with vaginal intercourse). Early anal intercourse was common, with a little under 28% engaging in anal sex before age 18. Early sexual debut females were the most likely to report lifetime bisexual partnering (reported by 67% respondents, compared with 43%-61% in other classes), though largely did not do so until later in life, with 84% reporting exclusively male partners before age 18.

Females in the **fourth class, “delayed debut with oral sex”** reported the oldest average age of debut (mean=18.1 years old), and were the most likely to report oral sex as their initial—if not only--sexual behavior (these females were the most likely to have engaged in a single sexual behavior in their lifetime). This class contained the most ‘consistent’ SM females; all females reporting exclusively same-sex lifetime sexual partners were in this class (comprising 27% of the class), and the class had the highest proportion of females identifying as bisexual, mostly homosexual, or 100% homosexual.

Initiation classes for males followed somewhat similar patterns, though the behaviors that defined each class, and the relative size of each class, differed. The **largest male class, “single-behavior debut”** (50.4%; n=273) was distinguished by an exclusively single behavior initiation, the majority of whom (76%) did so with oral sex (an additional 23% initiated with vaginal intercourse, the largest proportion of any of the classes). This class also included the highest proportion of males who had engaged in only a single lifetime behavior (14%).

The **second male class, “multi behavior debut”** (32.3%; n=169) was distinguished by the oldest timing of first encounter, which largely involved dual initiation with vaginal intercourse+ oral sex during the same year of age (82%), somewhat paralleling the female sample—in contrast to females, an additional 13% initiated with anal intercourse +oral sex, and 6% initiated with all three behaviors. As with females, this class largely contained ‘sexual minority-identified/heterosexually experienced’ respondents--More than one third (35%) reported only other-sex lifetime sexual partners (the largest proportion of any class), yet only 19% identified as exclusively heterosexual.

The **third male class, “early anal sex”** (11.2%; n=52) was distinguished by exclusively early engagement with anal intercourse, with ~65% reporting an initiation that involved anal

intercourse (56% either as a single behavior or with oral sex), and 100% engaging in anal intercourse before age 18. This class contained the ‘most consistent’ sexual minority males, including the highest proportion of bisexual or 100% homosexual identified males, as well as the highest proportion reporting lifetime same-sex sexual partners.

The fourth male class, “very early debut,” (6.2%; n=32) was distinguished by a mean age of first encounter ≤ 10 years old, and long spacing between 1st and 2nd sexual behavior (77% reported spacing of 6+ years). All respondents initiated with a single behavior, typically oral sex (81%). This class contained the highest proportion of homosexually-experienced-heterosexuals, as well as the highest proportion reporting lifetime bisexual partnering.

Bivariate Associations Between Sociodemographics and Sexual Initiation Class Membership

Among females, strongest associations between class membership and sociodemographics (Table 7) were observed with race/ethnicity and pre-18 sexual partnering. The dual behavior class contained a significantly higher proportion of White females than other classes, whereas the early debut class contained a significantly higher proportion of Black females, and lower proportion of Asian females. Females in the early debut class were significantly more likely to report exclusively other-sex partnering, whereas the delayed initiation with oral sex class was somewhat bimodal, containing both the highest proportion of those with no pre-18 sexual partners, as well as the highest proportion reporting exclusively same-sex partners. Typical debut females had the highest proportion of bisexual pre-18 partnering, though this differed significantly only from the dual behavior debut class, whose members reported the lowest proportion (17% vs. 11%, respectively).

There were fewer significant associations for males, but several are notable. Males in the early anal sex class were the most likely to report all forms of sexual victimization before sexual

debut, and were significantly more likely to have experienced victimization than those in the multi behavior debut class, who were the least likely to report victimization. Multi behavior debut males were significantly less likely to report pre-18 bisexual and exclusively same-sex partnering, whereas those in the very early debut class were most likely to report these partnering patterns.

Multivariate Associations Predicting Sexual Initiation Class Membership

In final multivariate models (Table 8), pre-18 sexual partnering history was the strongest predictor of class membership for both females and males. Females with no sexual partnering prior to age 18 were significantly more likely to belong to the dual behavior debut class (Relative Risk Ratio[RRR]: 3.2), and significantly less likely to belong to the early debut class (RRR: .03), relative to the referent class, typical debut. Females both with no sexual partnering prior to age 18 (RRR: 15.4), and with exclusively female partnering (RRR: 34.2), were more likely to appear in the delayed debut w/oral sex class, though the wide confidence intervals and extreme effect estimates suggest that the small sample size of the class may somewhat limit interpretability. Men with exclusively same sex (RRR: .20) or bisexual (RRR: .36) pre-18 partnering history were significantly less likely to be in the multi behavior debut class, and were significantly more likely to be in the very early debut class, relative to the referent class, single behavior debut.

Additional significant predictors emerged by biological sex. Black females were significantly less likely to be in the dual behavior debut class (RRR: .47), as were those from families with less than HS education (RRR: .42); in contrast, females from moderate neighborhood-level poverty were more likely to be in this class (RRR: 1.50). Females who reported stronger private religiosity were more likely to be in the early debut class (RRR: 1.12), as did those who were Black (RRR: 2.22). Among males, those who reported CSA prior to

sexual debut were significantly less likely to be in either the multi behavior debut (RRR: .28) or very early debut class (RRR: .04), and were more likely to be assigned to the early anal sex class, though the latter difference was non-significant.

Discussion

In this study, we identified eight unique patterns of sexual initiation among sexual minorities, with patterns differing by timing, sequence, and initiating behaviors. Patterns differed between males and females, and further socio-demographic differences were observed within biological sex.

Of note, only 33% respondents (41% females /20% males) initiated exclusively with vaginal intercourse, and over 28% (19% females /62% males) reported an initiation pattern that did not include vaginal intercourse at all (Table 3). In comparison, among the heterosexual respondents included in Haydon and colleagues (2012), initiation with vaginal intercourse was a bit more common: 39% (51% females/29% males) initiated exclusively with vaginal intercourse, and only 17% reported an initiation pattern that did not include vaginal intercourse (3% initiated with anal intercourse, but the study did not distinguish between anal intercourse with and without oral sex or vaginal intercourse in the same year).(38) Taken together, these results highlight how an exclusive focus on vaginal intercourse as ‘sexual initiation’ can misclassify sexually active adolescents as ‘pre-debut,’ particularly those who are sexual minorities.

In addition, there were several notable differences in the defining patterns of male and female sexual initiation classes (Table 5): For example, a single early debut class emerged for females, who typically initiated with vaginal intercourse, whereas for males, two early classes emerged, early anal sex and very early debut, each defined by a different initiation behavior (anal intercourse or vaginal intercourse + oral sex in the same year, vs. oral sex, respectively). The

largest class for both was defined by single behavior initiation, yet this was vaginal sex for females and oral sex for males, which occurred approximately 1 year earlier for females, emphasizing that differences by biological sex should be considered in any exploration of sexual initiation.

Within-SM differences further extended beyond biological sex to other sociodemographic characteristics: For example, there was a strong association between race/ethnicity and class membership for women—black women were significantly more likely to be in the early debut class, and significantly less likely to be in the dual initiation class than any other race, whereas white females were significantly more likely to be in the dual initiation class. As the early debut class reported several indicators traditionally associated with sexual risk, including earliest age of sexual debut (with less than 0.5% reporting no sexual partners before age 18), and highest likelihood of early anal sex, this result replicates findings in the general adolescent health literature that black females engage in behaviors associated with sexual risk (in particular, earlier ages of vaginal intercourse initiation) at higher rates than other-race peers, regardless of sexual orientation.(101,102) Taking an intersectional approach, these results may reflect the ‘triple jeopardy’ faced by black SM females, who, as they exist at the intersection of three minority identities, may face unique stressors and stigmas which lead to increased sexual risk.(81,103) That females in the early debut class were also significantly more likely to report structural vulnerabilities often faced by minority race groups, such as markers of lower SES (including higher neighborhood poverty and less educated parents), as well as were at increased risk of sexual victimization relative to all other groups, further corroborates this hypothesis. More importantly, these results highlight how health disparities are often not the result of innate population differences in risk, but rather can be tied to the interplay of stressors across multiple

levels of the social-ecological model faced by minority populations (often at substantially higher rates than majority populations) which in turn increases vulnerability by limiting access to status, power, and resources.(81)

Interestingly, there were no significant associations between race/ethnicity and class membership for males. That numerous existing studies have found that black SM adolescent males are disproportionately affected by HIV and STDs relative to other-race SM peers,(2,104) and often are more likely to engage in riskier sexual behaviors such as earlier sexual partnering, more frequent sexual partnering, and ‘riskier’ sexual partnering (unprotected; with significantly older partners; under the influence of drugs/alcohol), (105–107) our lack of significant racial differences in initiation class membership is surprising. A simple explanation for this discrepancy may be due to the substantially smaller male sample, which limited statistical power to detect sociodemographic differences across initiation classes. Another, more developmental explanation, may be that racialized differences in structural /contextual determinants of later life HIV/STD risk may differ from determinants of sexual initiation. For example, while homophobic community norms may increase the likelihood of sexual risk taking in young adulthood, during adolescence, these norms may result in identity concealment and/or social exclusion (if open about one’s sexual identity), reducing the likelihood (and/or opportunity) of sexual initiation. Future studies, which explore differences in encountered stigma and social support across sexual initiation classes, as well as how associations are moderated by biological sex and race/ethnicity, are needed.

We also found that females with stronger private religiosity, reflecting internal religious feelings and spirituality, were more likely to be in the higher risk early debut class, replicating previous studies which have linked religiosity and religious climate to sexual health risk (e.g.,

more sexual partners, HIV and STD diagnosis) among sexual minorities.(84,108) Other studies have noted that many sexual minorities who are affiliated with less gay-affirming denominations perceive their religious identity and sexual identity to be in conflict, leading to internalized homophobia and depression (which can subsequently increase the risk for risky health behaviors as well), though studies have largely focused on racial/ethnic minority SM male samples.(83,109,110) Though we are unable to determine the messages received and/or perceived attitudes towards homosexuality of respondents' religious communities to test if this conflict occurred in our sample, our results suggest that religion may be an important contributor to sexual behaviors among SM females, and potentially worthy of targeting for future interventions.

This study has several limitations. Most notably, while our inclusion of pre-18 sexual partnering patterns allowed us to assess overall biological sex patterns of early life sexual partnering, the biological sex of the partner involved in each *initiation* experience was not reported, so initiation patterns likely reflect a mixture of both same-sex and other-sex encounters (e.g., an oral sex encounter could be with either a male or female partner). Given qualitative evidence that first same-sex encounters may carry different emotional salience than first other-sex encounters,(53–55) future studies should aim to distinguish between first same-sex and other-sex oral, anal, and vaginal sexual encounters. A second limitation is the potential for recall bias and misreported initiation ages, as data were reported retrospectively. Previous explorations with Add Health respondents found that over 85% respondents were able to consistently report age of vaginal sex initiation between Wave III and IV (7 years apart),(111) suggesting a high level of reliability in adult retrospective reports of early life sexual behavior, though it is unclear if findings would be replicated with reports of oral and anal sex. A final limitation is the age of

the data---though the majority of data for the present study were reported in 2008, the Add Health sample reflects the experiences of individuals who were in high school in 1994-95, and therefore may not be generalizable to the experiences of adolescents in high school today. Given the substantial societal and political shifts around homosexuality and LGBT individuals in recent years,(112,113) as well as the noted links between stigma, victimization, and sexual risk among SM youth, increased social acceptance of SM groups may mean that contemporary SM sexual initiation patterns do not resemble those seen in the present study.

However, this study has several notable strengths. To the authors' knowledge, this represents the first attempt to understand sexual initiation patterns specific to SM populations, and the first to incorporate measures of multiple sexual behaviors. Use of LCA to model sexual initiation as a behavioral pattern, rather than a single dichotomous behavior, in this population is novel. Further, this methodology allows patterns to 'emerge' from the data, reflecting individuals' own experiences, rather than assumptions about 'typical' or critical sexual initiation patterns.

Perhaps most importantly, this study serves as a reminder to both clinicians and researchers of the importance of collecting data on sexual behaviors other than just vaginal intercourse. Existing sexual initiation measures suffer from a heteronormative view of sex that focuses almost exclusively on vaginal intercourse, which, by doing so, may lead to missed opportunities for health counseling and screening. For example, the 19.6% of males who initiated with anal sex (but not vaginal intercourse, Table 3) would be viewed as virgins, and subsequently at low sexual risk, despite the fact that anal intercourse carries substantially higher risk of HIV/STD transmission than vaginal intercourse. Further, respondents who initiated with vaginal intercourse + oral sex in the same year (e.g. females in the dual initiators class, 96% of whom initiated with vaginal intercourse + oral sex) differed from those who initiated with

vaginal intercourse alone (e.g. females in the typical debut class or early debut class, 58% and 89% of whom initiated with vaginal intercourse, respectively), a nuance that would be missed if only vaginal intercourse were considered. For instance, dual initiators were significantly more likely than typical initiators, and significantly less likely than females in the early debut class, to have zero sexual partners before age 18 (Table 8). Taken together, these findings highlight the importance of considering multiple sexual behaviors when assessing sexual initiation, particularly among SM youth.

From a research perspective, this is also a particularly salient reminder in light of recent and upcoming changes in the collection of sexual orientation data. Several nationally representative surveys have begun to include measures of sexual orientation, including the National Health Interview Survey (NHIS), which first incorporated a measure of sexual identity into their nationally-representative survey of health care utilization in 2013,(114) and the YRBS, which included measures of both sexual identity and other-sex /same-sex sexual partnering behaviors in the standard demographic questionnaire portion in 2015, mandating its collection in any site administering the YRBS.(115) Similarly, it was announced in 2015 that, under the upcoming Stage 3 Meaningful Use roll-out of electronic health records (EHR) across US health care settings, all EHR systems must include space to assess both sexual orientation and gender identity of the patient, to be eligible for enhanced Medicaid/Medicare reimbursements.(116) Though these changes will dramatically increase the availability of sexual orientation data, as suggested by the present study, it is crucial to ensure that any study of SM health is able to include behavioral indicators and predictors most relevant to SM individuals.

In conclusion, these results allow for further explorations that build off the present descriptive work, and situate the initiation classes in larger models predicting later-life sexual

and reproductive health. Future studies will aim to devise a sexual minority-specific model of the pathways from sexual initiation to young adult sexual and reproductive health that account for the predictors, social determinants, stressors, and contexts unique to sexual minority individuals.

Table 2. Selected sociodemographic characteristics of the analytic sample for Chapter 3, sexual minority respondents in Waves I and IV of the National Longitudinal Study of Adolescent to Adult Health, by biological sex (n=2,154)

	Total (n=2,154) % (n)	Females (n=1,628) % (n)	Males (n=526) % (n)
Race/Ethnicity, %(n)			
<i>Hispanic</i>	12.8 (348)	11.8 (244)	15.6 (104)
<i>NH-Black</i>	11.7 (414)	11.6 (329)	11.9 (85)
<i>NH-Asian</i>	3.3 (118)	3.4 (87)	2.8 (31)
<i>NH-White</i>	72.3 (1,274)	73.3 (968)	69.7 (306)
Wave IV Age, %(n)			
<i>24-26</i>	22.6 (393)	25.1 (328)	15.8 (65)
<i>27-29</i>	52.7 (1,174)	53.7 (892)	5.0 (282)
<i>30-34</i>	24.7 (587)	21.2 (408)	34.3 (179)
Parental Education Level, %(n)			
<i>< HS</i>	11.5 (249)	11.0 (186)	12.6 (63)
<i>HS diploma/GED</i>	25.4 (519)	26.5 (400)	22.3 (119)
<i>Some college</i>	29.7 (626)	3.8 (483)	26.7 (143)
<i>BA+</i>	33.5 (760)	31.7 (559)	38.3 (201)
Neighborhood Poverty, %(n)			
<i>Low</i>	57.2 (1,247)	56.9 (943)	58.0 (304)
<i>Medium</i>	21.5 (478)	22.3 (367)	19.3 (111)
<i>High</i>	21.3 (429)	2.8 (318)	22.8 (111)
Religiosity, mean (SE)			
<i>Public (1-6)</i>	2.53 (.09)	2.52 (.09)	2.56 (.16)
<i>Private (1-7)</i>	4.30 (.10)	4.36 (.11)	4.13 (.15)
Sexual Victimization Prior to Debut, %(n)			
<i>Coerced Encounter</i>	13.0 (255)	15.4 (224)	6.4 (31)
<i>Physically Forced</i>	8.7 (174)	9.9 (151)	5.6 (23)
<i>Sexual Abuse</i>	1.0 (210)	11.0 (174)	7.1 (36)
<i>Any</i>	21.0 (436)	23.8 (371)	13.0 (65)
Pre-18 Sexual Partnering			
<i>None</i>	2.9 (494)	17.7 (320)	29.8 (174)
<i>Other sex only</i>	57.6 (1,213)	65.7 (1,048)	35.1 (165)
<i>Other sex + same sex</i>	15.7 (329)	14.5 (226)	19.3 (103)
<i>Same-sex only</i>	5.8 (118)	2.1 (34)	15.9 (84)

SE= Standard Error; NH= Non-Hispanic

All column percentages weighted to reflect Add Health complex sampling design; all N's are unweighted counts; Percentages may not add to 100 due to rounding and weights

Table 3. Distribution of sexual orientation characteristics and sexual initiation indicators, by biological sex

	Total (n=2,154) % (n)	Females (n=1,628) % (n)	Males (n=526) % (n)	p-value
SEXUAL ORIENTATION				
Sexual Identity				
<i>Homosexually experienced heterosexual^a</i>	18.3 (390)	17.1 (276)	21.7 (114)	
<i>Mostly Heterosexual</i>	59.7 (1,272)	66.3 (1,070)	41.4 (202)	***
<i>Bisexual</i>	9.1 (196)	9.6 (156)	7.8 (40)	
<i>Mostly Homosexual</i>	4.4 (107)	3.4 (56)	7.3 (51)	
<i>100% Homosexual</i>	8.5 (183)	3.6 (66)	22.0 (117)	
Lifetime Sexual Partnering				
<i>Other-sex only</i>	37.3 (807)	4.8 (672)	27.8 (135)	
<i>Same sex + other-sex</i>	56.3 (1,215)	57.5 (931)	52.9 (284)	***
<i>Same-sex only</i>	6.4 (132)	1.7 (25)	19.3 (107)	
SEXUAL INITIATION				
Number of types of sexual acts, mean ***	2.56	2.61	2.40	***
Timing of first sexual encounter, mean age (yrs)	15.67	15.49	16.17	*
Anal sex Before age 18, %(n)	13.4 (254)	11.0 (157)	2.2 (97)	***
Spacing Between 1st and 2nd Behaviors, (yrs)				
<i>Multi-behaviors</i>	41.3 (853)	4.9 (638)	42.4 (215)	
<i>1</i>	19.8 (425)	19.9 (32.4)	19.6 (101)	
<i>2</i>	12.6 (290)	13.5 (226)	9.9 (64)	*
<i>3-5</i>	14.5 (322)	15.3 (258)	12.2 (64)	
<i>6+</i>	7.1 (162)	6.8 (115)	8.2 (47)	
<i>Single lifetime</i>	4.6 (102)	3.5 (67)	7.8 (35)	
First sexual behavior, %(n)				
<i>VI first</i>	32.9 (776)	4.7 (693)	11.7 (83)	
<i>OS first</i>	24.8 (504)	18.2 (289)	43.1 (215)	
<i>AI, no VI</i>	3.4 (72)	.3 (11)	12.0 (61)	***
<i>VI/OS</i>	35.1 (742)	36.8 (590)	3.3 (152)	
<i>AI/VI</i>	3.8 (60)	4.1 (45)	2.9 (15)	

All column percentages weighted to reflect Add Health complex sampling design; all N's are unweighted counts. Percentages may not add to 100% due to rounding and/or weighting. Sample included 6 respondents who had engaged in same-sex partnering, but did not report sexual orientation identity.

