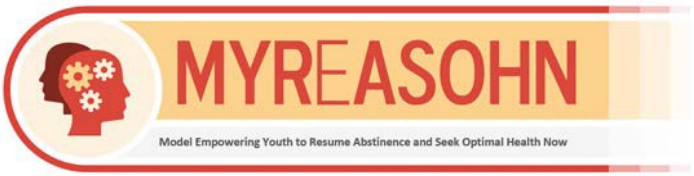

December 2020

Factors Influencing Youth Sexual Activity: Conceptual Models for Sexual Risk Avoidance and Cessation

This brief was developed as part of a portfolio of projects focused on youth sexual risk avoidance and cessation sponsored by the U.S. Department of Health and Human Services. The brief presents two complementary conceptual models—one for sexual risk avoidance and a second for sexual risk cessation—that aim to guide efforts to prevent youth risk behaviors and promote optimal health. It builds on an earlier brief that presented initial versions of the conceptual models. This brief describes refined versions of the conceptual models enhanced through additional information and analysis. The models identify a range of factors that research shows may influence youth decision making, sexual behavior, and related outcomes. These influencing factors occur at the environmental, interpersonal, or individual level, and many can be modified through educational intervention. To this end, the models may be used to guide and support efforts to develop and refine programs, tailor educational messages to youth, and empower parents and other adults to help youth avoid or cease sexual and non-sexual risk behaviors.

The avoidance of sexual activity among youth not only prevents unplanned pregnancies and sexually transmitted infections (STIs) but can also promote healthy outcomes and contribute to the positive development of youth. Research has shown, in particular, that delayed initiation of sexual intercourse can lead to better academic achievement for youth, improved self-esteem and mental health, and higher-quality relationships with romantic partners over time (Rotz et al. 2020b; Bridges and Hauser 2014; Sabia and Rees 2009; Meier 2007). Overall, rates of reported sexual activity among youth have declined in recent decades and are at their lowest since the early 1990s, with the decrease having been most pronounced during the past decade (Twenge and Park 2019). Still, estimates from 2019 show that 38 percent of high school–aged youth had ever had sex (Centers for Disease Control 2020; Kann et al 2018). In addition, among sexually experienced youth, estimates suggest that 60 percent wished they had waited longer before having had sex (Albert 2012).

These findings have influenced policymakers and practitioners to identify strategies and approaches to empower youth to make informed decisions that avoid sexual risk, support attainment of future goals, and promote healthy outcomes. Identifying the factors that influence youth's decisions to avoid sexual activity (for sexually inexperienced youth) or cease sexual activity (for sexually experienced youth) supports development of programming and policies focused on youth outcomes.

This brief presents two complementary conceptual models that depict factors that influence outcomes related to sexual risk avoidance and sexual risk cessation among youth. The brief describes *refined* versions of the conceptual models, building on an earlier brief that presented initial versions of these models.

The models were developed as part of a broad effort by the U.S. Department of Health and Human Services (HHS) to study sexual risk avoidance and cessation and identify innovative avenues for youth-focused programs, policy,

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and research. The Office of the Assistant Secretary for Health (OASH) at HHS sponsors the work, and the Administration for Children and Families' Office of Planning, Research, and Evaluation (OPRE) oversees it. The conceptual models contribute to an optimal health model for youth, which aims to encourage behavior that leads to a healthier life (Office of Population Affairs 2020).[1]

In this brief, we first discuss the social ecological model and how it is used to organize the factors identified as influential for sexual risk avoidance or cessation. Then we describe the iterative process used to develop and refine the models. Next, we present the two conceptual models and then describe the outcomes considered in the models and the similarities and differences between the models. Finally, we highlight key limitations of the conceptual models, as well as practical implications and opportunities for future research and analysis.

Key definitions

Sexual risk avoidance: Not engaging in consensual sexual activity.

Sexual risk cessation: Discontinuing consensual sexual activity after having engaged in it.