P-values reflect χ^2 -test [categorical variables]/F-tests [continuous variables] of significant difference in predictor distribution across biological sex; * $p < .05$; ** $p < .01$; *** $p < .001$; † $p < .10$

^a 'Homosexually experienced heterosexual' defined as respondents who identified as 100% heterosexual, yet had a history of same-sex sexual partnering

Table 4. Fit statistics for latent class analysis models of sexual initiation (1-9 classes, and final local dependent solution), by biological sex

	BIC	AIC	CAIC	Entropy
FEMALES (n=1,628)				
1 Class	24,122.215	24,051.131	24,135.215	1.000
2 Classes	21,784.848	21,637.214	21,811.848	1.000
3 Classes	21,62.024	21,395.838	21,661.024	.948
4 Classes	21,529.570	21,228.833	21,584.570	.956
5 Classes	21,318.035	20,94.747	21,387.035	.869
6 Classes	21,516.252	21,062.413	21,599.252	.878
7 Classes	21,098.941	20,568.550	21,195.941	.914
8 Classes	20,914.711	20,307.769	21,025.711	.889
9 Classes	20,139.104	19,455.611	20,264.104	.951
4-Classes Local Dependent ^a (2 residual pairs restricted)	21,463.142	21,113.193	21,527.142	.841
MALES (n=526)				
1 Class	8,614.337	8,558.027	8,627.337	1.000
2 Classes	7,992.242	7,875.291	8,019.242	.998
3 Classes	7,904.837	7,727.245	7,945.837	.975
4 Classes	7,871.618	7,633.385	7,926.618	.977
5 Classes	7,844.311	7,545.437	7,913.311	.986
6 Classes	7,873.937	7,514.423	7,956.937	.985
7 Classes	7,848.215	7,428.059	7,945.215	.942
8 Classes	7,826.378	7,345.582	7,937.378	.944
9 Classes	7,865.212	7,323.775	7,99.212	.955
4-Classes Local Dependent ^a (1 residual pair restricted)	7,881.071	7,621.181	7,941.071	.976

BIC= Bayesian Information Criteria; AIC=Akaike Information Criteria; CAIC= Consistent Akaike Information Criteria

^a *Final solution selected for use*

Table 5. Distribution of sexual initiation indicators within sexual initiation latent classes, by biological sex

FEMALES (n=1,628)				
	Typical Debut	Dual Behavior Debut	Early Sexual Debut	Delayed Debut with Oral Sex
	% (n)	% (n)	% (n)	% (n)
Class size	41.4% (655)	34.8 (564)	17.4 (293)	6.4 (116)
Number of types of sexual acts, mean	2.7	2.6	2.8	1.6
Timing of first sexual encounter, mean age (yrs)	15.3	16.36	13.25	18.14
Anal sex Before age 18, %(n)	14.8 (74)	0	27.9(83)	0
Spacing Between 1st and 2nd Behaviors, (yrs)				
<i>Multi-behaviors</i>	14.8 (74)	100	0	0
1	40.8 (261)	0	14.6 (51)	8.1 (12)
2	28.4 (198)	0	7.6 (19)	7.7 (9)
3-5	11.3 (89)	0	56.5 (156)	12.0 (13)
6+	4.6 (33)	0	21.3 (67)	17.7 (15)
<i>Single lifetime</i>	0	0	0	54.6 (67)
First sexual behavior, %(n)				
<i>VI first</i>	58.1 (407)	0	87.8 (256)	20.2 (30)
<i>OS first</i>	27.1 (174)	0	11.1 (30)	79.8 (85)
<i>AI, no VI</i>	<.1 (≤3)	<.1 (≤3)	1.1 (7)	<.1 (≤3)
<i>VI/OS</i>	8.4 (46)	95.8 (544)	0	0
<i>AI/VI</i>	6.3 (26)	4.2 (19)	0	0
MALES (n=526)				
	Single Behavior Debut	Multi Behavior Debut	Early Anal Sex	Very Early Debut
	% (n)	% (n)	% (n)	% (n)
Class size	50.4 (273)	32.3 (169)	11.2 (52)	6.2 (32)
Number of types of sexual acts, mean	2.3	2.5	2.6	2.8
Timing of first sexual encounter, mean age (yrs)	16.3	17.9	14.0	10.0
Anal sex Before age 18, %(n)	11.0 (29)	0	10.0	56.9 (16)
Spacing Between 1st and 2nd Behaviors, (yrs)				
<i>Multi-behaviors</i>	0	99.8 (168)	91.2 (47)	0
1	37.1 (96)	0	3.6 (≤3)	8.2 (≤3)
2	19.0 (62)	0	0	4.8 (≤3)
3-5	23.0 (21)	0	2.3 (≤3)	5.9 (≤3)
6+	6.7 (21)	<.1 (≤3)	0	76.4 (25)
<i>Single lifetime</i>	14.2 (33)	0	3.0 (≤3)	4.7 (≤3)
First sexual behavior, %(n)				
<i>VI first</i>	23.0 (81)	0	0	1.0 (≤3)
<i>OS first</i>	75.7 (189)	0	0	80.8 (26)
<i>AI, no VI</i>	1.3 (≤3)	12.6 (25)	55.5 (29)	18.2 (4)
<i>VI/OS</i>	0	81.6 (135)	35.1 (17)	0
<i>AI/VI</i>	0	5.8 (9)	9.4 (6)	0

VI= Vaginal Intercourse; OS= Oral Sex; AI= Anal Intercourse

All column percentages weighted to reflect Add Health complex sampling design; all N's are unweighted counts. Cells with counts ≤3 reported as such due to Add Health reporting requirements. Percentages may not add to 100% due to rounding and/or weighting.

Table 6. Distribution of sexual orientation indicators across sexual initiation latent classes, by biological sex

FEMALES (n=1,628)				
	Typical Debut % (n)	Dual Behavior Debut % (n)	Early Sexual Debut % (n)	Delayed Debut with Oral Sex % (n)
Class size	41.4% (655)	34.8 (564)	17.4 (293)	6.4 (116)
Sexual Identity ***				
<i>Homosexually-experienced heterosexual</i>	18.7 (118) ^d	15.3 (89)	19.5 (56) ^d	10.7 (13) ^{ac}
<i>Mostly Heterosexual</i>	66.4 (437) ^{bd}	72.2 (397) ^{ad}	65.5 (190) ^d	35.4 (46) ^{abc}
<i>Bisexual</i>	11.0 (63) ^b	7.0 (46) ^{ad}	8.5 (29) ^d	17.9 (18) ^{bc}
<i>Mostly Homosexual</i>	2.0 (20) ^d	3.6 (19) ^s	2.4 (8) ^d	13.9 (9) ^{abc}
<i>100% Homosexual</i>	1.9 (15) ^d	1.9 (12) ^d	4.1 (10) ^d	22.1 (29) ^{abc}
Lifetime Sexual Partnering ***				
<i>Other-sex only</i>	39.2 (271) ^b	48.4 (269) ^{acd}	33.3 (92) ^b	29.9 (40) ^b
<i>Same sex + other-sex</i>	60.8 (385) ^{bd}	51.6 (295) ^{ac}	66.7 (201) ^{bd}	43.4 (51) ^{ac}
<i>Same-sex only</i>	0	0	0	26.7 (25)
MALES (n=526)				
	Single Behavior Debut % (n)	Multi Behavior Debut % (n)	Early Anal Sex % (n)	Very Early Debut % (n)
Class size	50.4 (273)	32.3 (169)	11.2 (52)	6.2 (32)
Sexual Identity *				
<i>Homosexually-experienced heterosexual</i>	23.3 (61) ^c	19.4 (36)	12.0 (8) ^{ad}	38.3 (9) ^c
<i>Mostly Heterosexual</i>	38.8 (99) ^b	51.9 (78) ^{acd}	28.7 (16) ^b	29.7 (9) ^b
<i>Bisexual</i>	5.6 (18)	7.2 (13)	16.8 (6)	8.7 (≤3)
<i>Mostly Homosexual</i>	6.3 (28)	8.1 (14)	6.9 (≤3)	12.2 (7)
<i>100% Homosexual</i>	25.9 (66) ^d	13.4 (28) ^c	35.6 (20) ^{bd}	11.2 (≤3) ^{ac}
Lifetime Sexual Partnering †				
<i>Other-sex only</i>	28.7 (68) ^{cd}	34.9 (58) ^{cd}	15.5 (8) ^{ab}	5.0 (≤3) ^{ab}
<i>Same sex + other-sex</i>	48.3 (139) ^d	54.2 (92)	59.4 (29)	72.9 (24) ^a
<i>Same-sex only</i>	23.0 (66) ^b	10.8 (19) ^{ac}	25.2 (15) ^b	22.1 (7)

All column percentages weighted to reflect Add Health complex sampling design; all N's are unweighted counts. Percentages may not add to 100% due to rounding and/or weighting. Sample included 6 respondents who had engaged in same-sex partnering, but did not report sexual orientation identity.

'Homosexually experienced heterosexual' defined as respondents who identified as 100% heterosexual, yet had a history of same-sex sexual partnering

Stars next to variable names indicate χ^2 -test [categorical variables]/F-tests [continuous variables] of significant difference in predictor distribution across class membership; * $p < .05$; ** $p < .01$; *** $p < .001$; † $p < .10$

Letter superscripts indicate if proportion in a given class is significantly different ($p < .10$) from other classes:

^a indicates significantly different than "Typical Debut" for females / "Single Behavior Debut" for males

^b indicates significantly different from "Dual Behavior Debut" for females / "Multi Behavior Debut" for males

^c indicates significantly different from "Early Debut" for females / "Early Anal Sex" for males

^d indicates significantly different from "Delayed Debut with Oral Sex" for females / "Very Early Debut" for males

Table 7. Bivariate associations between sociodemographic predictors and sexual initiation latent class membership, by biological sex

FEMALES (n=1,628)				
	Typical Debut % (n)	Dual Behavior Debut % (n)	Early Debut % (n)	Delayed Debut with Oral Sex % (n)
Class Size	41.4 (655)	34.8 (564)	17.4 (293)	6.4 (116)
Race/Ethnicity ***				
Hispanic	12.3 (111)	1.2 (75)	14.1 (40)	9.8 (18)
NH-Black	11.1 (119) ^{bc}	5.2 (65) ^{acd}	22.8 (110) ^{ab}	18.7 (35) ^b
NH-Asian	4.0 (37)	3.4 (37) ^c	1.3 (8) ^b	5.2 (5)
NH-White	72.5 (388) ^{bc}	81.2 (387) ^{acd}	61.8 (135) ^{ab}	66.4 (58) ^b
Wave IV Age				
24-26	26.0 (138)	25.6 (113)	22.6 (52)	23.0 (25)
27-29	53.7 (360)	55.6 (309)	51.7 (164)	49.8 (57)
30-34	2.4 (157)	18.8 (142)	25.8 (77)	27.2 (32)
Parental Education Level***				
< High School	14.1 (81) ^b	6.6 (46) ^a	12.2 (40)	12.1 (19)
HS diploma/GED	27.9 (165)	22.5 (122) ^c	31.5 (82) ^b	25.1 (31)
Some college	28.2 (185) ^d	34.1 (179) ^d	34.8 (94) ^d	18.8 (25) ^{abc}
≥Bachelor's Degree	29.8 (224) ^{bcd}	36.7 (217) ^{ac}	21.5 (77) ^{abd}	44.0 (41) ^{ac}
Neighborhood Poverty*				
Low	58.3 (404)	59.0 (340) ^c	49.4 (141) ^b	57.2 (58)
Medium	19.5 (126) ^b	25.8 (142) ^a	21.5 (70)	24.5 (29)
High	22.3 (125) ^b	15.3 (82) ^{ac}	29.1 (82) ^b	18.3 (29)
Religiosity In Adolescence				
Public *	2.52 (.13) ^d	2.43 (.13) ^d	2.38 (.17) ^d	3.40 (.30) ^{abc}
Private **	4.20 (.15) ^d	4.27 (.15) ^d	4.55 (.20) ^d	5.38 (.24) ^{abc}
Sexual Victimization Prior to Debut				
Coerced Encounter	13.2 (84)	15.8 (74)	21.0 (54)	11.9 (12)
Physically Forced	8.7 (59)	9.6 (46)	13.7 (36)	8.8 (10)
Sexual Abuse	9.7 (56)	1.9 (62)	15.0 (43)	9.3 (13)
Any *	21.2 (138) ^c	23.5 (125) ^c	32.4 (85) ^{abd}	23.8 (371) ^c
Pre-18 Sexual Partnering***				
None	1.9 (92) ^{bcd}	27.9 (161) ^{acd}	.3 (≤3) ^{abd}	53.5 (66) ^{abc}
Other sex only	69.8 (456) ^{bcd}	6.5 (332) ^{acd}	83.7 (237) ^{abd}	19.2 (23) ^{abc}
Other sex + same sex	17.4 (94) ^b	1.9 (63) ^a	16.0 (54)	11.1 (15)
Same-sex only	2.0 (13) ^{cd}	.8 (8) ^d	<.01 (≤3) ^{ad}	16.2 (12) ^{abc}
MALES (n=526)				
	Single Behavior Debut % (n)	Multi Behavior Debut % (n)	Early Anal Sex % (n)	Very Early Debut % (n)
Class size	50.4 (273)	32.3 (169)	11.2 (52)	6.2 (32)
Race/Ethnicity				
Hispanic	13.5 (49)	14.0 (29)	27.9 (20)	17.9 (6)
NH-Black	13.5 (47)	9.7 (24)	12.5 (8)	8.9 (6)

(Table 7, Continued)	Single Behavior Debut % (n)	Multi Behavior Debut % (n)	Early Anal Sex % (n)	Very Early Debut % (n)
Race/Ethnicity				
<i>NH-Asian</i>	1.7 (14)	4.6 (15)	4.0 (≤3)	.2 (≤3)
<i>NH-White</i>	71.3 (163)	71.6 (101)	55.6 (23)	73.0 (19)
Wave IV Age				
<i>24-26</i>	18.9 (36)	16.0 (22)	4.5 (4)	9.1 (3)
<i>27-29</i>	46.3 (142)	48.9 (93)	68.4 (29)	51.2 (18)
<i>30-34</i>	34.7 (95)	35.1 (54)	27.1 (19)	39.4 (11)
Parental Education Level				
<i>< High School</i>	13.5 (35)	9.7 (17)	16.9 (8)	12.8 (3)
<i>HS diploma/GED</i>	24.9 (69)	14.9 (26)	23.9 (12)	37.5 (12)
<i>Some college</i>	24.2 (68)	3.4 (52)	25.6 (15)	3.3 (8)
<i>≥Bachelor's Degree</i>	37.4 (101)	45.0 (74)	33.7 (17)	19.3 (9)
Neighborhood Poverty				
<i>Low</i>	59.2 (158)	62.7 (106)	44.6 (25)	47.7 (16)
<i>Medium</i>	19.2 (59)	18.1 (32)	22.2 (13)	2.3 (7)
<i>High</i>	21.6 (56)	19.2 (31)	33.2 (14)	32.0 (10)
Religiosity In Adolescence				
<i>Public</i>	2.69 (.21) ^d	2.45 (.26)	2.74 (.41)	1.81 (.38) ^a
<i>Private</i>	4.30 (.22)	4.08 (.25)	3.79 (.50)	3.59 (.69)
Sexual Victimization Prior to Debut				
<i>Coerced Encounter***</i>	6.1 (14)	1.8 (7) ^c	17.1 (96) ^b	14.2 (4)
<i>Physically Forced *</i>	5.6 (12)	1.3 (3) ^c	12.6 (5) ^b	13.1 (3)
<i>Sexual Abuse **</i>	8.3 (20) ^{bd}	2.0 (5) ^{ac}	19.5 (7) ^{bd}	1.0 (4) ^{ac}
<i>Any **</i>	13.7 (32) ^b	4.8 (14) ^{ac}	30.0 (11) ^b	19.6 (8)
Pre-18 Sexual Partnering***				
<i>None</i>	31.0 (95) ^{cd}	41.6 (77) ^{cd}	6.5 ab	0
<i>Other sex only</i>	32.8 (80) ^d	45.3 (67) ^d	28.5 (15)	11.8 (3) ^{ab}
<i>Other sex + same sex</i>	19.6 (53) ^{bd}	8.5 (19) ^{acd}	32.3 (16) ^b	49.0 (16) ^{ab}
<i>Same-sex only</i>	16.6 (45) ^{abc}	4.6 (7) ^{acd}	32.7 (19) ^{ab}	39.1 (13) ^{ab}

All column percentages weighted to reflect Add Health complex sampling design; all N's are unweighted counts. Percentages may not add to 100% due to rounding and/or weighting.

Stars next to variable names indicate χ^2 -test [categorical variables]/F-tests [continuous variables] of significant difference in predictor distribution across class membership; * $p < .05$; ** $p < .01$; *** $p < .001$; ¹ $p < .10$

Letter superscripts indicate if proportion in a given class is significantly different ($p < .10$) from other classes:

^a indicates significantly different than "Typical Debut" for females / "Single Behavior Debut" for males

^b indicates significantly different from "Dual Behavior Debut" for females / "Multi Behavior Debut" for males

^c indicates significantly different from "Early Debut" for females / "Early Anal Sex" for males

^d indicates significantly different from "Delayed Debut with Oral Sex" for females / "Very Early Debut" for males

Table 8. Relative risk ratios (and 95% confidence intervals) from multinomial logistic regression analyses of sociodemographic predictors of sexual initiation latent class membership, by biological sex

FEMALES (n=1,628)^a			
	Dual Behavior Debut <i>RRR (95% CI)</i>	Early Debut <i>RRR (95% CI)</i>	Delayed Debut with Oral Sex <i>RRR (95% CI)</i>
Race/Ethnicity			
<i>Hispanic</i>	.82 [.51,1.33]	1.37 [.74,2.51]	.71 [.29,1.74]
<i>NH-Black</i>	.47 [.29,.75]**	2.22 [1.28,3.83]**	1.84 [.70,4.81]
<i>NH-Asian</i>	.81 [.38,1.73]	.38 [.09,1.55]	1.48 [.41,5.33]
<i>NH-White</i>	Referent	Referent	Referent
Wave IV Age			
<i>24-26</i>	.95 [.62,1.44]	.91 [.58,1.43]	.97 [.50,1.88]
<i>27-29</i>	Referent	Referent	Referent
<i>30-34</i>	.92 [.63,1.33]	1.16 [.72,1.86]	1.23 [.61,2.47]
Parental Education Level			
<i>< High School</i>	.42 [.23,.74]**	.87 [.47,1.61]	.59 [.16,2.19]
<i>HS diploma/GED</i>	.70 [.47,1.05] †	1.15 [.69,1.92]	.71 [.31,1.65]
<i>Some college</i>	1.06 [.76,1.47]	1.40 [.83,2.37]	.44 [.20,.99]*
<i>≥Bachelor's Degree</i>	Referent	Referent	Referent
Neighborhood Poverty			
<i>Low</i>	Referent	Referent	Referent
<i>Medium</i>	1.50 [1.03,2.17]*	1.14 [.70,1.86]	1.38 [.69,2.77]
<i>High</i>	.95 [.61,1.48]	1.15 [.67,1.97]	.93 [.31,2.77]
Religiosity In Adolescence			
<i>Public</i>	.91 [.82,1.00] †	.90 [.80,1.02]	1.05 [.82,1.35]
<i>Private</i>	1.05 [.96,1.14]	1.12 [1.02,1.24] *	1.12 [.89,1.41]
Sexual Victimization Prior to Debut^b			
<i>Coerced Encounter</i>	1.39 [.81,2.36]	1.37 [.65,2.87]	.99 [.32,3.06]
<i>Physically Forced</i>	1.07 [.57,2.00]	1.25 [.62,2.52]	1.56 [.40,6.01]
<i>Sexual Abuse</i>	1.14 [.70,1.86]	1.31 [.72,2.38]	1.20 [.47,3.06]
Pre-18 Sexual Partnering			
<i>None</i>	3.20 [2.16,4.74]***	.03 [.00,.20]***	15.35 [7.51,31.36]***
<i>Other sex only</i>	Referent	Referent	Referent
<i>Other sex + same sex</i>	.75 [.45,1.25]	.69 [.40,1.19]	2.26 [.82,6.23]
<i>Same-sex only</i>	.46 [.09,2.38]	.01 [.00,.11]***	34.17 [12.68,92.11]***
MALES (n=526)^a			
	Multi Behavior Debut <i>RRR (95% CI)</i>	Early Anal Sex <i>RRR (95% CI)</i>	Very Early Debut <i>RRR (95% CI)</i>
Race/Ethnicity			
<i>Hispanic</i>	1.11 [.48,2.54]	2.47 [.70,8.63]	.57 [.18,1.80]
<i>NH-Black</i>	1.00 [.49,2.07]	.69 [.21,2.30]	.36 [.09,1.43]
<i>NH-Asian</i>	3.71 [.94,14.66] †	2.39 [.21,26.80]	.22 [.02,2.90]
<i>NH-White</i>	Referent	Referent	Referent

(Table 8, Continued)	Multi Behavior Debut <i>RRR (95% CI)</i>	Early Anal Sex <i>RRR (95% CI)</i>	Very Early Debut <i>RRR (95% CI)</i>
Wave IV Age			
24-26	.74 [.29,1.92]	.16 [.04,.56]**	.40 [.08,2.09]
27-29	Referent	Referent	Referent
30-34	.97 [.52,1.80]	.52 [.18,1.53]	.90 [.29,2.75]
Parental Education Level			
< High School	.82 [.32,2.14]	.64 [.16,2.50]	1.67 [.21,13.18]
HS diploma/GED	.50 [.23,1.11] †	.81 [.31,2.10]	2.37 [.47,11.99]
Some college	1.01 [.45,2.27]	.86 [.29,2.59]	2.40 [.52,11.16]
≥Bachelor's Degree	Referent	Referent	Referent
Neighborhood Poverty			
Low	Referent	Referent	Referent
Medium	.91 [.39,2.10]	1.74 [.53,5.77]	1.08 [.21,5.53]
High	1.19 [.57,2.47]	1.63 [.56,4.76]	1.43 [.45,4.60]
Religiosity In Adolescence			
Public	.91 [.76,1.10]	1.26 [.91,1.74]	.87 [.66,1.15]
Private	1.02 [.89,1.18]	.78 [.58,1.05]	.97 [.75,1.27]
Sexual Victimization Prior to Debut^b			
Coerced Encounter	.74 [.11,4.97]	3.67 [.37,36.39]	2.11 [.26,17.45]
Physically Forced	.30 [.03,3.48]	.98 [.11,8.90]	3.18 [.38,26.55]
Sexual Abuse	.28 [.08,.97] *	2.43 [.71,8.31]	.04 [.01,.29]**
Pre-18 Sexual Partnering			
None	1.03 [.55,1.93]	.24 [.03,1.68]	.00 [.00,.00]***
Other sex only	Referent	Referent	Referent
Other sex + same sex	.36 [.14,.88]*	1.56 [.47,5.20]	6.33 [1.43,27.98]*
Same-sex only	.20 [.04,.93]*	2.54 [.76,8.44]	7.82 [1.44,42.56]*

RRR = Relative Risk Ratio (from multinomial logistic regression). CI= Confidence Interval. NH= Non-Hispanic.

Bold text indicates statistically significant association (between predictor and corresponding class, relative to referent class) at * $p < .05$; ** $p < .01$; *** $p < .001$; † $p < .1$. All models weighted to reflect Add Health complex sampling design.

^a "Typical Debut" served as the referent class for females; "Single Behavior Debut" served as the referent class for males

^b 'Any sexual victimization' prior to debut was not included in final multivariate model owing to multicollinearity with other included victimization variables

CHAPTER 4: ADOLESCENT PSYCHOSOCIAL PREDICTORS, AND YOUNG ADULT SEXUAL AND REPRODUCTIVE HEALTH CONSEQUENCES, OF SEXUAL INITIATION PATTERNS AMONG SEXUAL MINORITY YOUTH: DIFFERENCES BY BIOLOGICAL SEX AND RACE

Introduction

Lesbian, gay, and bisexual sexual minorities (SM) consistently have been found to be at higher risk for sexually transmitted diseases than their heterosexual peers, particularly during late adolescence and emerging adulthood. Men who have sex with men (MSM) account for a disproportionate number of HIV and STD diagnoses each year, with rates highest among MSM of color and young adults aged 25-34. Though STDs are understudied among sexual minority women, preliminary evidence suggests that similar disparities exist, though additional within-SM differences appear to exist across sexual minority identities (e.g., between lesbian and bisexual women). In one exploration of 57,903 undergraduate women enrolled in the 2006 National College Health Assessment, bisexual women had significantly higher odds of a prior-year STD diagnosis than heterosexual peers, yet lesbian women had significantly lower odds.(117) Previous studies of female respondents in the National Survey of Family Growth (118) and National Longitudinal Study of Adolescent to Adult Health (Add Health) similarly found that bisexual women were at increased risk, and lesbian women were at decreased risk, for both lifetime and prior-year STD diagnosis, relative to heterosexual women.(8,119) Though racial/ethnic differences in STD risk among SM females are similarly understudied, existing data suggest that SM females of color may be at increased risk of STDs relative to white SM peers: A

prior study of Add Health respondents found an interactive effect between race and sexual identity, such that lifetime STD risk was highest among Black and Hispanic ‘mixed-orientation’ (including bisexual, mostly homosexual, and mostly heterosexual) women relative to White ‘mixed-orientation’ and White heterosexual women.(8)

In looking to understand sexual orientation disparities in STD rates, researchers have often turned to the theoretical approaches of life course theory and minority stress theory/psychological mediation framework. Life course theory holds that health is the result of both contemporaneous and prior exposures and experiences, particularly those that represent developmental milestones and transitions.(56,57) Under this model, timing of sexual debut, conceived of as a ‘critical transition’ between being sexually inactive to sexually active, is hypothesized to have life-long impacts on one’s sexual development. Off-timing debut, particularly debut that occurs earlier than that of one’s peers, is therefore seen as predictive of not only risky sexual decision making around the time of debut, but potentially predictive of lifelong risky decision making. Though ample support exists for this hypothesis,(1) the typical approach in the literature has suffered from a limited definition of sexual debut that focuses exclusively on age of first vaginal intercourse, ignoring the multitude of sexual behaviors most adolescents engage in, particularly SM adolescents, for whom (presumably, heterosexual) vaginal intercourse may have less salience than other sexual behaviors.

Within the heterosexual literature, some recent explorations have focused on trajectories and patterns of sexual initiation, and their implication for sexual health. Using a sample of ~1600 heterosexual Dutch adolescents, deGraf and colleagues (2007) assessed if respondents had participated in a variety of sexual behaviors, as well as the timing of initial behavior, and found that 73% respondents followed a sexual initiation trajectory categorized as ‘progressive’--defined

as engaging in less intimate behaviors (kissing) at earlier ages than more intimate behaviors (oral sex)—and that females and males were equally likely to adhere to a progressive trajectory.(36) Respondents who followed the progressive trajectory were significantly less likely than those who followed a “non-linear” trajectory to have engaged in unprotected/condom-less sexual intercourse (anal or vaginal) with their last sexual partner, and reported a significantly older age of (vaginal) sexual debut. Using data from Add Health, Reese and colleagues (2013) explored the association between sexual initiation *sequence* and teen pregnancy (pregnancy before the age of 20) and found that, compared with women who had vaginal sex first (55% of the sample), odds of teen pregnancy were significantly lower among women who reported oral-genital sex first and waited a year or more before vaginal sex, as well as among those who reported both behaviors at the same age.(37)

Little is known about the typical patterns and trajectories of sexual initiation among sexual minorities, or whether these patterns are associated with later life sexual health. Three studies have attempted to capture initiation patterns, but have focused exclusively on SM men, and all three relied on small convenience samples, limiting generalizability and cross-study comparison. Bruce et al. (2012) found initial evidence that gay and bisexual male adolescents may follow a similar progression in sexual debut across multiple behaviors, noting that in their study of 200 self-identified gay and bisexual sexual minority male adolescents, on average, respondents initiated with (same-sex) oral sex (mean age=15.0), then progressed to the more intimate behaviors of (other-sex) vaginal sex (mean age=15.5), and receptive and insertive (same-sex) anal sex (mean age=16,5 and 17,0, respectively).(33) Similarly, in a study of 363 HIV+ Black and Hispanic MSM recruited across the country, heterosexual vaginal sex debut occurred, on average, about half a year prior to MSM oral or anal sex debut (mean age=14.1 and

14.5, respectively).(12) In contrast, in a study of approximately 700 sexually active gay and bisexual men in Pennsylvania, Lombardi and colleagues (2008) found that across the sample heterosexual vaginal sex debut occurred, on average, one year *after* first same-sex (oral or anal) sexual encounter (mean age=18.8 and 17.6, respectively).(42) Yet as none of these studies explored how initiation patterns were associated with later life SRH, it remains to be seen if this link exists for sexual minorities in the same way it does for heterosexuals. At the same time, despite differences in heterosexual SRH across racial/ethnic groups, even less information is available on racial/ethnic differences within sexual minorities, as most studies have relied on racially homogenous, often all White or all Black, samples. As a result, research is still needed to both understand the sexual initiation patterns specific to sexual minorities, as well as to determine if and how within-sexual minority racial/ethnic differences in trajectories are associated with later-life SRH outcomes.

In addition to a need for more descriptive information on early life sexual behaviors of sexual minorities, there is also a need to situate sexual behaviors within a broader context, focusing on determinants at the socio-environmental level. Health (and health disparities) are often not just the result of individual behaviors, but rather can be linked to external institutional, structural, and social factors which serve as stressors, limiting access to power, status, and resources for vulnerable groups (such as sexual minorities).(60,120) Mark Hatzenbuehler's **psychological mediation framework**,(67) offers a theoretical framework to explore the mediating pathways through which stressors impact mental health. The primary components of the model include three types of mediators (i.e., 'processes'): (A) emotional regulation, which holds that stress can lead to maladaptive strategies for handling emotions and/or stress exposure, increasing risk of adverse mental health; (B) social/interpersonal processes, which holds that

stress reduces access to social support and/or decreases willingness to engage in social situations, increasing risk for social isolation and subsequent psychopathology; and (C) cognitive processes, which include how individuals conceive of themselves (e.g., self-esteem and self worth) and/or the world (e.g., pessimistic or hopeless ‘schematics’ about the world and future). From here, it is hypothesized that it is *individual and within-group differences in the psychological processes* through which stressors “get under the skin” and are internalized, thereby impacting health.

Most importantly, theories such as the psychological mediation framework can be further viewed through intersectionality frameworks that move beyond population comparisons across a single dimension (e.g., between heterosexual majority and sexual minority groups as a whole), to instead explore *within* sexual minority differences at the intersection of multiple (traditionally) vulnerable identities.(81) Under these frameworks, sexual orientation is just one distinct identity aspect that, rather than wholly defining a person or population, overlaps with other identities such as biological sex, race/ethnicity, and socioeconomic status, each of which carries its own set of social, cultural, and structural norms, values, and advantages (or disadvantages). Together, these distinct identities overlap to confer an entirely new identity (‘black lesbian female’) that is more than the simple additive sum of each individual aspect (black+ lesbian + female). For example, the lived experience of a white gay male may be quite different than that of a black lesbian female, as the joint intersection of the traditionally higher-status (within the United States, specifically) race and biological sex of the former has conferred access to institutional power and status inaccessible to the latter.(103) Following, between- and within-group differences are therefore viewed not as reflective of innate population differences in risk, but rather as the result of within- and between-group differences in social determinants and structural (dis)advantages, and, more importantly, the stressors they confer.(59–61)

Within the context of the psychological mediation framework, and its focus on within-group differences in stress exposure and stress processing, within-sexual minority differences in both sexual initiation and early-life social support may be particularly important to understand. For example, while several studies have found that sexual minority youth of color experience more victimization and violence than their white peers,(68,121–123) much less is known regarding racial differences in how victimization is internalized, and/or how victimization may impact health. Two studies offer preliminary evidence for racial/ethnic differences in stress processing: One study of the 2005-2007 YRBS noted a direct association between sexual orientation and early sexual debut (prior to age 16) among females of any race, and males from all racial backgrounds but non-Hispanic black (SM-identified respondents were significantly more likely to have an early sexual debut relative to heterosexual peers), yet found several race/ethnicity and biological sex differences in whether peer victimization (e.g., bullying and harassment at school) mediated this pathway in cross-sectional models.(123) Peer victimization was a moderately strong mediator of the sexual orientation/early sexual debut association for white females alone (inclusion of victimization variables reduced the OR of sexual orientation on early debut from 3.2 to 2.4), yet it was a weak mediator for white males and all other females, and actually had a suppression effect for Latino males. Another cross-sectional study of SM youth aged 16-24 based in Chicago (recruited in 2004-2005), found that the correlation between sexual orientation victimization (e.g., called names, received verbal threats, were threatened, etc. due to perceived sexual identity) and psychological distress varied across race/ethnicity, suggesting between-group differences in how victimization was internalized: namely, black respondents reported the highest levels of sexual orientation-related victimization, yet the lowest level of psychological distress, whereas white respondents reported lower rates of victimization

than blacks, but higher rates of psychological distress.(122) Though both studies hint at racial/ethnic and gender differences in both exposure to victimization, and internalization/processing of victimization, as available data were cross-sectional, temporality and causality of relationships remain unclear, necessitating explorations that rely on longitudinal data.

At the same time, there may be racial differences in availability of social support across multiple levels (e.g., peers, friends, community, etc.), which in turn could either directly have implications for health, or serve as a protective/promotive mediating mechanism through which victimization is linked to health disparities. In the aforementioned study in Chicago, evidence emerged for a compensatory, rather than protective, pathway from social support and victimization to psychological distress—victimization, peer support, and family support all independently predicted distress when included in a single model (lower support and higher victimization predicted higher amounts of distress, adjusting for each other), and, in fact, peer support had the strongest impact on psychological distress.(122) Another study of 515 MSM found that Black respondents had significantly higher odds than non-Black respondents of ever paying for sex, as well as fewer perceived sources of emotional support (which in turn was strongly predictive of transactional sex).(105) Rather than suggesting that black MSM simply engage in riskier sexual behaviors, results highlight how sexual risk disparities may exist precisely because of differences in access to social support—namely, lack of social support may create contexts that increase sexual risk, such as by limiting access to romantic and sexual partners, should one either not be able to ‘come out’ as gay or bisexual, or be rejected from their community after coming out.

Following, the present study will aim to integrate both life course theory and the psychological mediation framework to develop a sexual minority-specific model of the determinants of young adult SRH, with a focus on the specific outcome of STD diagnosis, as detailed in the hypothesized model to be tested with structural equation modeling (Figure 1). Namely, whereas life course theory suggests that sexual initiation could be a critical determinant of later life SRH owing to its developmental significance as a ‘life transition,’ and psychological mediation suggests that there are psychological, psychosocial, and environmental contexts—and subsequent differences in psychological and psychosocial processing—specific to sexual minorities that affect health, my model hypothesizes that differences in adolescent psychosocial processing will be realized as differences in sexual initiation patterns/trajectories, which itself will have significant implications for future sexual development and sexual risk. Finally, this paper will also bring an intersectional lens to analyses and explicitly test how race/ethnicity may moderate lifelong sexual trajectories, by running multi-group analyses to empirically compare if /how associations differ across groups.

Methods

Data and Sample

This project is a secondary analysis of data from The National Longitudinal Study of Adolescent to Adult Health (“Add Health”), an ongoing prospective study of a nationally representative probability sample of 20,745 adolescents in grades 7-12 during the 1994-1995 school year. Respondents were not selected into the original data sample on the basis of their sexual orientation. To date, four waves of in-home interviews have been completed, most recently in 2008 (n=15,170; 80% response rate), when respondents were young adults aged 24-32. More detailed information on the Add Health study design can be found elsewhere.(87) For

the present analysis, data predominantly come from the Wave I (adolescence/high school) and Wave IV (young adulthood in-home interviews), with supplemental information drawn from the Wave I parent interview and Wave III in-home interview as needed (detailed below).

The present analysis sample was limited to sexual minority respondents, based on self-reported sexual orientation indicators assessed at Wave IV. Following approaches used elsewhere, (15,45,88) a respondent was considered a sexual minority if they reported a lifetime history of 1+ same-sex sexual partner, and/or they self-identified their sexual orientation as anything other than 100% heterosexual or asexual (including "mostly heterosexual," "bisexual," "mostly homosexual," and "100% homosexual"). Respondents who only answered one of the questions, but provided a sexual minority response for that question (n=47) were also included in the sample (see Appendix A for distribution of sexual orientation indicators within the sexual minority sample). Within the sexual minority sample, the analysis sample was further restricted to those respondents with a sample weight, reported ever engaging in at least one sexual behavior (oral, anal, or vaginal sex), and had non-missing data on all control variables, resulting in a final sample of 2,155 including 1,627 females and 528 males.

Measures

Sexual Initiation Pattern Class Membership: During the Wave IV interview, respondents were asked if they had ever engaged in vaginal, anal, and oral sex, and if yes, were prompted to report the age (in whole years) at which each encounter first occurred. Based on these responses, five separate indicators of sexual initiation were created, paralleling those indicators created by Haydon and colleagues (2012),(38) and served as the basis for the sexual initiation latent class analysis (further summarized in Table 9): The first indicator, **First Sexual Behavior**, was categorized as vaginal intercourse; oral sex; vaginal intercourse +oral sex in the

same calendar year; anal intercourse without vaginal intercourse in the same year (includes debut with anal intercourse alone, or anal intercourse + oral sex in the same year); and anal intercourse + vaginal intercourse in the same year (with or without oral sex in the same year). The second indicator, **Timing of First Sexual Encounter**, was defined as the age of initiation of the first sexual behavior, and was continuously coded, with all ages below the age of 10 collapsed as ≤ 10 . The third indicator, **Number of Types of Sexual Behaviors**, was defined as the number of behaviors, of the three assessed, the respondent had ever engaged in over their lifetime. The fourth indicator, **Spacing Between 1st and 2nd Behaviors**, was defined as the number of years between the first and second behavior initiated, and was categorized as 0 (initiating ≥ 1 behavior in a single year); 1 year; 2 years; 3-5 years, 6 or more years; and single lifetime behavior. The final indicator, **Anal Sex Prior to Age 18**, was dichotomized as yes /no, with no also including those who had had anal sex, but at later ages.

Adolescent Psychosocial Predictors (Wave I reports): Four latent constructs were included as predictors of sexual initiation class membership. These constructs were selected as they map onto the psychosocial processes proposed in the psychological mediation framework, and have been empirically demonstrated in the sexual minority literature to be significant determinants of both adolescent and young adult sexual health.

Self-esteem, reflecting internalized self-worth (a “cognitive process,” in psychological mediation framework terms), was estimated from 6 self-reported indicators based on a reduced form of the Rosenberg Self-Esteem Scale adapted for use in Add Health.(124) The items are as follows: “*I have a lot to be proud of*”; “*I feel loved and wanted*”; “*I like myself as I am*”; “*I do everything just right*”; “*I feel socially accepted*” and “*I have lots of good qualities.*” Each item

was reported using a five-point Likert scale (1=Strongly Disagree, 5=Strongly Agree), such that higher values reflect higher endorsement of the indicators in question.

School belonging, reflecting respondents' feelings of social connectedness and belonging within their school (and school peers), was included based on the tenants of the psychological mediation framework which hold that "stressors [associated with being a sexual minority] interfere with interpersonal relations...significantly alter social processes...and may cause social isolation."(67) It was estimated from 6 items: frequency the respondent had problems "*getting along with other students*" (5-pt Likert scale; from "never" to "everyday"), and how much, during the current/most recent school year, respondents agreed (5-pt Likert scale; from "strongly disagree" to "strongly agree") that they were "*close to people at school*"; "*part of school*"; "*happy to be at school*"; "*safe in school*" and "*students are prejudiced*," expanding on a scale utilized elsewhere in the literature.(125,126) All items were coded so that a higher score was reflective of stronger connectedness.

Neighborhood Connectedness, offered as a parallel measure to school connectedness (but reflecting the non-school social environment), was modeled as a latent construct estimated from 3 indicators, one dichotomous, "*I feel safe in my neighborhood*"(yes/no), and two continuous: "*people in this neighborhood look out for each other*" (yes/no); and "*how happy are you with living in your neighborhood*" (5-pt Likert; range from "not at all" to "very much").

Parental Support was estimated from 5 continuous indicators, each assessed using a 5-point Likert scale, reflecting respondents' closeness, satisfaction with communication, overall relationship satisfaction, how much they felt their parent cared about them, and the extent to which they felt their parent was warm and loving toward them. Measures were assessed separately for the residential mother/maternal figure and father/paternal figure; if only one parent

was listed (i.e., if respondent was living in a single-parent household), that response was used; if both parents were present, the higher score of the two was used, following procedures used elsewhere (ex: Needham, 2008).(127)

Outcome: Lifetime and Prior-Year STD diagnoses (Wave IV reports): Risk of STD diagnosis was explored for two time frames: **lifetime STD diagnosis**, was dichotomized never/1 or more, based on self-reported diagnosis of any of the following: chlamydia; gonorrhea; trichomoniasis; syphilis; genital herpes; genital warts; hepatitis B; human papilloma virus (HPV). **Prior-year STD diagnosis**, was dichotomized using the same coding, but only referred to STD diagnoses that occurred in the past 12 months.

Covariates/Control Variables: Additional covariates were included, based on their demonstrated association with adolescent sexual initiation in the literature: **Wave IV chronological age**, computed as the difference, in whole years, between respondent date of birth, and the date of the Wave IV interview, was modeled as a categorical variable (24-26 years old; 27-29 [referent]; 30-34). **Wave I Neighborhood poverty**, reflecting the proportion of families in a census tract with dependents younger than 18 years of age with income below the poverty level in 1989, was included, and is from the Add Health Wave I contextual data. Neighborhoods were coded as “low poverty” (<11.6% of families below the poverty level); “medium poverty” (between 11.6% and 23.9% families below poverty level); or “high poverty” (>23.9% families below poverty level), following coding schemes reported elsewhere. (40) **Parental Educational Attainment**, a proxy measure for socioeconomic status in adolescence (<High school; High school diploma/GED; Some college/Associate's degree/post-high school secondary education; and Bachelor's Degree or higher) reflecting the highest level of educational attainment of the respondent's parents at the time of the Wave I interview. Responses were derived from self-

reports by the respondent's mother or female guardian (or father/male guardian if no female parent/guardian available) in a supplemental Wave I interview, or by the respondent if no parent report was available. If both parental reports were available, the higher of the two reports was used, otherwise the level reported by the single parent/guardian was used. **Respondent Educational Attainment**, reflecting the number of years of education completed by the time of the Wave IV interview, coded as "high school education or less," "some college/post-high school education," or "college degree or higher" was included, but only in final models which assessed Wave IV outcomes (lifetime/prior-year partnering and STD diagnosis), owing to issues of temporality.

Race/ethnicity, categorized as Hispanic Ethnicity-any Race; Non-Hispanic (NH) -White; NH-Black; and NH-Asian, based on self-reports at Wave I and III,¹ was used in analyses in two different ways. For females, race/ethnicity was used to perform multi-group comparisons of overall model associations (e.g., adolescent psychosocial and sexual initiation predictors of STD diagnosis) across racial/ethnic groups. For males, owing to the smaller sample, race/ethnicity was modeled as a covariate, with NH-White used as the referent group.

Sexual assault and victimization, a known predictor of later life sexual risk, is significantly more common among SM females and males, both in childhood and within intimate partnerships.(24,26–28,128) Three separate measures of victimization were included, each assessed retrospectively at the Wave IV interview. **Childhood sexual abuse** defined as "a

¹ During Wave I, respondents were given the option to self-identify their ethnicity as "Hispanic or Latino" and their race as "Black or African American"; "Asian or Pacific Islander"; "American Indian or Native American"; "White"; or "Other." At Wave III, race and ethnicity were reassessed, with the "Other" category excluded from possible responses. The Wave III self-reported race was substituted for the 16 respondents who self-identified as "Other" at Wave I and were re-interviewed at Wave III (and the 4 respondents who were not re-interviewed were dropped from analysis). For the small number of respondents reporting "American Indian or Native American" at Wave I (n=44), a similar process was undertaken for the 39 respondents re-interviewed (with the 21 of whom still identified as American Indian dropped from analysis, and the remaining 18 'reassigned' based on the race /ethnicity reported at Wave III).

parent or adult caregiver touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations;” **Physically forced sex** (“*forced physically to have any type of sexual activity against your will*”); and **Coerced sex** (“*forced non-physically*”), the latter two encounters explicitly defined to have occurred with a non-parent/caregiver.

Respondents who reported any of these experiences were then asked to report the age at which the event first occurred; if the age of first encounter was younger or equal to the respondent’s age at earliest sexual initiation, it was included.

Finally, **lifetime/prior-year same-sex and other-sex sexual partner count**, reflecting the number of male and female sexual partners (“*considering all types of sexual activity*”) the respondent reported at the Wave IV interview, was included. Partnering count was hypothesized to serve as a potential mechanism through which initiation impacted STD risk. Namely, riskier and/or earlier initiation patterns would be associated with higher partner counts, which in turn would increase STD risk, based on previous studies in heterosexual samples, which found that lifetime partner count partially or fully mediated the link from early sexual debut (e.g., vaginal intercourse before age 15) and lifetime STD diagnosis by late adolescence when respondents were 18-24 years old.(1,129) Lifetime partner count variables were included in models estimating lifetime STD diagnosis, and prior-year partner counts were used for models predicting prior-year STD diagnosis.

Approach

Sexual Initiation Latent Class Construction: Latent class analysis (LCA) was used to identify different patterns of sexual initiation (i.e., ‘classes’), separately for females and males. For both females and males, a 4-class solution emerged as the best fit. For females, sexual initiation patterns were characterized as typical debut, dual behavior debut, early sexual debut,

and delayed debut with oral sex. For males, sexual initiation patterns were characterized as single behavior debut, multi behavior debut, early anal sex, and very early debut. Classes are briefly described in Table 9; detailed description of class construction can be found in chapter 3.

Structural Equation Models: Using these classes, the conceptual model in Figure 1 was estimated in a structural equation framework, using Mplus (v.7.31). Models were fit separately for males and females. To account for the complex Add Health sampling framework and survey weights, models utilized the *type=complex* method, and *cluster*, *weight*, and *stratification* options. Models were fit using the robust maximum likelihood estimator (MLR), to account for non-normal/dichotomous outcomes. To account for a small amount of missingness on observed indicators (5.90% females [n=96] and 7.20% males [n=38] were missing data on at least one indicator), assumed to occur at random, models utilized full information maximum likelihood (FIML) estimation. This estimation method was used as it has been found to produce less biased estimates without the loss of statistical power of multiple imputation or listwise deletion, and can be used with continuous, dichotomous, and categorical variables.(130–132)

First, a measurement model was specified for the adolescent psychosocial latent constructs, utilizing confirmatory factor analysis (CFA). Adjustments were made, including excluding observed indicators, and allowing indicators to cross-load onto other latent constructs, as guided by modification indices, overall goodness-of-fit, and theoretical justification. The structural model was then estimated in two steps: First, multinomial logistic regression within a structural equation framework was used to estimate the effects of adolescent psychosocial latent factors on sexual initiation class membership (treated as a nominal endogenous variable), with and without controlling for the time 1 covariates listed above.

Then, logistic regression within a structural equation framework was used to estimate the effects of both psychosocial processes and sexual initiation class membership on STD risk (lifetime or prior-year, estimated separately). Four separate models were fit: M1 (crude effect of sexual initiation class membership on lifetime/prior-year STD diagnosis); M2 (crude effect of adolescent psychosocial processes and sexual initiation class membership); M3 (adjusted for covariates), and M4 (same as M3, with further adjustment for lifetime or prior year same-sex and other-sex partner counts, depending on timing of STD diagnosis being assessed). M4 was included based on the hypothesized mechanism through which sexual initiation class membership would affect STD diagnosis probability; namely, that ‘riskier’ initiation classes would have significantly more sexual partners, which in turn would be associated with increased STD probability. Overall model fit was assessed by goodness-of-fit statistics (AIC, BIC, size-adjusted BIC) and the Satorra-Bentler Scaled chi-square difference test between nested models.(133)

Multi-group SEM (females): Once the final model was determined, a multi-group SEM was fit to determine if associations differed by race/ethnicity. Owing to the smaller male sample size, analyses were underpowered to fit stable multi-group models for males, and thus were fit for females only.

First, measurement invariance of the latent constructs across race/ethnicity groups was tested by comparing models wherein factor loadings were constrained to be equal for all groups, to models where factor loadings were allowed to be freely estimated/differ. Owing to the complex survey design of Add Health, changes in the CFI (cut point of $\Delta \leq .10$ to indicate null hypothesis of measurement invariance should not be rejected),(132) rather than the χ^2 test of difference, were compared between these two models to assess measurement invariance. Then,

the overall structural model (adjusting for all covariates and mean-centered lifetime/prior year partner count [to account for skewed/non-normal distribution and different range/outliers between racial groups]) was fit across race/ethnicity, and magnitude, direction, and significance of coefficients were compared to determine if/how pathways differed between groups. Models were fit using the WLMSV estimator, owing to convergence issues with the MLR estimator. Subsequently, all multi-group analyses produced probit coefficients, rather than the logit coefficients used in previous analyses. Probit coefficients reflect the direction and significance of *change in probability* of the outcome associated with the predictor in question (e.g., a positive coefficient indicates probability of diagnosis significantly increases), and less emphasis is paid to the magnitude of coefficients. Therefore predicted probabilities of STD diagnosis by class membership were computed as well (holding latent constructs and partner counts at their means, and all categorical covariates held at their reference value) for ease of interpretability (results presented in Appendix C).

Results

Females

Female sample characteristics (Table 10): A total of 1,627 female respondents were included for analysis; descriptive characteristics of the sample, by sexual initiation class membership, can be found in Table 10. A total of 43.5% females (n=710) had ever been diagnosed with an STD; females in the early debut class had the highest proportion of respondents with a lifetime diagnosis (53.5%, n=169) and those in the delayed debut class had the lowest (21.4%, n=25). A substantially smaller proportion of female respondents reported a prior-year STD diagnosis (19.6%, n=304), relative to lifetime diagnosis risk, though patterns across the classes remained the same, with early debut females having the highest proportion of

respondents with a prior-year diagnosis (21.4%, n=61), and delayed debut having the lowest (13.2%, n=12). On average, across the entire, unstratified female sample, respondents reported substantially higher other-sex than same-sex partner counts, both lifetime (15.9 vs. 2.0, respectively) and in the prior-year (1.5 vs. 0.3, respectively); however, once stratified by class membership, several differences emerged: Among women in the early debut class, the numbers of lifetime other-sex and same-sex partners were small (this class had the lowest number of lifetime male partners, relative to other classes), and roughly equal (2.4 vs. 2.3, respectively), though prior-year partner counts were similar to those in other classes. Women in the delayed debut class reported the highest number of lifetime same-sex partners (4.6 vs. 2.0-2.3 in other classes), and like the early debut class, reported a small number of lifetime other-sex partners (5.4), close to the number of same-sex partners.

Measurement Model (Appendix B): The best-fit measurement model closely corresponded with the hypothesized model, except that one indicator of school connectedness (students are prejudiced) was dropped due to poor fit (i.e., extremely low loading on the overall latent construct of school connectedness), and one indicator of self-esteem (*I feel accepted*) was allowed to co-vary with both school connectedness and self-esteem (i.e., was included as an indicator of both constructs). Goodness-of-fit indices, including low RMSEA, and high CFI/TFI, indicated that the measurement model was well specified (standardized factor loadings and goodness-of-fit indices presented in Appendix B).

Adolescent psychosocial predictors of class membership (Table 11): Unstandardized log-odds and standard errors of associations between adolescent psychosocial predictors and sexual initiation class membership are presented in Table 11. Among females, two significant associations emerged. Self-esteem was significantly and positively associated with higher odds

of class membership in the typical debut class, relative to the dual behavior initiation class, in both crude and adjusted models. Neighborhood connectedness was significantly and positively associated with odds of membership in the delayed debut class, and negatively associated with early debut class membership, though this association only retained significance for the delayed debut class in adjusted models. Neither school connectedness nor parental support was associated with membership in any of the sexual initiation classes in either crude or adjusted models.

Lifetime STD Diagnosis Models (Table 12; Figure 2): Log-odds of estimated lifetime STD diagnosis (unstandardized for categorical/dichotomous predictors, standardized with respect to predictor for continuous variables [adolescent psychosocial processes and partner counts]) are presented in Table 12; diagrams of model findings (with only significant paths presented) are included in Figure 2. For all models, the dual debut class served as the referent class for comparisons across sexual initiation class membership.

Compared to females in the dual-behavior debut class, females in the early debut class had significantly higher log-odds, and those in the delayed debut class had significantly lower log-odds, of lifetime STD diagnosis in crude models (M1), and those adjusted for adolescent psychosocial processes (M2) and covariates (M3). Of the psychosocial processes, both neighborhood connectedness and parental support emerged as significant predictors of lifetime STD diagnosis. After adjusting for all covariates, those with higher parental support and neighborhood connectedness in adolescence had lower log-odds of STD diagnosis (M3).

Inclusion of partner counts in adjusted models (M4) attenuated the effects of both psychosocial processes and class membership. Early debut and delayed debut class membership only marginally predicted lifetime STD diagnosis, and both coefficients substantially decreased

in magnitude. Of the psychosocial predictors, only neighborhood connectedness retained significance as a predictor of lifetime STD diagnosis, though unlike class membership, the magnitude of the coefficient only changed slightly. Supplemental analyses that tested the pathway for this effect did support the hypothesis (Appendix D). Though lifetime partner counts significantly predicted lifetime STD diagnosis (albeit in opposite directions, with higher other-sex partner counts associated with higher odds of lifetime STD diagnosis, and the reverse seen for higher same-sex partner counts), sexual initiation class membership was only weakly associated with partnering (the only significant association was that females in the early debut class had significantly higher probability of higher lifetime partner counts), suggesting that partnering was not a mediator of the initiation /lifetime STD association.

Prior-year STD Diagnosis Models (Table 12; Figure 3): Far fewer significant associations emerged for prior-year STD diagnoses (Log-odds of prior-year STD diagnosis among females presented in Table 12; diagrams of model findings, with only significant paths presented, are included in Figure 3). There were no significant differences in log-odds of prior-year diagnosis across sexual initiation classes (as with lifetime models, dual behavior debut served as the referent class). Of the psychosocial predictors, only parental support significantly predicted prior-year STD diagnosis; across all three models, higher parental support was associated with significantly lower odds of prior-year diagnosis (β : -.21; SE: .11; $p < .05$).

Multi-Group Results (Females only)

The majority of female respondents (73.2%, $n=967$) were Non-Hispanic White (Table 10); the remaining sample was split between an approximately equal proportion of Hispanic (11.8%; $n=244$) and black (11.6%; $n=329$) respondents, and a small proportion of Asian respondents (3.4%; $n=87$). Several differences emerged in the distribution of sexual initiation

class membership within the four racial/ethnic groups (Appendix C), conforming to prevailing trends of increased HIV/STD risk among racial/ethnic differences minorities.(134–136) For example, while between 30%-38% of Hispanic, Asian, and white females were categorized as dual-behavior initiators, only 15.6% of black females fell into this class; similarly, 35% of black females were categorized as early debut, compared with 6%--21% of other racial groups.

Tests of measurement invariance, comparing model fit between measurement models where factors were constrained to load equally vs. load freely on latent constructs for racial groups, suggested that measurement invariance was supported ($\Delta\text{TFI}=.01$; results not reported). However, convergence issues still emerged for results among Asian females, owing to sparse cell sizes in some of the indicators among the Asian group, as well as the overall smaller sample size of this group; following, a less-restrictive model, wherein factor loadings were freely estimated, was employed for this group. Following, multi-group structural models of lifetime and prior-year STD diagnosis were fit, adjusting for all covariates and lifetime/prior-year partner count, and retaining the measurement model where all factor loadings were constrained to be equal (Within-racial group associations presented in Table 15). As with the unstratified models, dual behavior served as the referent sexual initiation class for all models. In addition, prevalence of lifetime/prior-year STD diagnosis, and model estimated predicted probability of lifetime/prior-year STD diagnosis, by race/ethnicity and sexual initiation class membership, are presented in Appendix C.

Race/ethnicity differences in lifetime STD diagnosis (Table 14): Across the four racial groups, several significant associations between adolescent psychosocial predictors and lifetime STD diagnosis emerged, which differed across race/ethnicity. For black and white females, significant associations were in the expected direction: among black females higher parental

support was predictive of significantly lowered probability of lifetime diagnosis, and among white females, higher neighborhood connectedness also had a protective effect (Table 15). However, among Asian females, school connectedness was associated with *increased* likelihood of lifetime STD diagnosis.

Associations between sexual initiation class membership and lifetime STD diagnosis also differed by race/ethnicity. Among all groups but white females, early debut (relative to dual behavior debut) was associated with significantly higher probability of lifetime diagnosis. Among Hispanic and white females, delayed debut w/oral sex was significantly associated with lifetime STD diagnosis, but in the opposite direction: among Hispanic females, delayed debut (relative to dual-behavior debut) was associated with significantly higher probability of lifetime STD diagnosis (β : 0.94; SE: .53; $p < .10$), whereas for white females, delayed debut had a protective effect (β : -.71; SE: .30; $p < .05$). Finally, typical debut was associated with significantly higher probability of lifetime diagnosis for both Hispanic and black females, but had no significant associations for Asian or white females.

Differences in modeled predicted probability of diagnosis across initiation classes revealed further nuance. (Appendix C; Figure 6) For example, predicted probability of diagnosis as estimated from final adjusted probit coefficients (holding all other variables at their referent variable [categorical predictors] or mean [continuous predictors]) was quite varied across sexual initiation classes for Hispanic females (ranging from 36% to 85%) and black females (ranging from ~46% to 72%), whereas for white females, predicted probability was consistent (and consistently low) across initiation classes (ranging from ~15% to 37%).

Race/ethnicity differences in prior-year STD diagnosis (Table 15): In general, predictive probability of prior-year diagnosis was low across most race-by-initiation groups

(Appendix C; Figure 7). Predicted probability was below 20% for white females regardless of initiation class, Asian females in all but the early debut class, and black females who were in either the typical or dual-behavior debut classes. Many of the racial differences in initiation and adolescent psychosocial associations seen in lifetime STD models were replicated in the prior-year models. For example, as in lifetime models, delayed debut had a protective effect against prior-year STD probability for white females (β : $-.70$; SE: $.39$; $p < .10$), and a promotive effect for Hispanic females (β : 1.06 ; SE: $.56$; $p < .10$). Similarly, early debut was associated with significantly higher likelihood of prior-year diagnosis for Hispanic and Asian females, though unlike in lifetime models, was not a significant predictor among black females. As with the unstratified female sample, parental support had a significant protective effect for both black (β : $-.43$, SE: $.21$, $p < .05$) and white (β : $-.13$, SE: $.06$, $p < .05$) females. Among Asians, school connectedness remained a significant predictor of increased probability of prior-year STD diagnosis (β : 1.09 ; SE: $.53$, $p < .05$). However, as was seen in lifetime models, for Hispanic respondents, none of the adolescent psychosocial processes were significantly associated with prior-year STD diagnosis.

Males

Male sample characteristics (Table 10): A total of 528 male respondents were included for analysis; descriptive characteristics of the sample, stratified by sexual initiation class membership, are presented in Table 10. Overall, a substantially lower proportion of males than females had ever been diagnosed with an STD either in their lifetime (20% [$n=111$] males vs. 43.5% females [$n=710$]), or in the prior-year (8.5% males [$n=46$] vs. 19.6% females [$n=304$]). However, while females reported substantially higher numbers of lifetime other-sex partners, on average, males reported higher numbers of both lifetime and prior-year same-sex partners.

Additional descriptive differences in STD risk and partnering emerged across the sexual initiation classes: The very early debut class had the highest proportion of both lifetime (42.4%, n=12) and prior-year (16.7%; n=7) STD diagnoses, as well as reported the highest average number of prior-year partners (both same-sex and other-sex). The multi-behavior debut class had the lowest proportion of lifetime diagnoses, and was roughly tied with the single behavior debut class for lowest proportion of prior-year diagnoses, as well as had the lowest average number of lifetime and prior-year same-sex partner counts.

Measurement Model (Appendix B): The best-fit measurement model for males was identical to that of females, with the exception of the parental support construct. Default approaches to CFA modeling arbitrarily selects one indicator per latent construct to be constrained to have a factor loading of 1.0 in unstandardized models, with the remaining indicators freely estimated. For females, the parental support indicator constrained to 1.0 reflected how much respondents believed their parent cared about them. For males, all manifest indicators for the parental support were freely estimated (e.g. none of the factor loadings were constrained) owing to sparse data at lower ranges of the parental support indicators. As with the female model, goodness-of-fit indices indicated that the final measurement model was well specified for males (final standardized factor loadings and goodness-of-fit of the measurement model are presented in Appendix B).

Adolescent psychosocial predictors of class membership (Table 11): Similar to the female models, neighborhood connectedness was significantly associated with class membership for males (Table 11). In crude models, neighborhood connectedness was negatively associated with log-odds of membership in both early anal sex and very early debut classes, relative to the multi-behavior debut class, though this association retained significance only for the early anal

sex class after adjustment for covariates. However, no other significant associations emerged with sexual initiation class membership.

Lifetime STD Diagnosis (Table 13): As with females, sexual initiation was only partially associated with lifetime STD risk among males, with significant associations observed only for the early anal sex class in crude models, and the very early debut class in crude and adjusted models (Table 13). Relative to the multi-behavior class, males in the early anal sex class had significantly higher log-odds of lifetime STD diagnosis in the crude model only (M1), whereas males classified as very early debut had significantly higher log-odds of lifetime STD diagnosis across all adjusted models. Unlike with females, however, no significant associations emerged between adolescent psychosocial processes and lifetime STD diagnosis (Table 13).

Of the included covariates, race/ethnicity had the strongest association with lifetime diagnosis; both black and Hispanic males had significantly higher log-odds of STD diagnosis relative to white males, even after controlling for lifetime partner count. As with females, both other-sex and same-sex lifetime partner counts were strongly and significantly associated with probability of lifetime STD diagnosis, though, in contrast to females, both other-sex and same-sex partner counts positively predicted probability of diagnosis for males.

Prior-year STD Diagnosis (Table 13): As with the female sample, there were no significant differences in odds of prior-year STD diagnosis across the sexual initiation classes in either the crude or adjusted SEM results, nor were there any significant associations between prior-year diagnosis and any of the adolescent psychosocial processes (Table 13). However, both other-sex and same-sex prior year partner counts were significantly associated with higher log-odds of prior-year STD diagnosis. Of the included covariates, race/ethnicity was significantly associated with prior-year diagnosis, with Hispanic males reporting significantly higher log-odds

of prior-year diagnosis, and Asian males reporting significantly lower log-odds, relative to non-Hispanic whites. In addition, males who had ever been sexually abused prior to their sexual initiation were significantly more likely than those who had not been abused to have been diagnosed with an STD in the previous year (M3), though this association did not retain significance after controlling for prior-year partner counts.

Discussion

Though there are notable differences in the sexual initiation patterns of sexual minority youth, the impact of initiation pattern on young adult STD risk was mixed. For both males and females, lifetime STD diagnosis was associated with initiation patterns involving early sexual initiation: Females in the early debut class, and males in the very early debut class, had higher odds of lifetime STD diagnosis relative to the referent initiation class (dual behavior and multi behavior debut, respectively). Yet men in the early anal sex class, who engaged at earlier ages, and engaged in early-life (i.e., pre-age 18) anal sex more frequently than any other group---an arguably riskier behavior than vaginal or oral sex, given the increased risk of transmission anal intercourse carries---did not differ from the multi-behavior group in odds of lifetime STD diagnosis after controlling for adolescent psychosocial processes. Taken together, results suggest that explorations of sexual initiation beyond simply age of vaginal initiation may be necessary in order to most fully capture pathways from early life sexual behavior to later life SRH.

Additional challenges to the life-course hypothesis emerged, as no differences were observed in prior-year STD diagnosis across sexual initiation classes for either males or females (when sample collapsed across race). While it is not immediately clear why initiation would be (partially) related to lifetime, but not prior-year STD risk, one potential explanation may be that

the direct impact of initiation on SRH may be negligible by the time one reaches young adulthood. This possibility is consistent with patterns identified among heterosexuals, which have found that later life sexual risk is primarily tied to more proximal factors (e.g., prior year partner counts), than timing of sexual initiation.(58,137) Another explanation may simply be related to timing—as respondents were aged 24-32, they had aged out of the 18-24 age range in which STD prevalence has traditionally been highest (likely due to heightened sexual risk in this time period).(104) Future studies should aim to assess age of diagnosis, or include multiple measures of STD diagnosis across multiple time points, in order to identify the most pertinent risk period.

The mechanism through which early initiation impacts STD risk remains unclear. Based on life course theory, we hypothesized that the pathway from sexual initiation to STD risk would occur through sexual partnering; that is, respondents whose sexual initiation pattern involved earlier initiation (e.g., earlier debut, early anal sex, etc.) would have more sexual partners. However, even though lifetime partner counts attenuated the associations between initiation pattern and lifetime STD diagnosis, the decrease was small and the mediation hypothesis was not supported: While both other-sex and same-sex lifetime partnering predicted lifetime diagnosis, initiation was only partially associated with partnering for females (females in the early debut class had significantly more lifetime other-sex partners, and those in delayed debut with oral sex class had significantly more prior-year same sex partners relative to referent dual-behavior class; Appendix D, Table 18), and was not significantly associated with partnering among males. Future studies are therefore needed to identify and test other potential behavioral mediators on the pathway from initiation to STD risk (e.g., other sexual behaviors typically associated with increased STD risk), as well as underlying contextual or social factors which serve as

antecedents of sexual initiation (and potentially have implications for future sexual/STD risk as well).

Mixed support emerged for psychological mediation framework hypotheses, namely that adolescent social support and psychosocial processes would be associated with sexual initiation. Of the four adolescent psychosocial predictors included, only self-esteem (females only) and neighborhood connectedness (males and females) were associated with sexual initiation class membership (Table 11). For both sexes, associations between neighborhood connectedness and sexual initiation were in the expected direction seen in the literature—namely, higher neighborhood connectedness was associated with higher odds of membership in ‘less risky’ sexual initiation classes.(134,138–140) Among females, higher neighborhood connectedness was associated with higher odds of membership in the ‘less risky’ delayed debut class in crude and adjusted models (‘less risky,’ in that initiation occurred at later ages and with oral sex, a behavior which carries lower STD/pregnancy risk), and with lower log-odds of the ‘more risky’ early debut membership in crude models (earlier initiation, early participation in riskier behaviors such as anal and vaginal intercourse), relative to dual-behavior membership. Similarly, among males, higher neighborhood connectedness was associated with lower odds of membership, relative to multi-behavior debut membership, in the more risky early anal sex (crude and adjusted models), and early debut (crude model only) sexual initiation classes. However, in contrast to findings in the general adolescent literature that adolescents (and female adolescents in particular) with higher self-esteem are more likely to delay sexual initiation,(141–143) in the present analyses, higher self-esteem was associated with significantly higher log-odds of typical debut (relative to the referent dual-behavior debut class) among SM females (Table 11), despite the typical debut group reporting an earlier age of debut Chapter 3, Table 5).

At the same time, numerous significant associations emerged between latent constructs and *lifetime* sexual risk (e.g. partner counts and STD risk) that were not seen for sexual initiation class membership. For example, among females, parental support was not significantly associated with sexual initiation class membership (Table 11), yet higher parental support *was* predictive of lower odds of lifetime and prior-year STD diagnosis (Table 12), and lower lifetime (both same-sex and other-sex) and prior-year (other-sex only) partner counts (Appendix D). Similarly, for males, school connectedness was associated with significantly lower lifetime and prior-year other-sex partner counts (Appendix D), yet was not predictive of sexual initiation class membership (Table 11). Taken together, results suggest that parental and peer support in adolescence may have a long-term protective effect against sexual risk that lasts into young adulthood, regardless of if sexual initiation specifically is impacted.

That parental and peer support is an important protective factor against sexual risk is hardly a new finding, either for adolescents in general,(144,145) or sexual minorities specifically.(146,147) However, why support would be predictive of partnering and STD risk, but not initiation, remains unclear, particularly as previous literature has found that parental support tends to decrease in importance over time, in favor of peer and partner support.(122) One explanation may be that sexual initiation is tied to different aspects of the social-environmental context than have been captured in current models. For example, parental support may have an indirect, distal effect on sexual initiation behavior by shaping the underlying social environment and conveying pro-social messages that take time to be internalized. In contrast, other family-level factors, such as parental monitoring (i.e. supervision, behavioral control measures [e.g. curfews], and awareness of child's whereabouts), may have a more immediate impact on sexual

initiation, as monitoring (or lack thereof) may directly in/decrease opportunity for adolescents to be alone and engage in sexual behavior.(148,149)

Results from the multi-group female models offer a more nuanced lens through which to understand these associations. Despite no significant associations emerging between parental support and STD risk overall, when female models were disaggregated by race, higher parental support in adolescence was significantly predictive of lower probability of prior-year and lifetime STD diagnosis for black females, and lower probability of prior-year diagnosis for white females. It is not immediately clear why parental support was the sole significant adolescent psychosocial predictor of lifetime and prior-year STD risk in the multi-group models, nor why parental support did not have a significant protective effect for Hispanic or Asian females. However, racial/ethnic differences in the availability of alternate sources of social support, relative to the importance of parents and family, may play a role. A recent study of 524 adults in NYC found that while the main source of major social support for lesbian/bisexual women of any race (white vs. black vs. Latina) came from family members, the majority of everyday social support came from same-race lesbian and bisexual friends for black and white women, but from partners and straight friends for Latina women.(150) Following, racial differences in availability of same-race SM friends (or lack thereof) may subsequently reduce (or enhance) the importance of parental support as the dominant source of social support.

Another explanation may be due to racial/ethnic differences in community norms and acceptance of homosexuality. In the present analysis, overall rates of both lifetime and prior-year STD risk were highest among black women than all other racial/ethnic groups (Appendix C), conforming to trends in the sexual health literature that black women have traditionally reported higher rates of STDs than their white peers, regardless of their sexual orientation.(8,104,151)

Intersectionality frameworks suggest that this disparity may be partially due to the fact that black women face multiple sources of structural /institutional racism and sexism due to their minority race and biological sex which are not encountered by their white female (and/or male) peers.(90,136,151,152) Among black SM women in particular, their minority sexual orientation may also confer additional sources of stress (on top of structural racism and heterosexism) as, traditionally, rates of homophobia and anti-gay sentiment have been much higher within the black (versus non-Hispanic white) community.(12,103,106,147,153,154) Following, black SM women may be more likely to experience parental rejection if their sexual identity is disclosed, or more likely to develop internalized homophobia, if they feel a need to hide their sexual identity,(153) both of which may contribute to the increased risk of lifetime and prior-year STD risk seen that emerged in this population in the present approach. Given that parental support may be less expected and/or encountered among black SM women, for those who *do* encounter parental support (and acceptance), it may therefore have a particularly strong protective effective against STD risk. Several previous parent-targeted interventions have been demonstrated to be effective at preventing adolescent sexual risk behaviors, often through the provision of educational (e.g. information providing) or skills-based training around effective and open communication, either for parents on their own, or parent-adolescent dyads.(151,160–162) Future interventions could therefore adapt these intervention models to either promote parental acceptance of their sexual minority child, or provide training/resources around sexual health information tailored specifically to the needs of sexual minority youth, potentially to the long-term benefit of their child's sexual health.

Several limitations of the present study must be mentioned. The biggest limitation is that the substantially smaller male sample size (relative to female sample) precluded conducting

multi-group SEM for males that paralleled the models fit for females. Within the female sample, the substantially smaller Asian cohort (n=87, compared with n=244 to 967 in all other groups) may have meant that models were underpowered to detect reliable estimates for Asians (as seen in the large SE for prior-year diagnosis; Table 14), or overall measurement invariance across the four racial/ethnic groups. Though Add Health is notable for the overall racial/ethnic diversity of its sample, which is better equipped than most studies for explorations of the intersection of race and sexual orientation, there are still many underrepresented groups, such as Asian women, and Native American males and females (who were fully dropped from analysis, owing to sample size). A replication of the present analysis in a sample which oversampled (or exclusively enrolled) racially-diverse sexual minorities would be useful, in order to fully understand how race moderates not only patterns of initiation, but overall pathways from adolescence to young adult STD risk.

Another limitation (for lifetime models in particular) is the lack of data on timing of both lifetime STD diagnoses and sexual partners, raising potential questions over temporality, should, for example, STD diagnosis have occurred earlier in life than the majority of partners accumulated. A final limitation is that analyses did not include sexual orientation-specific measures of psychosocial processes---though we were able to capture general measures of self-esteem, neighborhood connectedness, parental support, and peer support, Add Health did not include measures which assessed perceived support (or lack thereof) specifically tied to sexual identity, such as peer acceptance of one's sexual orientation, or community norms around homosexuality. Given that minority stress theories specifically highlight the importance of both generalized stressors, and minority-specific stressors, the lack of more targeted measures of stress during adolescence likely resulted in an incomplete measure of social stress and social

support.

Despite these limitations, there are several notable strengths of this analysis. This is the first study to develop a model of pathways from sexual initiation to young adult SRH specific to lesbian, gay, and bisexual sexual minority adolescents. My model also benefits from the use of novel statistical techniques, which are well-suited to the research questions being explored. For example, the use of latent class analysis to model sexual initiation patterns is notable in that LCA allows patterns to ‘emerge’ from the data, ensuring they reflect the respondents’ own experiences, rather than pre-determined assumptions about ‘typical’ /critical sexual initiation patterns and behaviors. Previous qualitative work has found wide variation across sexual orientation groups in how individuals define ‘sex’ and ‘sexual debut,’ with sexual minorities significantly more likely than their heterosexual peers to consider non-vaginal intercourse encounters (e.g., oral-genital contact) as ‘sex,’ and to describe their virginity loss as occurring in a non-vaginal sexual encounter. By using broader, empirically-derived measures of the sexual initiation *patterns* unique to my SM youth sample, I offer a way to test study hypotheses using a more informative measure of initiation that accounts for multiple behaviors, as well as multiple developmentally-significant components of initiation (spacing, timing, sequence). In addition, the use of SEM is both novel and particularly appropriate for the questions explored in the present analysis. One benefit is that the confirmatory measurement model employed to model the adolescent psychosocial latent constructs is robust to potential misspecifications, as this approach tests and derives best-fit latent constructs by explicitly measuring and adjusts for measurement error in observed indicators that, if left unaccounted for, would bias both indirect and direct pathways from the construct.(158–160) This is an advantage over typical regression approaches, which would require either manually constructing each psychosocial predictor a priori (and require an

assumption that the final scale was correctly specified, potentially biasing results), or including each indicator as a separate predictor (violating assumptions of uncorrelated error terms between model variables). In addition, SEM allows multiple pathways to be tested simultaneously, reducing standard errors and Type I error that would be introduced if traditional sequential/step-wise regression approaches, were employed.(132) In addition, the use of multi-group SEM allows for empirical tests of *within*-sexual minority differences (e.g. by race/ethnicity), addressing a major gap in the sexual minority adolescent literature, which, to date, has largely ignored racial/ethnic differences in sexual health of SM women. Finally, this study also benefits from the use of prospectively collected constructs of adolescent psychosocial processes, *measured* in adolescence, rather than retrospectively reported in young adulthood, reducing the potential for recall bias.

Though study hypotheses were not fully supported, emergent results offer several potential future directions for interventions and research aiming to address STD disparities among SM youth. As initiation pattern does not appear to necessarily have a meaningful direct impact on subsequent partnering, yet social support does (Appendix D), results suggests that interventions aiming to address sexual minority STD risk may benefit from focusing less on delaying sexual initiation, and more on increasing social support, particularly at the parent or peer level. Positive youth development approaches routinely emphasize that adolescent sexual behaviors are both normative and developmentally appropriate, (e.g. 161–163) and that it is only *risky* sexual behavior (e.g. more proximal determinants such as increased partner counts and contraception non-use) that is worthy of prevention, not sexual behavior in general. Alternatively, results suggest that social support may in fact be a moderator, rather than a predictor, of pathways from sexual initiation to STD risk—namely, increased social support may be

protective against any future sexual risk (e.g. increased partners) following a riskier/earlier initiation. This hypothesis is supported by the resiliency literature, as noted by Amy Herrick and colleagues (2014):

Overreliance on theoretical models centering on risk and vulnerability—which produce interventions that address vulnerabilities among SM youth but permit them to remain in toxic cultural settings—impedes a fuller understanding of their health and illness... Thus, the most productive step researchers can take to move the field forward is to incorporate more comprehensive and holistic theories that include pathways of resiliencies and risks when designing health- promoting interventions.”(164)

Resiliency-based prevention approaches, which aim to increase self-efficacy and coping in the face of encountered stress and stigma (as well as increase sources of social support), rather than simply prevent sexual initiation (and sexual behaviors in general), may be particularly appropriate for SM populations.

Figure 1: Hypothesized structural model for Chapter 4 analyses of pathways to lifetime/prior-year STD diagnosis at Wave IV

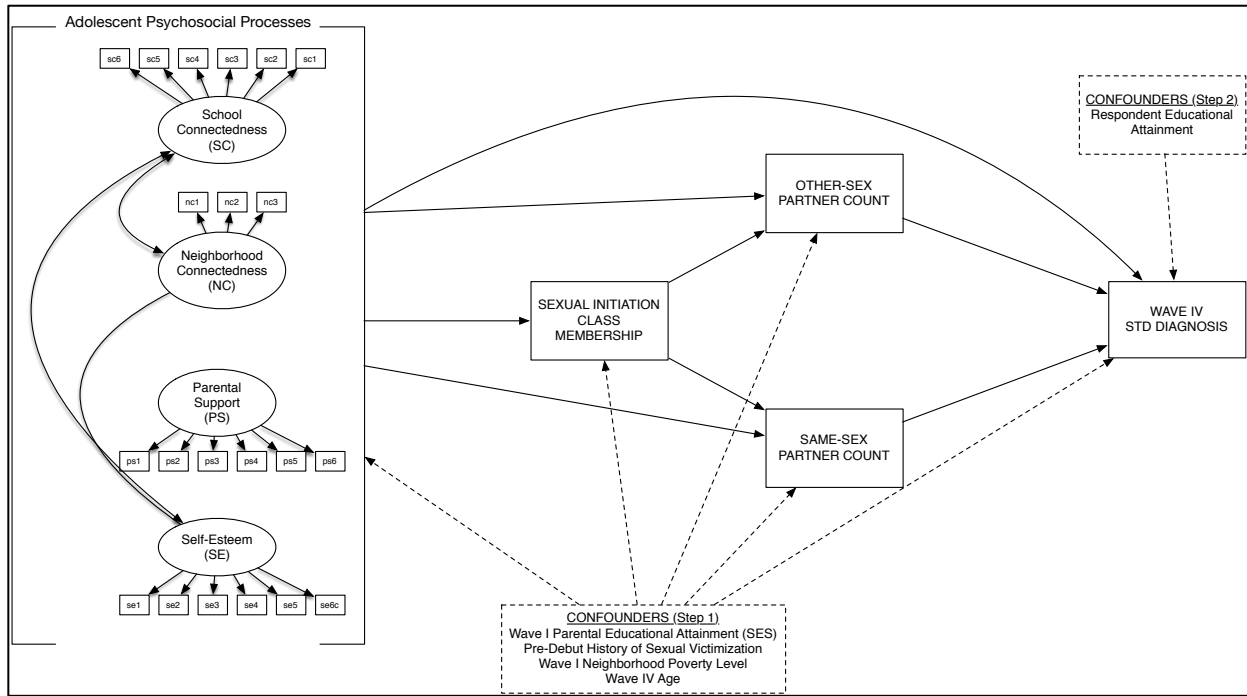
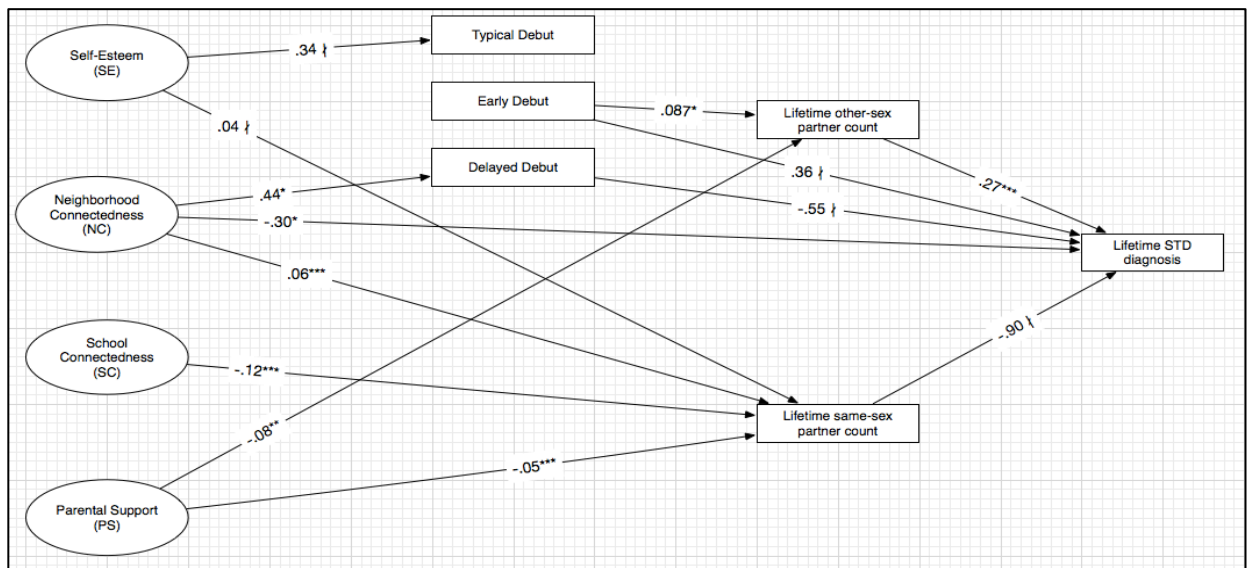


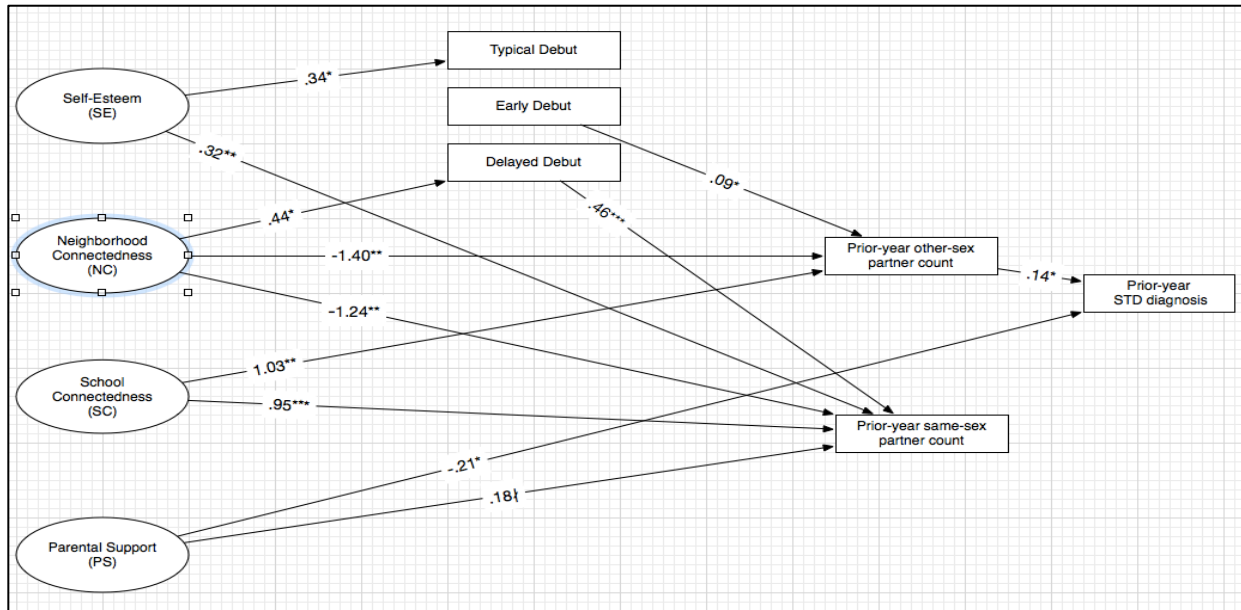
Figure 2. Final model of adolescent psychosocial processes, sexual initiation class membership, and lifetime STD diagnosis—Females



† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Coefficients reflect standardized (continuous and latent exogenous variables) and unstandardized (categorical exogenous variables) log-odds from structural equation models, weighted to account for Add Health complex sampling design. Only significant paths for main variables are shown.

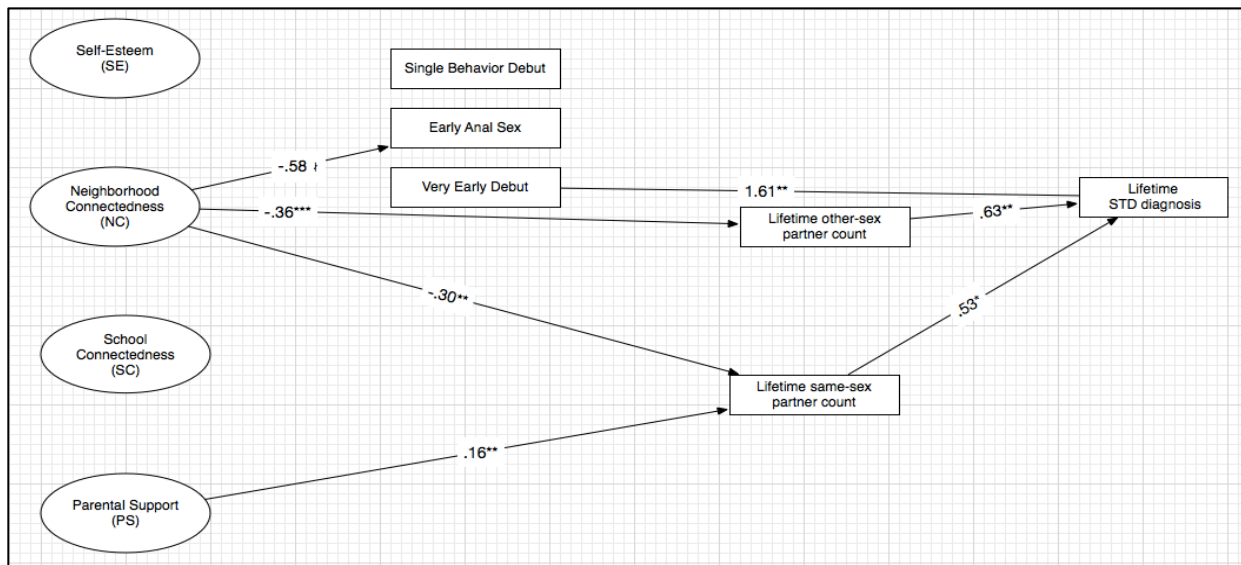
Figure 3. Final model of adolescent psychosocial processes, sexual initiation class membership, and prior-year STD diagnosis—Females



† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Coefficients reflect standardized (continuous and latent exogenous variables) and unstandardized (categorical exogenous variables) log-odds from structural equation models, weighted to account for Add Health complex sampling design. Only significant paths for main variables are shown

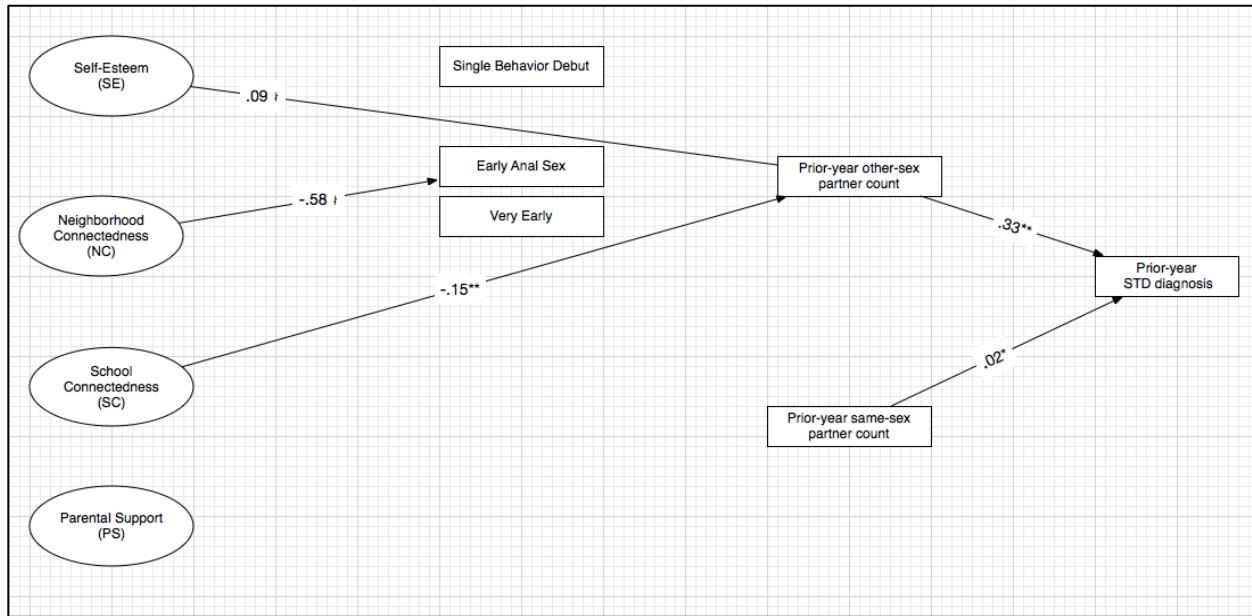
Figure 4. Final structural model of adolescent psychosocial processes, sexual initiation class membership, and lifetime STD diagnosis—MALES



† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Coefficients reflect standardized (continuous and latent exogenous variables) and unstandardized (categorical exogenous variables) log-odds from structural equation models, weighted to account for Add Health complex sampling design. Only significant paths for main variables are shown

Figure 5. Final model of adolescent psychosocial processes, sexual initiation class membership, and prior-year STD diagnosis—MALES



*† p < .10; * p < .05; ** p < .01; *** p < .001*

Coefficients reflect standardized (continuous and latent exogenous variables) and unstandardized (categorical exogenous variables) log-odds from structural equation models, weighted to account for Add Health complex sampling design. Only significant paths for main variables are shown

Table 9. Characteristics of sexual initiation latent classes among sexual minority respondents in The National Longitudinal Study of Adolescent to Adult Health

FEMALES		
Typical Debut	41.4% (n=655)	<ul style="list-style-type: none"> • Single behavior debut (by 85%) • Initiated with Vaginal Intercourse (alone [58%] or with OS [15%]) • Shortest time to 2nd Behavior (>69% initiated 2nd behavior in 1-2 years) • “Non-lesbian identified, early life bisexually experienced”: Least likely to identify as Mostly or 100% Homosexual, most likely to report bisexual partnering prior to age 18
Dual Behavior Debut	34.8% (n=564)	<ul style="list-style-type: none"> • Initiated with Vaginal intercourse + Oral sex in same year (>95%) • Moderate age of debut (16.4 years)
Early Debut	17.4% (n=293)	<ul style="list-style-type: none"> • Single behavior debut (100%) • Initiated with Vaginal Intercourse (~88%) • Earliest age of sexual debut (13.3 years; >2 yrs earlier than all classes) • Highest likelihood of anal sex before age 18 • Longest time to 2nd behavior (~79% waited 3+ years)
Delayed Debut w/Oral Sex	6.4% (n=116)	<ul style="list-style-type: none"> • Single behavior debut (100%) • Initiated with Oral Sex (80%) • Lowest lifetime behavior count—55% engaged in only one behavior in lifetime (oral sex) • Latest age of debut (18.1 years)
MALES		
Single Behavior Debut	50.4% (n=273)	<ul style="list-style-type: none"> • Single behavior debut (100%) • Initiated with Oral Sex (75.7%) • Shortest time to 2nd behavior (56.1% waited ≤2 years) • Highest likelihood of single lifetime behavior (14.2%)
Multi Behavior Debut	32.3% (n=169)	<ul style="list-style-type: none"> • Dual or multi behavior debut (94% dual debut; 6% debuted with all three) • Initiated with Vaginal Intercourse + Oral Sex (81.6%) or Anal Intercourse+ Oral Sex (12.6%). • Oldest age of debut (17.9 years)
Early Anal Sex	11.2% (n=169)	<ul style="list-style-type: none"> • Dual or multi behavior debut (91.2%) • Initiated with Anal Intercourse + Oral Sex (55.5%). An additional 9.4% initiated with all three behaviors • 100% engaged in anal sex prior to age 18
Very Early Debut	6.2% (n=32)	<ul style="list-style-type: none"> • Single behavior debut (100%) • Initiated with oral sex (8.8%) or anal intercourse (18.6%) • Extremely young timing of first sexual encounter (≤10 years) • Very long spacing between 1st and 2nd behaviors (76.4% waited ≥6 years)

Table 10. Selected sociodemographic characteristics of the analytic sample for Chapter 4, by biological sex and sexual initiation class membership (n=2,155)

FEMALES (N=1,627)					
	Total	Typical Debut % (n)	Dual Behavior Debut % (n)	Early Debut % (n)	Delayed Debut with Oral Sex % (n)
Class Size		41.3 (654)	34.7 (563)	17.5 (294)	6.4 (116)
Race/Ethnicity					
<i>Hispanic</i>	11.8 (244)	12.4 (111)	1.3 (75)	14.0 (40)	9.8 (18)
<i>NH-Black</i>	11.6 (329)	1.9 (118)	5.2 (65)	23.2 (111)	18.7 (35)
<i>NH-Asian</i>	3.4 (87)	4.1 (37)	3.5 (37)	1.2 (8)	5.2 (5)
<i>NH-White</i>	73.2 (967)	72.7 (388)	81.1 (386)	61.6 (135)	66.4 (58)
Wave IV Age					
24-26	24.9 (326)	25.8 (137)	25.4 (112)	22.5 (52)	23.0 (25)
27-29	53.8 (892)	53.8 (360)	55.8 (309)	51.4 (164)	49.8 (59)
30-34	21.3 (409)	20.4 (157)	18.9 (142)	26.1 (78)	27.2 (32)
Parental Education Level					
< <i>High School</i>	11.0 (186)	13.9 (80)	6.7 (46)	12.6 (41)	12.1 (18)
<i>HS diploma/GED</i>	26.4 (399)	28.0 (165)	22.3 (121)	31.4 (82)	25.1 (31)
<i>Some college</i>	30.8 (483)	28.3 (185)	34.2 (179)	34.6 (94)	18.8 (25)
≥ <i>Bachelor's Degree</i>	31.7 (559)	30.0 (224)	36.8 (217)	21.4 (77)	44.0 (41)
Neighborhood Poverty					
<i>Low</i>	57.0 (943)	58.4 (404)	59.2 (340)	49.2 (141)	57.2 (58)
<i>Medium</i>	22.4 (367)	19.5 (126)	25.8 (142)	21.4 (70)	24.5 (29)
<i>High</i>	20.7 (317)	22.1 (124)	15.0 (81)	29.3 (83)	18.3 (29)
Sexual Victimization Prior to Debut					
<i>Coerced Encounter</i>	15.4 (224)	13.2 (84)	15.8 (74)	21.0 (54)	11.9 (12)
<i>Physically Forced</i>	9.9 (151)	6.7 (59)	9.6 (46)	13.7 (36)	8.8 (10)
<i>Sexual Abuse</i>	11.0 (174)	9.7 (56)	10.9 (62)	14.9 (43)	9.3 (13)
Respondent Educational Attainment					
≤ <i>High school graduate /GED</i>	21.9 (332)	24.5 (130)	18.4 (108)	23.0 (69)	21.4 (25)
<i>Some College</i>	48.6 (789)	45.7 (323)	49.8 (256)	58.8 (171)	32.2 (39)
≥ <i>Bachelor's Degree</i>	29.5 (506)	29.8 (201)	31.8 (199)	18.2 (54)	46.5 (52)

(Table 10, Continued)					
	Total	Typical Debut % (n)	Dual Behavior Debut % (n)	Early Debut % (n)	Delayed Debut with Oral Sex % (n)
Lifetime sexual partner count, mean					
<i>Other-sex only</i>	15.9	16.5	15.0	2.4	5.4
<i>Same-sex only</i>	2.0	2.0	1.4	2.3	4.6
Prior year sexual partner count, mean					
<i>Other-sex only</i>	1.5	1.6	1.5	1.7	0.7
<i>Same-sex only</i>	0.3	0.2	0.2	0.3	0.7
†Lifetime STD Diagnosis (n=1,617)	43.5 (710)	45.5 (300)	4.2 (216)	53.3 (169)	21.4 (925)
Prior-Year STD Diagnosis (n=1,615)	19.6 (304)	2.0 (120)	19.5 (111)	21.4 (61)	13.2 (12)
MALES (N=528)					
	Total	Single Behavior Debut % (n)	Multi Behavior Debut % (n)	Early Anal Sex % (n)	Very Early Debut % (n)
Class Size		50.3 (274)	32.2 (169)	11.1 (52)	6.4 (33)
Race/Ethnicity					
<i>Hispanic</i>	15.7 (105)	13.8 (50)	14.0 (29)	27.9 (20)	17.2 (6)
<i>NH-Black</i>	12.1 (87)	13.5 (48)	9.7 (24)	12.5 (8)	12.6 (7)
<i>NH-Asian</i>	2.8 (31)	1.7 (14)	4.6 (15)	4.0 (≤3)	0.1 (≤3)
<i>NH-White</i>	69.4 (305)	71.0 (162)	71.6 (101)	55. (23)	70.0 (19)
Wave IV Age					
<i>24-26</i>	15.7 (66)	18.9 (37)	16.0 (22)	4.5 (4)	8.7 (≤3)
<i>27-29</i>	50.0 (283)	46.2 (152)	48.9 (93)	68.4 (29)	53.5 (19)
<i>30-34</i>	34.3 (179)	35.0 (95)	35.1 (54)	27.1 (19)	38.8 (11)
Parental Education Level					
<i>< High School</i>	13.0 (65)	13.8 (36)	9.7 (17)	16.9 (8)	16.3 (4)
<i>HS diploma/GED</i>	22.2 (118)	24.8 (68)	14.9 (26)	23.9 (12)	36.0 (12)
<i>Some college</i>	26.7 (144)	24.2 (69)	30.4 (52)	25.6 (15)	29.1 (8)
<i>≥Bachelor's Degree</i>	38.2 (201)	37.2 (101)	45.0 (74)	33.7 (17)	
Neighborhood Poverty					
<i>Low</i>	58.0 (305)	59.0 (158)	62.7 (106)	44.6 (25)	49.8 (16)
<i>Medium</i>	19.2 (110)	19.2 (58)	18.1 (32)	22.2 (13)	19.5 (7)
<i>High</i>	22.8 (113)	21.9 (58)	19.2 (31)	33.2 (14)	30.7 (10)

(Table 10, Continued)	Total	Single Behavior Debut % (n)	Multi Behavior Debut % (n)	Early Anal Sex % (n)	Very Early Debut % (n)
Sexual Victimization Prior to Debut					
<i>Coerced Encounter</i>	6.4 (31)	6.1 (14)	1.8 (7)	17.1 (6)	13.6 (4)
<i>Physically Forced</i>	5.6 (23)	5.6 (12)	1.3 (≤3)	13.6 (5)	12.5 (≤3)
<i>Sexual Abuse</i>	7.0 (36)	8.2 (20)	2.0 (5)	19.5 (7)	1.0 (4)
Respondent Educational Attainment					
<i>≤ High school graduate /GED</i>	22.7 (113)	25.0 (57)	20.5 (38)	17.6 (10)	35.5 (8)
<i>Some College</i>	41.6 (225)	35.7 (113)	39.6 (62)	63.7 (30)	59.8 (20)
<i>≥ Bachelor's Degree</i>	35.7 (190)	39.4 (104)	40.0 (69)	18.7 (12)	14.7 (5)
Lifetime sexual partner count, mean					
<i>Other-sex only</i>	11.9	9.3	11.6	21.0	18.3
<i>Same-sex only</i>	12.6	13.7	7.4	23.4	12.1
Prior-year sexual partner count, mean					
<i>Other-sex only</i>	1.6	1.3	2.0	1.2	2.4
<i>Same-sex only</i>	2.1	2.0	1.1	3.7	5.5
Lifetime STD Diagnosis (n=515)	20.0 (111)	19.0 (60)	15.8 (26)	23.7 (13)	42.4 (12)
Prior-Year STD Diagnosis (n=515)	8.5 (46)	7.0 (24)	7.2 (11)	16.7 (7)	12.6 (4)

Unweighted N's and weighted percentages, weighted to account for Add Health complex sampling design

Table 11. Crude and adjusted log-odds of sexual initiation class membership, by adolescent psychosocial processes

FEMALES						
	Typical Debut		Early Debut		Delayed Debut With Oral Sex	
	Crude β (S.E.)	Adjusted β (S.E.)	Crude β (S.E.)	Adjusted β (S.E.)	Crude β (S.E.)	Adjusted β (S.E.)
Adolescent Psychosocial Process						
Self-esteem	.33 (.19) †	.34 (.19) †	.36 (.25)	.35 (.25)	-.26 (.29)	-.31 (.30)
Neighborhood connectedness	-.04 (.11)	.00 (.10)	-.19 (.11) †	-.10 (.12)	.41 (.18)*	.44 (.18)*
School Connectedness	.11 (.13)	.14 (.14)	.06 (.16)	.11 (.16)	.01 (.24)	.05 (.25)
Parental Support	-.64 (.46)	-.70 (.47)	-.73 (.56)	-.66 (.57)	.26 (.72)	.31 (.73)
Wave IV Age						
24-26		-.04 (.24)		.37 (.30)		-.56 (.41)
27-29		-.09 (.20)		-.36 (.24)		-.55 (.35)
30-34		Referent		Referent		Referent
Parental Education Level						
< High School		1.01 (.32)***		.95 (.38)**		.45 (.49)
HS diploma/GED		.49 (.21)**		.78 (.27)***		-.05 (.37)
Some college		.05 (.19)		.49 (.27) †		-.73 (.36)*
≥Bachelor's Degree		Referent		Referent		Referent
Neighborhood Poverty						
Low		Referent		Referent		Referent
Medium		.21 (.22)		.59 (.26)*		.34 (.42)
High		-.38 (.19)*		-.17 (.24)		.00 (.32)
Sexual Victimization Prior to Debut						
Coerced Encounter		-.21 (.29)		.13 (.38)		-.39 (.49)
Physically Forced		.05 (.33)		.23 (.41)		.19 (.59)
Sexual Abuse		-.10 (.26)		.20 (.29)		-.07 (.43)
MALES						
	Single Behavior Debut		Early Anal Sex		Very Early Debut	
	Crude β (S.E.)	Adjusted β (S.E.)	Crude β (S.E.)	Adjusted β (S.E.)	Crude β (S.E.)	Adjusted β (S.E.)
Adolescent Psychosocial Process						
Self-esteem	-.13 (.44)	.05 (.42)	.45 (.56)	.65 (.64)	-.02 (.80)	.18 (.81)
Neighborhood connectedness	-.24 (1.10)	-.01 (.20)	-4.12 (1.66)*	-.58 (.33) †	-2.48 (1.37) †	-.38 (.26)
School Connectedness	.20 (.28)	.16 (.29)	.08 (.38)	.00 (.40)	.39 (.77)	.24 (.77)
Parental Support	.20 (.15)	.14 (.16)	.28 (.32)	.14 (.29)	.10 (.26)	.11 (.29)

MALES

(Table 11, Continued)	Single Behavior Debut		Early Anal Sex		Very Early Debut	
	Crude β (S.E.)	Adjusted β (S.E.)	Crude β (S.E.)	Adjusted β (S.E.)	Crude β (S.E.)	Adjusted β (S.E.)
Wave IV Age						
24-26		.20 (.51)		-.87 (.80)		-.69 (.89)
30-34		Referent		Referent		Referent
Race/Ethnicity						
Hispanic		-.09 (.47)		.71 (.45)		-.30 (.88)
NH-Black		.12 (.42)		-.18 (.61)		-.26 (.79)
NH-Asian		-1.20 (.78)		-.25 (1.54)		-3.21 (.64)***
NH-White		Referent		Referent		Referent
Parental Education Level						
< High School		.33 (.48)		-.12 (.72)		.94 (1.15)
HS diploma/GED		.68 (.40) †		.50 (.58)		1.64 (.70)*
Some college		-.05 (.40)		-.35 (.59)		.73 (.69)
≥Bachelor's Degree		Referent		Referent		Referent
Neighborhood Poverty						
Low		Referent		Referent		Referent
Medium		.02 (.43)		.50 (.61)		-.14 (.69)
High		.02 (.42)		.71 (.46)		.23 (.62)
Sexual Victimization Prior to Debut						
Coerced Encounter		.69 (.77)		1.83 (1.36)		1.54 (1.29)
Physically Forced		.71 (.95)		.33 (1.46)		1.22 (1.41)
Sexual Abuse		1.36 (.65)*		2.35 (.80)***		-1.26 (.95)

All coefficients reflect unstandardized log-odds (and standard errors) of class membership, relative to membership in the referent class: Dual-Behavior Debut served as the referent class for females; Mutli-Behavior Debut served as the referent class for males.

Table 12. Crude and adjusted log-odds of lifetime/prior-year STD diagnosis from structural equation models of pathways from adolescent psychosocial predictors and sexual initiation class membership—Females

	LIFETIME STD DIAGNOSIS				PRIOR-YEAR STD DIAGNOSIS			
	<u>M1</u> <i>β</i> (S.E.)	<u>M2</u> <i>β</i> (S.E.)	<u>M3</u> <i>β</i> (S.E.)	<u>M4</u> <i>β</i> (S.E.)	<u>M1</u> <i>β</i> (S.E.)	<u>M2</u> <i>β</i> (S.E.)	<u>M3</u> <i>β</i> (S.E.)	<u>M4</u> <i>β</i> (S.E.)
Sexual Initiation Class Membership								
Typical Debut	.22 (.16)	.23 (.16)	.21 (.16)	.20 (.17)	.03 (.20)	.03 (.20)	.04 (.20)	.04 (.20)
Dual-Behavior Debut	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Early Debut	.54 (.20)**	.51 (.20)*	.45 (.21)*	.36 (.21) I	.12 (.24)	.09 (.24)	.10 (.25)	.09 (.25)
Delayed Debut with Oral Sex	-.90 (.32)**	-.83 (.32)**	-.89 (.33)**	-.55(.32) I	-.46 (.40)	-.41 (.40)	-.42 (.41)	-.35 (.42)
Adolescent Psychosocial Process								
Self-esteem		.07 (.11)	.04 (.11)	.02 (.11)		.01 (.12)	-.01 (.12)	-.01 (.12)
Neighborhood connectedness		-.35 (.12)*	-.28 (.12)*	-.30 (.13)*		-.14 (.14)	-.11 (.14)	-.10 (.14)
School Connectedness		.06 (.10)	.01 (.10)	.03 (.10)		.01 (.01)	-.04 (.13)	-.05 (.12)
Parental Support		-.14 (.09) I	-.15 (.09) I	-.13 (.10)		-.18 (.11) I	-.21 (.11)*	-.21 (.11)*
Wave IV Age								
24-26			.24 (.21)	.34 (.22)			.59 (.25)*	.59 (.26)*
27-29			-.24 (.17)	-.18 (.18)			-.01 (.21)	-.01 (.21)
30-34			Referent	Referent			Referent	Referent
Parental Education Level								
< High School			-.08 (.27)	-.01 (.27)			-.43 (.35)	-.44 (.35)
HS diploma/GED			.02 (.19)	.06 (.20)			.06 (.23)	.07 (.23)
Some college			.01 (.19)	.02 (.19)			.04 (.23)	.05 (.23)
≥Bachelor's Degree			Referent	Referent			Referent	Referent
Neighborhood Poverty								
Low			Referent	Referent			Referent	Referent
Medium			.18 (.17)	.24 (.18)			.35 (.21) I	.35 (.21) I
High			.63 (.19)**	.78 (.20)**			.43 (.23) I	.45 (.23) I
Sexual Victimization Prior to Debut								
Coerced Encounter			-.03 (.24)	-.09 (.25)			.34 (.30)	.36 (.29)
Physically Forced			.11 (.28)	.02 (.30)			-.41 (.35)	-.41 (.35)
Sexual Abuse			.25 (.22)	.16 (.23)			-.39 (.28)	-.41 (.29)
Respondent Educational Attainment (Wave IV)								
≤ High school graduate			-.28 (.21)	-.34 (.22)			.13 (.26)	.12 (.26)
Some College			-.12 (.17)	-.22 (.17)			-.18 (.21)	-.18 (.21)

(Table 12, continued)	LIFETIME STD DIAGNOSIS				PRIOR-YEAR STD DIAGNOSIS			
	<u>M1</u> <i>β (S.E.)</i>	<u>M2</u> <i>β (S.E.)</i>	<u>M3</u> <i>β (S.E.)</i>	<u>M4</u> <i>β (S.E.)</i>	<u>M1</u> <i>β (S.E.)</i>	<u>M2</u> <i>β (S.E.)</i>	<u>M3</u> <i>β (S.E.)</i>	<u>M4</u> <i>β (S.E.)</i>
Respondent Educational Attainment (Wave IV)								
<i>≥Bachelor's Degree</i>			Referent	Referent			Referent	Referent
Lifetime sexual partner count								
<i>Other-sex only</i>				.27(.05)***				
<i>Same-sex only</i>				-.90 (.52) 1				
Prior-year sexual partner count								
<i>Other-sex only</i>							.14 (.07)*	
<i>Same-sex only</i>							-.03 (.10)	
Model Fit								
<i>AIC</i>	2,185.067	65,019.551	65,007.493	64,90.622	64,457.191	64,445.413	64,28.515	
<i>BIC</i>	2,206.620	65,397.165	65,449.841	65,353.759	64,834.806	64,887.762	64.733.445	
<i>Sample-size adjusted BIC</i>	2,193.913	65.174.787	64,189.342	65,086.906	64,612,428	64,627.262	64,466.592	

Unstandardized coefficients reported for all categorical and dichotomous variables; standardized coefficients (with respect to predictor) reported for all continuous and latent variables (e.g. partner counts and adolescent psychosocial processes), and interpreted as increase in log-odds of outcome associated with a 1 standard deviation increase in predictor.

All coefficients weighted to account for Add Health complex sampling design.

Table 13. Crude and adjusted log-odds of lifetime/prior-year STD diagnosis from structural equation models of pathways from adolescent psychosocial predictors and sexual initiation class membership—Males

	LIFETIME STD DIAGNOSIS				PRIOR-YEAR STD DIAGNOSIS			
	<u>M1</u> <i>β (S.E.)</i>	<u>M2</u> <i>β (S.E.)</i>	<u>M3</u> <i>β (S.E.)</i>	<u>M4</u> <i>β (S.E.)</i>	<u>M1</u> <i>β (S.E.)</i>	<u>M2</u> <i>β (S.E.)</i>	<u>M3</u> <i>β (S.E.)</i>	<u>M4</u> <i>β (S.E.)</i>
Sexual Initiation Class Membership								
Single Behavior Debut	.22 (.32)	.26 (.32)	.28 (.33)	.29 (.36)	-.03 (.60)	-.02 (.59)	-.27 (.59)	-.03 (.53)
Multi-Behavior Debut	Referent	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Early Anal Sex	.50 (.48)	.43 (.51)	.36 (.49)	.15 (.55)	.95 (.68)	.90 (.73)	.26 (.76)	.50 (.68)
Very Early Debut	1.37 (.56)*	1.38 (.54)**	1.74 (.59)***	1.61 (.59)**	.62 (.80)	.68 (.78)	.61 (.86)	.39 (1.05)
Adolescent Psychosocial Process								
Self-esteem		-.08 (.25)	-.29 (.28)	-.33 (.29)		-.29 (.40)	-.52 (.39)	-.60 (.40)
Neighborhood connectedness		-.06 (.24)	.07 (.24)	.19 (.25)		.31 (.37)	.60 (.41)	.48 (.35)
School Connectedness		-.22 (.23)	-.26 (.24)	-.17 (.25)		-.44 (.37)	-.61 (.42)	-.44 (.42)
Parental Support		-.02 (.20)	-.02 (.20)	-.18 (.20)		.09 (.27)	.09 (.29)	.01 (.29)
Wave IV Age								
24-26			-.63 (.44)	-.70 (.48)			-1.04 (.74)	-.66 (.69)
27-29			-.13 (.36)	-.11 (.36)			.63 (.47)	.99 (.49)*
30-34			Referent	Referent			Referent	Referent
Race/Ethnicity								
<i>Hispanic</i>			1.31 (.47)**	1.28 (.47)**			1.80 (.62)**	1.82 (.65)**
<i>NH-Black</i>			1.42 (.43)***	1.36 (.45)**			.82 (.59)	.83 (.59)
<i>NH-Asian</i>			-.04 (.84)	-.53 (1.14)			-.81 (1.27)	-4.98 (4.61)
<i>NH-White</i>			Referent	Referent			Referent	Referent
Parental Education Level								
< High School			-.37 (.41)	-.47 (.48)			.09 (.65)	.45 (.78)
HS diploma/GED			-.09 (.36)	-.43 (.41)			.20 (.63)	.61 (.70)
Some college			-.14 (.41)	-.03 (.34)			-.36 (.66)	-.18 (.69)
≥Bachelor's Degree			Referent	Referent			Referent	Referent
Neighborhood Poverty								
Low			Referent	Referent			Referent	Referent
Medium			.60 (.34) †	.61 (.35) †			.78 (.52)	.74 (.57)
High			-.14 (.41)	-.14 (.37)			.00 (.69)	-.23 (.71)

(Table 13, Continued)	M1 β (S.E.)	M2 β (S.E.)	M3 β (S.E.)	M4 β (S.E.)	M1 β (S.E.)	M2 β (S.E.)	M3 β (S.E.)	M4 β (S.E.)
Sexual Victimization Prior to Debut								
<i>Coerced Encounter</i>			.65 (.57)	-.53 (.99)			-.50 (.77)	-.62 (.76)
<i>Physically Forced Sexual Abuse</i>			.28 (.99)	-.04 (1.11)			1.02 (.883)	.90 (.780)
			.65 (.57)	.51 (.67)			1.13 (.70)†	1.12 (.72)
Respondent Educational Attainment (Wave IV)								
\leq High school graduate			-.46 (.52)	-.56 (.49)			-.31 (.75)	-.12 (.66)
Some College			-.64 (.42)	-.60 (.40)			-.46 (.70)	-.20 (.65)
\geq Bachelor's Degree			Referent	Referent			Referent	Referent
Lifetime sexual partner count								
<i>Other-sex only</i>				.63 (.21)**				
<i>Same-sex only</i>				.53 (.24)*				
Prior-year sexual partner count								
<i>Other-sex only</i>								.33 (.15)**
<i>Same-sex only</i>								.02 (.01)*
Model Fit								
AIC		21,29.017	21,279.102	21,25.194		21,075.332	21,067.828	20,986.682
BIC		21,588.854	21,641.975	21,621.605		21,374.169	21,43.701	21,357.763
Sample-size adjusted BIC		21,366.654	21,372.162	21,345.443		21,151.970	21,16.888	21,081.602

Unstandardized coefficients reported for all categorical and dichotomous variables; standardized coefficients (with respect to predictor) reported for all continuous and latent variables (e.g. partner counts and adolescent psychosocial processes), and interpreted as increase in log-odds of outcome associated with a 1 standard deviation increase in predictor.

All coefficients weighted to account for Add Health complex sampling design

Table 14. Adjusted probit coefficients of lifetime and prior-year STD diagnosis, by race/ethnicity, from structural equation models of pathways from adolescent psychosocial predictors and sexual initiation class membership—Females

LIFETIME DIAGNOSIS				
	Hispanic <i>β</i> (S.E.)	Black <i>β</i> (S.E.)	Asian <i>β</i> (S.E.)	White <i>β</i> (S.E.)
Total, % (n)	11.8 (244)	11.6 (329)	3.4 (87)	73.2 (967)
Lifetime STD diagnosis, % (n)	46.8 (97)	66.3 (210)	41.6 (36)	39.5 (367)
Sexual Initiation Class Membership				
Typical Debut	.62 (.34) I	.66 (.29)*	-.81 (.84)	-.02 (.12)
Dual-Behavior Debut	Referent	Referent	Referent	Referent
Early Debut	1.41 (.43)***	.52 (.28) I	2.39 (1.12) *	-.10 (.17)
Delayed Debut with Oral Sex	.94 (.53) I	-.01 (.43)	-1.18 (1.65)	-.71 (.30)*
Adolescent Psychosocial Process				
Self-esteem	.10 (.11)	.28 (.19)	-.32 (.27)	.01 (.07)
Neighborhood connectedness	-.26 (.17)	-.07 (.12)	-.18 (.20)	-.17 (.09) I
School Connectedness	.14 (.10)	-.06 (.11)	.79 (.21)***	-.03 (.09)
Parental Support	.15 (.12)	-.45 (.21)*	-.05 (.14)	-.06 (.06)
Wave IV Age				
24-26	.26 (.35)	-.03 (.30)	-1.10 (1.10)	.30 (.16) I
27-29	-.51 (.29) I	-.09 (.25)	-1.59 (1.01)	.04 (.13)
30-34	Referent	Referent	Referent	Referent
Parental Education Level				
< High School	-.74 (.40) I	-.12 (.44)	1.33 (1.10)	.20 (.25)
HS diploma/GED	-.10 (.36)	-.10 (.31)	-1.71 (1.02) I	.10 (.15)
Some college	-.61 (.36) I	-.53 (.32) I	.52 (.84)	.16 (.14)
≥Bachelor's Degree	Referent	Referent	Referent	Referent
Neighborhood Poverty				
Low	Referent	Referent	Referent	Referent
Medium	.50 (.30)	.49 (.30) I	2.46 (1.13) *	.02 (.13)
High	.50 (.33)	.44 (.24) I	-1.33 (1.17)	.31 (.17) I
Sexual Victimization				
Coerced Encounter	-.24 (.43)	.53 (.33)	-.95 (.87)	-.05 (.15)
Sexual Abuse	.32 (.37)	-.16 (.38)	-3.32 (240.1)	.09 (.17)
Respondent Educational Attainment				
≤ High school graduate /GED	.10 (.37)	.11 (.36)	.93 (.91)	-.24 (.18)
Some College	-.25 (.31)	.20 (.27)	-.04 (.98)	-.15 (.13)
≥Bachelor's Degree	Referent	Referent	Referent	Referent
Lifetime sexual partner count				
Other-sex only	.01 (.01)	.04 (.01)***	.15 (.03)***	.02 (.01)***
Same-sex only	-.06 (.07)	-.05 (.03)*	-.13 (.16)	-.01 (.01)
PRIOR-YEAR STD DIAGNOSIS				
Prior-Year STD diagnosis, % (n)	19.0 (40)	27.3 (80)	12.3 (15)	18.9 (169)
Sexual Initiation Class Membership				
Typical Debut	.11 (.42)	.03 (.32)	-.89 (.93)	-.01 (.13)
Dual-Behavior Debut	Referent	Referent	Referent	Referent
Early Debut	.81 (.46) I	.36 (.32)	2.93 (1.50)*	-.20 (.21)
Delayed Debut with Oral Sex	1.06 (.56) I	.31 (.46)	-9.45 (12.95)	-.70 (.39) I

(Table 14, continued)	Hispanic <i>β</i> (S.E.)	Black <i>β</i> (S.E.)	Asian <i>β</i> (S.E.)	White <i>β</i> (S.E.)
Adolescent Psychosocial Process				
<i>Self-esteem</i>	.01 (.11)	.23 (.19)	-1.16 (.73)	-.01 (.08)
<i>Neighborhood connectedness</i>	-.13 (.16)	.03 (.11)	.14 (.39)	-.02 (.08)
<i>School Connectedness</i>	.09 (.10)	-.14 (.10)	1.09 (.53)*	-.06 (.09)
<i>Parental Support</i>	.09 (.12)	-.43 (.21)*	.13 (.27)	-.13 (.06)
Wave IV Age				
24-26	-.26 (.47)	.15 (.31)	2.76 (1.44) †	.40 (.18)*
27-29	-.31 (.34)	-.20 (.26)	-.76 (.126)	.09 (.16)
30-34	Referent	Referent	Referent	Referent
Parental Education Level				
< High School	-.63 (.47)	-.27 (.41)	1.85 (1.73)	-.23 (.31)
HS diploma/GED	.29 (.42)	.01 (.31)	-6.37 (28.84)	-.01 (.18)
Some college	-.43 (.48)	-.22 (.31)	2.46 (1.25)*	.07 (.16)
≥Bachelor's Degree	Referent	Referent	Referent	Referent
Neighborhood Poverty				
Low	Referent	Referent	Referent	Referent
Medium	.60 (.36) †	.25 (.32)	-3.43 (3.45)	.14 (.15)
High	.18 (.43)	.22 (.27)	-.66 (1.69)	.29 (.19)
Sexual Victimization				
<i>Coerced Encounter</i>	-1.13 (.60) †	.32 (.31)	-1.07 (1.54)	.16 (.17)
<i>Sexual Abuse</i>	-.56 (.41)	-.05 (.37)	-3.37 (2465.1)	-.29 (.20)
Respondent Educational Attainment				
≤ High school graduate /GED	.45 (.45)	.23 (.35)	-3.17 (1.86) †	.05 (.20)
Some College	.01 (.39)	.14 (.29)	.41 (1.07)	-.14 (.15)
≥Bachelor's Degree	Referent	Referent	Referent	Referent
Lifetime sexual partner count				
<i>Other-sex only</i>	.12 (.10)	.10 (.01)***	.06 (.35)	.05 (.01)***
<i>Same-sex only</i>	-.85 (.13)***	.02 (.14)	1.14 (1.41)	-.01 (.08)

Unstandardized probit coefficients, reflecting within-racial/ethnic group associations between predictors and STD diagnosis, weighted to account for complex Add Health survey design.

Factor loadings for observed indicators of adolescent psychosocial latent constructs constrained to be equal between Hispanic, black, and white respondents, and allowed to load freely among Asian respondents.

CHAPTER 5: CONCLUSIONS AND IMPLICATIONS FOR PUBLIC HEALTH

Overview of Findings

The purpose of this dissertation was to elucidate the multi-behavior patterns of sexual initiation among sexual minority youth who are part of a nationally-representative sample not selected on the basis of sexual orientation, as well as explore both the early-life psychosocial predictors of initiation, and the implications of initiation patterns on young adult STD risk.

Using latent class analysis (LCA), the first paper (Chapter 3) explored common patterns of sexual initiation among sexual minorities, incorporating information not just on non-vaginal sexual behaviors (i.e., oral sex and anal intercourse, in addition to vaginal intercourse), but on timing, sequence and spacing of these behaviors. While we know a bit about typical sexual behavior timelines for heterosexual youth,(165–167) virtually nothing is known, however, about what is typical or relevant (and, therefore, atypical and potentially indicative of risk) for sexual minority youth. The sexual initiation classes derived in Chapter 3 therefore directly address this gap in the literature, by providing a comprehensive empirical measure of sexual initiation specific to sexual minorities. Eight initiation patterns emerged—four distinct patterns each for males and females, which differed substantially enough from each other to warrant the need for biological sex-specific initiation measures, as well as differed substantially enough from the earlier heterosexual initiation patterns to warrant SM-specific measures. Within-biological sex differences in class membership demographics emerged as well, most notably by race/ethnicity for females, and sexual victimization history for males, highlighting the importance of moving away from a ‘one size fits all’ approach to measuring sexual debut.

The second paper moved beyond the descriptive focus of the first paper, and situated sexual initiation classes in a larger model of adolescent/early-life determinants of young adult STD risk. Integrating theoretical frameworks such as life course theory and psychological mediation framework, structural equation modeling was used to test pathways from adolescent psychosocial factors (parental support, school connectedness, etc.) to initiation pattern to STD diagnosis history. Results found that initiation predicted lifetime, but not prior-year, STD risk for both males and females, suggesting that sexual initiation as a determinant of SRH may be time/developmentally limited, rather than persist across the life course. More importantly, adolescent psychosocial support, particularly parental support and neighborhood connectedness/social capital, were significantly protective against STD risk.

Cross-Study Themes and Implications for Public Health

Taken together, several cross-study themes emerge which have potential impact for future public health practice and policy. Perhaps most importantly, as suggested by the fact that multiple initiation classes emerged in Chapter 3, results highlight how sexual initiation is often more complex than just a binary transition from never having to having had vaginal intercourse, and instead often involves a multitude of sexual behaviors, which, if not acknowledged, may preclude understanding of important nuances of adolescent sexual behavior. As classes were defined by aspects other than initiation behavior, results suggest timing (i.e., age of debut) is just one important factor of initiation, along with sequence and spacing of other sexual behaviors. For example, females in both the typical debut and early sexual debut classes reported earlier ages of initiation than the dual behavior class (Table 5), yet, relative to the dual behavior class, only those in the early sexual debut class had significantly higher log-odds of lifetime STD diagnosis (Table 12). Among males, lifetime STD risk was significantly higher among the very

early debut class and the early anal sex class, who reported earlier ages of sexual debut than the referent multi-behavior class (Table 13), yet males in these higher-STD risk classes largely initiated with behaviors other than vaginal intercourse (Table 5), and thus might have been misclassified as lower-risk if only vaginal intercourse were considered.

Further, though we are unable to definitively assess the biological sex of initiation partners, vaginal intercourse as assessed in the Add Health survey is likely reflective of a heterosexual encounter, and its prominence in several of the initiation classes (for both males and females), highlights how vaginal intercourse is an important component of SM sexual initiation. Differences across sexual initiation classes in sexual identity and both lifetime and pre-age 18 sexual partnering similarly emphasize that early-life sexual behaviors may involve combination of both heterosexual and homosexual encounters, regardless of how one identifies in young adulthood. Following, public health researchers and practitioners who work with sexual minorities should aim to assess multiple sexual behaviors (and multiple aspects of sexual initiation), as well as same-sex and other-sex encounters (regardless of how one currently identifies), in order to measure sexual initiation in ways that better reflect how sexual minority youth actually engage in early-life sex. Though beyond the scope of the present analysis, a future area of study could be to explore individual and social-environmental predictors of sexual abstinence and/or the decision to delay /not engage in sexual behaviors among sexual minorities, particularly with regards to implications for sexual identity formation (and internalization and self-acceptance of one's identity).

A second theme that emerged was that sexual minorities are not one monolithic population, but rather that numerous within-sexual minority differences exist, both in typical sexual initiation patterns (Chapter 3) and in the pathways from sexual initiation to STD risk

(Chapter 4). For example, Hispanic women in the delayed debut initiation class had significantly higher odds (than the referent dual-behavior class) of lifetime STD diagnosis, whereas white women in the delayed debut class had significantly lower odds (Table 14). Similarly, early debut was associated with significantly higher odds of lifetime and prior-year STD diagnosis for non-white women, but there was no difference in either outcome for white women (between early debut and dual-debut initiation classes). Though current models do not explicitly test *why* differences in pathways from initiation to STD risk emerged across race/ethnicity, one explanation may be that, within sexual minority women, racial minorities may face additional sources of stigma /stress which compound the effect of risk exposures, and/or reduce access to protective factors, relative to white sexual minority peers.(81,90,150,168) Future studies should further explore these pathways, in order to understand the various formal and informal networks and sources of social support available to SM of color.

Results from the male models offer additional preliminary support for the important protective effect of psychosocial support—though males in the early anal sex class had significantly higher odds of lifetime STD diagnosis relative to the multi-behavior debut class (Table 13), once adolescent psychosocial predictors were adjusted for (of which, neighborhood connectedness was significantly protective against early anal sex initiation; Table 11), this association was no longer significant. By highlighting how similar exposures (in this case, sexual initiation) can have markedly different health effects across populations, results offer further support for the need to view health disparities through an intersectional, rather than additive lens. In particular, findings may be of use to public health practitioners and clinicians in order to best direct resources towards those most at risk (due to engaging in riskier sex, and/or

lacking social support). Further, by exploring socio-environmental predictors of initiation, results help identify potential mechanisms to intervene upon to prevent future risk.

However, while this dissertation is notable for including multiple aspects of the social and contextual environment, contextual effects must be interpreted within a caveat: namely, applicability of results to current sexual minority youth may be limited by broader shifts in social acceptability of both sexual minorities, and adolescent sexuality in general.(112,113) Results from national surveys note that the proportion of teenagers having sexual intercourse has steadily declined since the 1990s, when respondents in the Add Health sample were in their adolescent years.(169,170) Evidence suggests that birth cohort differences in sexual minority sexual behavior may exist as well, with several studies noting increases in adolescent and young adult same-sex sexual activity over time.(29,31,171) In addition, a recent study by Nelson and colleagues (2016) explored differences in SM male sexual debut patterns with male partners across ten-year birth cohorts, and found that men born in the 1970s (the equivalent birth cohort for Add Health respondents) and those born in the 1990s (who are presently in adolescence) had roughly equivalent ages of sexual debut (any behavior), and anal sex debut specifically, though ages of debut were significantly higher for those born in 1980s (who are presently in young adulthood).(172) Given that behavioral trends over time have occurred simultaneously with overall societal changes in both visibility and acceptance of sexual minorities,(112,113,173) an updated, nationally representative study of the sexual initiation patterns of sexual minority youth (as well as within-group differences and determinants at the intersection of biological sex and race/ethnicity) would be a tremendous contribution to the field, as well as potentially shed further light on how the broader social environment shapes adolescent sexual behavior.

Finally, that sexual initiation was predictive of lifetime, but not prior-year, STD diagnosis offers a critique to programs and policies which aim to prevent and/or delay adolescent sexual behavior in general, or among sexual minorities specifically. If sexual initiation were predictive of life-long sexual risk behaviors, then we would expect to see associations not just for lifetime risk, but prior-year risk as well. That even those who had a ‘riskier’ initiation in adolescence appear to no longer demonstrate increased sexual risk by the time they had aged into young adulthood suggests that initiation patterns may have a ‘time-limited’ effect on future sexual risk (if it has an effect at all). Approaches that promote *safe* sexual behaviors, such as comprehensive school-based sexual health education, may be far more effective at promoting long-term sexual health for this population, particularly when employed with a ‘queer-inclusive,’ non-heteronormative lens (e.g., which includes discussions of sexual orientation, non-vaginal sexual behaviors, and avoids presumptions of exclusively heterosexual partnering, etc.), may be far more effective. Previous studies have noted that sexual minorities often lack access to comprehensive, relevant, sexual health information and education that could help avoid or prevent future sexual risk, however differences have emerged by biological sex. Across studies, SM females repeatedly noted that most existing sexual health information was irrelevant to their lives, either as a result of perceiving lesbian sex as low risk, or because of an overall lack of lesbian-specific ‘sexual scripts,’ primarily driven by either the absence of discussion of sexual minority health, or its discussion exclusively in the context of gay men and HIV.(6,174,175) In contrast, SM males were often split in their experiences—some reported heightened online sexual health information seeking as a result of perceiving themselves at higher risk for HIV/STIs, whereas others felt unprepared for sex, having only learned about barrier methods in the context of pregnancy prevention (with little discussion of STIs), and only encountering anal

sex in pornography.(45,174) Following, sexual health promoting interventions which are inclusive of and/or tailored to the needs of SM youth, may therefore go a long way in addressing these disparities. For example, a study in Massachusetts found that SM high school students who received minimal or no ‘gay-sensitive’ instruction (as measured by self-reported comprehensiveness/inclusiveness of available materials by HIV educators) reported higher numbers of sexual partners, and were more likely to have had sex while intoxicated, compared to SM adolescents receiving highly-sensitive sex education.(43)

In conclusion, this dissertation offers the first attempt to model sexual initiation specific to lesbian, gay, and bisexual sexual minority adolescents, as well the first study to link population-specific initiation measures to later life SRH. Though study hypotheses were not fully supported, results highlight heteronormative biases in our assessment approaches of adolescent sexual behavior (particularly for SM youth), while demonstrating that the use of broader, ‘population-appropriate’ measures of sexual initiation may better capture those most at risk for later-life adverse sexual health outcomes. At the same time, results challenge traditional adolescent sexual health programs/policies which prioritize delaying sexual initiation, by demonstrating that for sexual minorities, approaches which promote social support and resiliency may have a more long-lasting impact on sexual health than simply waiting longer to have sex.

**APPENDIX A: DISTRIBUTION OF SEXUAL ORIENTATION INDICATORS AMONG
SEXUAL MINORITY SAMPLE**

Table 15. Sexual orientation indicator endorsement among sexual minority respondents in the National Longitudinal Study of Adolescent to Adult Health, by biological sex (n=2,154)

Lifetime Partner History ^a	0 Same-Sex Partners % (n)	≥1 Same-Sex Partner % (n)	TOTAL % (n)
FEMALES (n=1,628)			
Sexual Identity			
<i>100% heterosexual</i>	Excluded from sample	28.9 (276)	17.1 (276)
<i>Mostly heterosexual</i>	97.3 (648)	44.9 (422)	66.3 (1,070)
<i>Bisexual</i>	2.3 (21)	14.7 (135)	9.6 (156)
<i>Mostly homosexual</i>	<0.1 (≤3)	5.7 (55)	3.4 (56)
<i>100% homosexual</i>	<0.1 (≤3)	5.8 (64)	3.6 (66)
TOTAL	40.8 (672)	59.2 (952)	
MALES (n=526)			
Sexual Identity			
<i>100% heterosexual</i>	Excluded from sample	30.1 (114)	21.7 (114)
<i>Mostly heterosexual</i>	94.5 (130)	20.9 (72)	41.4 (202)
<i>Bisexual</i>	4.5 (4)	8.7 (36)	7.8 (40)
<i>Mostly homosexual</i>	0.1 (≤3)	9.8 (50)	7.3 (51)
<i>100% homosexual</i>	--	30.5 (117)	22.0 (117)
TOTAL	27.9 (135)	72.2 (389)	

Unweighted N's and weighted percentages, weighted to account for Add Health complex sampling design

Based on this coding scheme, sexual minority respondents included those who identified as 100% heterosexual, but reported a previous same-sex sexual partner ('homosexually-experienced heterosexual'), as well as those who had a valid response on one indicator and missing response on the other indicator (n=6).

APPENDIX B: FACTOR LOADINGS OF ADOLESCENT PSYCHOSOCIAL PROCESSES, BY BIOLOGICAL SEX

Table 16. Final standardized factor loadings (and R²) of observed indicators of latent constructs of adolescent psychosocial processes, by biological sex

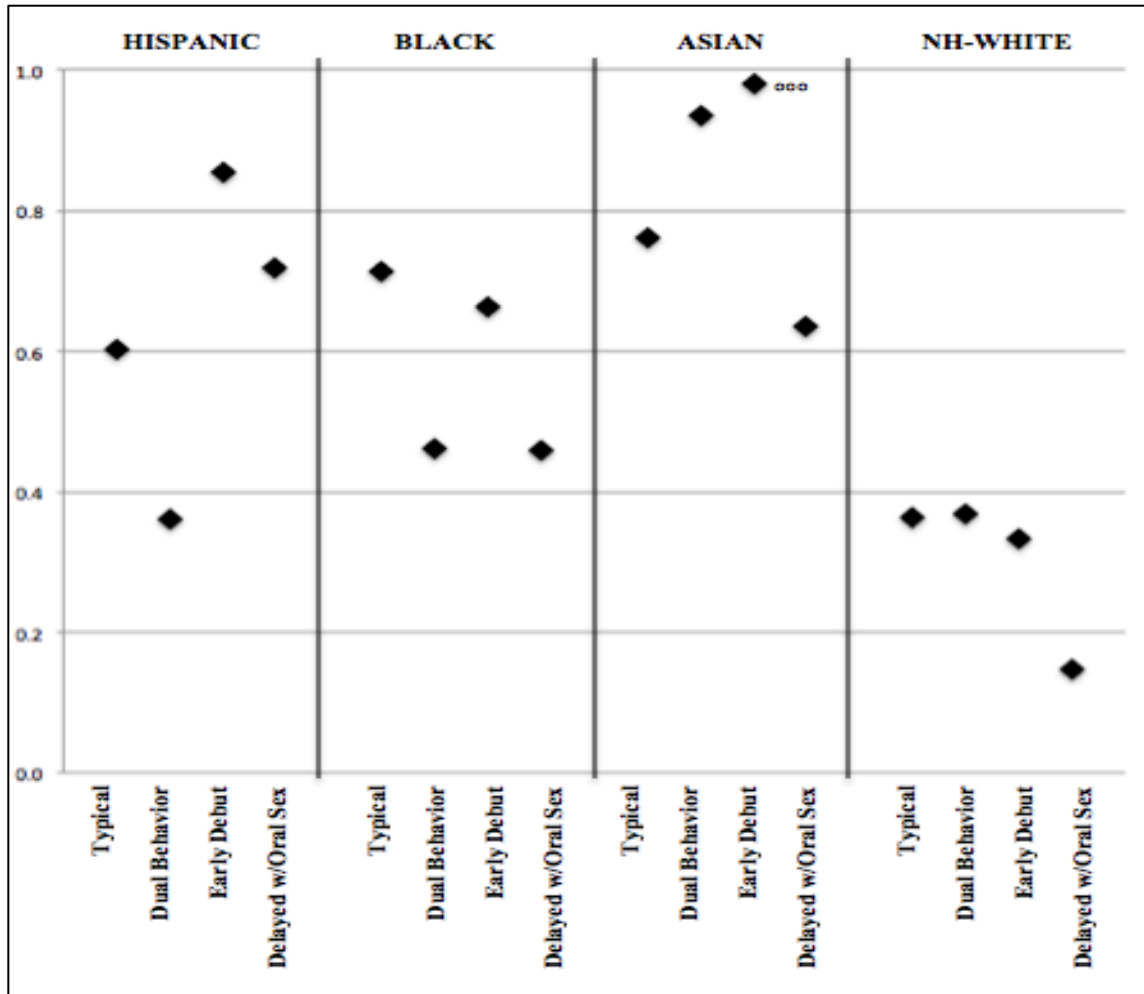
	Females		Males	
	<i>Factor Loading</i>	<i>R²</i>	<i>Factor Loading</i>	<i>R²</i>
Self Esteem				
Feel socially accepted	.469	.427	.591	.525
Do everything just right	.645	.416	.560	.314
Like myself as I am	.698	.487	.556	.309
Feel loved and wanted	.868	.754	.760	.578
Have a lot to be proud of	.781	.611	.739	.546
Have lots of good qualities	.585	.342	.589	.309
<i>Cronbach's α</i>	.854		.818	
Neighborhood connectedness				
People in this neighborhood look out for each other	.679	.461	.577	.333
I feel safe in my neighborhood	.455	.207	.722	.521
Happy living in neighborhood	.780	.608	.633	.401
<i>Cronbach's α</i>	.548		.564	
School connectedness				
Close to people at school	.743	.551	.643	.413
Feel part of school	.822	.676	.744	.554
Happy to be in school	.757	.575	.735	.54
Frequency of problems getting along w/other students	.403	.163	.429	.184
Feel safe in school	.489	.239	.612	.375
Students are prejudiced	na	na	na	
Like myself as I am (self-esteem indicator co-load)	.301	.427	.176	.525
<i>Cronbach's α</i>	.776		.776	
Parental Support				
How much parent cares about you	.543	.295	.189	.179
Closeness with parent	.744	.554	.533	.514
Satisfaction with communication	.788	.621	.668	.559
Satisfied with overall relationship	.837	.701	.537	.523
Parent is warm and loving toward you	.797	.635	.59	.608
<i>Cronbach's α</i>	.859		.838	
Model Fit				
RMSEA	.033		.037	
CFI	.938		.901	
TFI	.927		.883	

Factor loadings standardized with respect to both latent construct and observed indicator ('StdYX' standardization); All factor loadings weighted to account for Add Health complex sampling design

RMSEA= Root Mean Square Error of Approximation; CFI=Comparative Fit Index; TFI= Tucker Lewis Index

APPENDIX C: PREDICTED PROBABILITY AND PROPORTION OF STD DIAGNOSIS BY SEXUAL INITIATION CLASS MEMBERSHIP, ACCORDING TO RACE/ETHNICITY (FEMALES ONLY)

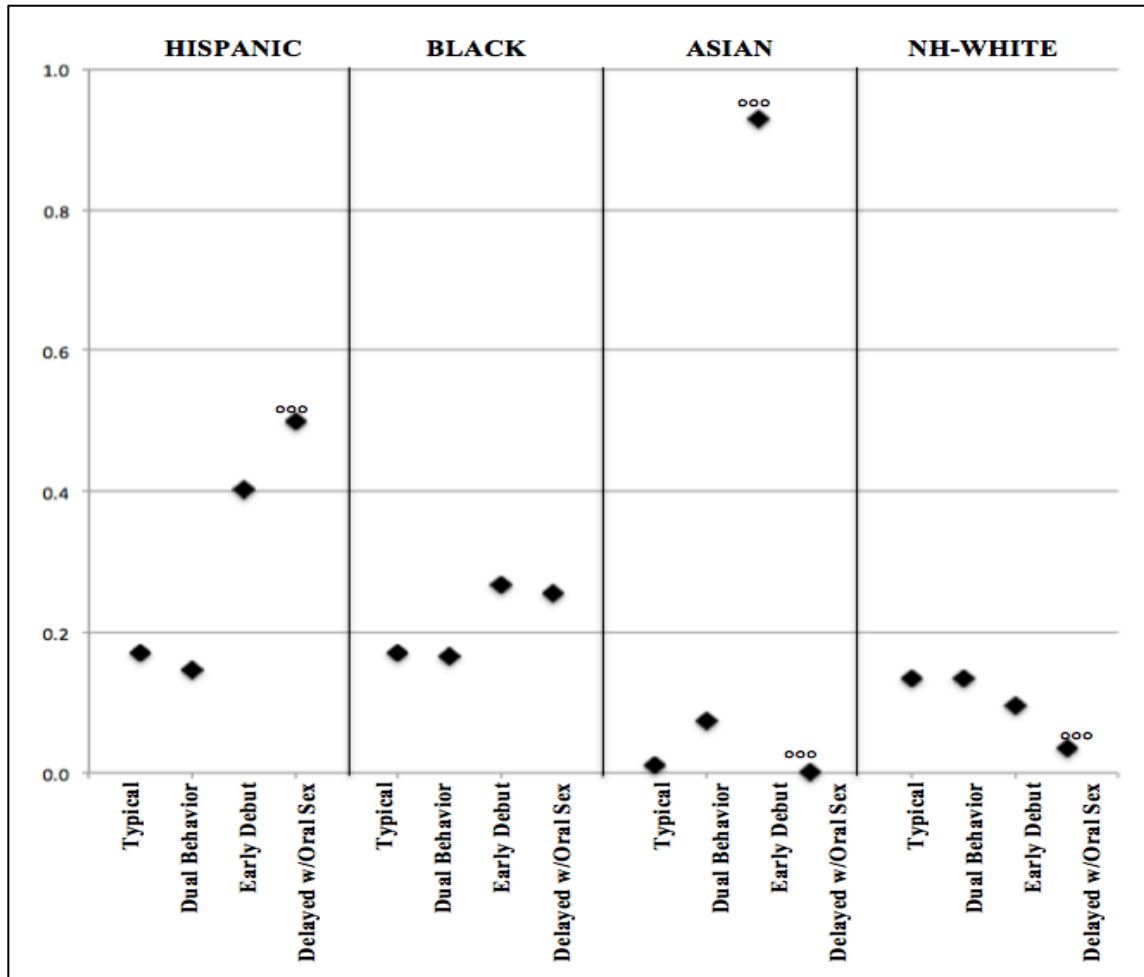
Figure 6. Predicted probability of lifetime STD diagnosis by race/ethnicity and sexual initiation class membership, from multi-group structural equation model—Females



Predicted probability computed from unstandardized probit coefficients for each sexual initiation class, with categorical variables held at their referent value, latent constructs held at their within-race mean value, and partner counts held at 0 (to account for centering). Full model results can be found in Table 14.

^{ooo} indicates estimated probability may be unreliable due to small cell sizes $1.4 (\leq 3)$

Figure 7. Predicted probability of prior-year STD diagnosis by race/ethnicity and sexual initiation class membership, from multi-group structural equation model—Females



Predicted probability from multi-group structural equation model of prior-year STD diagnosis, adjusted for all covariates and prior-year partner counts. Probability computed from unstandardized probit coefficients for each sexual initiation class, with all categorical variables held at their referent value, latent constructs held at their within-race mean value, and partner counts held at 0 (to account for centering). Full model results can be found in Table 16.

ooo indicates estimated probability may be unreliable due to small cell sizes $1.4 (\leq 3)$

Table 17. Lifetime and prior-year STD diagnosis, by race/ethnicity and sexual initiation class membership (Females only)

HISPANIC					
	<u>Total</u>	<u>Typical Debut</u>	<u>Dual-Behavior Debut</u>	<u>Early Debut</u>	<u>Delayed Debut w/Oral Sex</u>
Sexual Initiation Class Membership, %(n)	11.8 (244)	43.5 (111)	30.3 (75)	20.9 (40)	5.33 (18)
STD Diagnosis, %(n)					
<i>Lifetime</i>	46.8 (97)	48.6 (49)	26.5 (9)	71.4 (24)	47.1 (5)
<i>Prior-Year</i>	19.0 (40)	18.2 (16)	14.8 (14)	23.2 (7)	32.7 (≤ 3)
BLACK					
Sexual Initiation Class Membership, %(n)	11.6 (329)	39.0 (118)	15.6 (65)	35.1 (111)	10.4 (35)
STD Diagnosis, %(n)					
<i>Lifetime</i>	66.3 (210)	72.7 (81)	48.7 (37)	59.5 (15)	40.5 (145)
<i>Prior-Year</i>	27.3 (80)	22.5 (27)	20.2 (16)	34.5 (31)	31.2 (6)
ASIAN					
Sexual Initiation Class Membership, %(n)	3.4 (87)	48.9 (37)	35.0 (37)	6.4 (8)	9.7 (5)
STD Diagnosis, %(n)					
<i>Lifetime</i>	41.6 (36)	33.5 (15)	59.5 (15)	67.2 (5)	1.4 (≤ 3)
<i>Prior-Year</i>	12.3 (15)	7.0 (7)	14.9 (5)	55.9 (≤ 3)	1.4 (≤ 3)
WHITE					
Sexual Initiation Class Membership, %(n)	73.2 (967)	41.0 (388)	38.4 (386)	14.7 (135)	5.8 (58)
STD Diagnosis, %(n)					
<i>Lifetime</i>	39.5 (367)	41.6 (155)	40.5 (145)	41.8 (61)	12.6 (6)
<i>Prior-Year</i>	18.9 (169)	20.6 (70)	20.2 (76)	15.4 (21)	6.2 (≤ 3)

Unweighted N and weighted %, to account for complex Add Health Survey Design.

APPENDIX D: CRUDE AND ADJUSTED MODELS PREDICTING LIFETIME/PRIOR-YEAR SAME-SEX AND OTHER-SEX SEXUAL PARTNER COUNT

Table 18. Adjusted probit coefficients of lifetime and prior-year sexual partner count—Females

	LIFETIME PARTNERS		PRIOR YEAR PARTNERS	
	Other-sex <i>β</i> (S.E.)	Same-sex <i>β</i> (S.E.)	Other-sex <i>β</i> (S.E.)	Same-sex <i>β</i> (S.E.)
Sexual Initiation Class Membership				
Typical Debut	2.10 (1.66)	.62 (1.47)	.08 (.21)	-0.03 (.06)
Dual-Behavior Debut	Referent	Referent	Referent	Referent
Early Debut	4.91 (1.97)*	.58 (1.57)	.21 (.22)	.03 (.07)
Delayed Debut with Oral Sex	-7.65 (5.77)	3.25 (2.05)	-.76 (.71)	.46 (.09)***
Adolescent Psychosocial Process				
Self-esteem	.04 (.04)	.04 (.02) †	..29 (.14)*	.32 (.11)**
Neighborhood connectedness	.03 (.04)	.06 (.01)***	-1.30 (.41)**	-1.24 (.29)***
School Connectedness	-.05 (.04)	-.12 (.01)***	1.03 (.36)**	.95 (.27)***
Parental Support	-.08 (.03)**	-.05 (.01)***	.14 (.10)	.18 (.09) †
Wave IV Age				
24-26	-3.45 (2.21)	-.56 (1.62)	.09 (.28)	.09 (.07)
27-29	-3.09 (1.86) †	-.77 (1.44)	.08 (.24)	-.02 (.07)
30-34	Referent	Referent	Referent	Referent
Parental Education Level				
< High School	-4.69 (3.65)	-1.66 (2.68)	.23 (.31)	-.16 (.10)
HS diploma/GED	-.78 (2.01)	-.22 (1.47)	-.13 (.29)	.04 (.06)
Some college	-1.62 (2.13)	-.64 (1.38)	-.04 (.24)	-.08 (.06)
≥Bachelor's Degree	Referent	Referent	Referent	Referent
Neighborhood Poverty				
Low	Referent	Referent	Referent	Referent
Medium	-.66 (1.68)	.33 (1.45)	-.05 (.23)	-.06 (.06)
High	-3.55 (2.29)	.40 (1.33)	-.32 (.23)	.02 (.06)
Sexual Victimization				
Coerced Encounter	2.84 (1.99)	-.16 (1.67)	-.12 (.34)	.11 (.08)
Physically Forced	3.67 (2.30)	2.36 (1.75)	-.06 (.44)	-.04 (.09)
Sexual Abuse	4.65 (1.98)*	.33 (1.69)	.22 (.30)	-.16 (.09) †
Respondent Educational Attainment				
≤ High school graduate /GED	3.97 (2.87)	1.86 (1.68)	.22 (.30)	.30 (.08)***
Some College	4.86 (2.17)*	1.04 (1.42)	.15 (.22)	.18 (.07)**
≥Bachelor's Degree	Referent	Referent	Referent	Referent

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Unstandardized coefficients reported for all categorical and dichotomous variables; standardized coefficients (with respect to predictor and outcome; 'STDYX' standardization) reported for all continuous and latent variables (e.g. partner counts and adolescent psychosocial processes). All coefficients weighted to account for complex Add Health Survey Design.

Table 19. Adjusted probit coefficients of lifetime and prior-year sexual partner count—Males

	LIFETIME PARTNERS		PRIOR YEAR PARTNERS	
	Other-sex β (S.E.)	Same-sex β (S.E.)	Other-sex β (S.E.)	Same-sex β (S.E.)
Sexual Initiation Class Membership				
Singe Behavior Debut	-.07 (.09)	.08 (.15)	-.71 (.98)	1.14 (3.12)
Multi Behavior Debut	Referent	Referent	Referent	Referent
Early Anal Sex	.06 (.09)	.13 (.11)	-1.16 (1.80)	2.78 (3.30)
Very Early Debut	.05 (.06)	.03 (.08)	.66 (1.43)	4.88 (3.63)
Adolescent Psychosocial Process				
Self-esteem	.06 (.08)	-.04 (.08)	.09 (.05) †	-.01 (.07)
Neighborhood connectedness	-.36 (.09)***	-.30 (.09)**	-.01 (.10)	.07 (.07)
School Connectedness	-.02 (.08)	.11 (.08)	-.15 (.06)**	.03 (.07)
Parental Support	.07 (.05)	.22 (.06)***	.04 (.06)	-.06 (.05)
Wave IV Age				
24-26	-.06 (.12)	.07 (.11)	-1.0 (1.83)	2.14 (3.24)
27-29	-.01 (.06)	.01 (.11)	-.50 (.98)	-0.95 (2.09)
30-34	Referent	Referent	Referent	Referent
Race/Ethnicity				
Hispanic	-.01 (.11)	.10 (.14)	.14 (1.77)	2.29 (2.47)
NH-Black	-.03 (.07)	.08 (.08)	-.03 (1.28)	.68 (1.93)
NH-Asian	-.01 (.08)	.03 (.15)	2.51 (1.69)	.03 (6.28)
NH-White	Referent	Referent	Referent	Referent
Parental Education Level				
< High School	-.21 (.11) †	.05 (.15)	-.65 (1.74)	-.46 (3.70)
HS diploma/GED	-.01 (.10)	-.04 (.12)	-.97 (1.46)	-2.13 (2.95)
Some college	-.03 (.08)	-.05 (.13)	-.28 (1.14)	-.28 (2.39)
≥Bachelor's Degree	Referent	Referent	Referent	Referent
Neighborhood Poverty				
Low	Referent	Referent	Referent	Referent
Medium	-.06 (.09)	.05 (.12)	-.01 (1.21)	1.36 (2.19)
High	-.05 (.11)	.02 (.12)	.59 (1.32)	.91 (2.48)
Sexual Victimization				
Coerced Encounter	.10 (.10)	-.05 (.14)	.36 (2.80)	-1.33 (3.49)
Physically Forced	.08 (.08)	.07 (.10)	.65 (2.67)	-.05 (3.95)
Sexual Abuse	.20 (.06)**	.02 (.08)	1.75 (1.43)	-.34 (4.80)
Respondent Educational Attainment				
≤ High school graduate /GED	.15 (.11)	-.01 (.17)	-.55 (1.15)	.13 (2.88)
Some College	.01 (.10)	-.02 (.11)	-.70 (1.00)	1.16 (2.48)
≥Bachelor's Degree	Referent	Referent	Referent	Referent

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Unstandardized coefficients reported for all categorical and dichotomous variables; standardized coefficients (with respect to predictor and outcome; 'STDYX' standardization) reported for all continuous and latent variables (e.g. partner counts and adolescent psychosocial processes). All coefficients weighted to account for complex Add Health Survey Design.

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