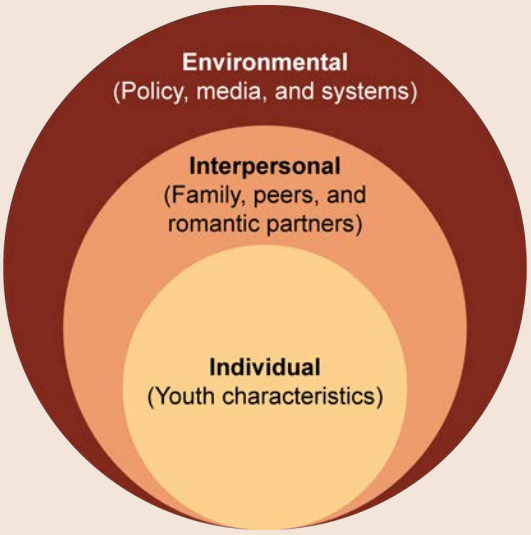
Conceptual model: A representation of factors, supported by evidence, that influence key outcomes of interest, along with an illustration and related narrative.

A framework for examining influences on youth sexual behaviors

Multiple factors affect whether (and when) youth engage in consensual sexual intercourse and other sexual activities.[2] These factors can influence youth and their decisions long before an unintended pregnancy or other undesired outcome occurs. Factors influencing sexual risk avoidance and cessation outcomes occur at multiple levels—from a person's environment to his or her interpersonal relationships and individual characteristics.

To reflect how factors at different levels influence behavior, we used the social ecological model to organize factors according to their level of influence on sexual risk avoidance or cessation (Bronfenbrenner 1977) (Figure 1). Although we used this model as the organizing framework, the conceptual models draw on other theoretical models—such as theories of self-determination, attachment, positive youth development, self-regulation, and the life course (Ryan and Deci 2000; Leventhal et al. 2016; Waters et al. 2000; Benson et al. 2007; Hutchinson 2011).

Figure 1. Social ecological model



Note: Adapted from Bronfenbrenner 1977.

The social ecological model considers factors at multiple levels and interactions among factors within and across levels. Levels are organized from distal to proximal, in terms of the likelihood of immediately affecting youth behavior. The most distal is the environmental level, with the interpersonal and individual levels more proximal. Influencing factors are grouped into categories, such as media or peers.

These factors, alone and in combination, lead to short-term nonbehavioral outcomes (for example, beliefs and intentions), sexual behavioral and health outcomes (for example, sexually transmitted infections and teen pregnancy), and non-sexual behavioral outcomes (for example, academic achievement and alcohol or drug use). Outcomes vary by model. The sexual risk avoidance model focuses on outcomes for sexually inexperienced youth related to delay of sexual initiation. The sexual risk cessation model focuses on outcomes for sexually experienced youth related to the discontinuation of sexual activity. The conceptual models

[1] The concept of health, as defined by the World Health Organization, is "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (WHO n.d.). Expanding on this definition, the optimal health model articulated by OPA defines optimal health as "a dynamic balance of physical, emotional, social, spiritual, and intellectual health … Lifestyle change can be facilitated through a combination of learning experiences that enhance awareness, increase motivation, and build skills and, most important, through the creation of opportunities that open access to environments that make positive health practices the easiest choice" (O'Donnell 2009).

[2] The definition of sexual intercourse varied in the literature, but primarily referenced vaginal intercourse. Therefore, for purposes of this brief, it refers to vaginal intercourse.

include only those factors with supporting evidence linking them to these outcomes.

Two-stage approach to develop and refine the models

We developed the conceptual models in two stages. In the initial stage, we started with a list of 56 potential factors that might influence youth behavior related to sexual risk avoidance and cessation. A set of experts advised us on the development of this list of potential factors. Through an in-depth literature search and review, we identified 38 factors that influenced sexual risk avoidance and/or cessation outcomes (36 for avoidance and 20 for cessation). Initial versions of these conceptual models were described in the prior brief (Adamek et al. 2019). The remaining 17 factors were omitted from the initial models because (1) no literature was identified, (2) the evidence from the literature we reviewed was inconclusive, or (3) the evidence suggested a null effect of the factor on key outcomes.

In the second (refinement) stage, we identified and reviewed additional research to examine the association of the 17 omitted factors with avoidance and cessation outcomes, and then added factors to the models, if warranted by the evidence. We identified and reviewed 17 additional articles, and also reviewed findings from a secondary analysis of data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) (Unpublished manuscript 2019). Secondary objectives of the refinement process were to assess the evidence to determine if behavioral outcomes should be added to the models, and to verify the relevance of the sexual health outcomes included in the initial models.

Through the refinement process we identified additional factors with evidence to include in the models. For the sexual risk avoidance conceptual model, we added 10 factors during model refinement. For the sexual risk cessation conceptual model, we added seven factors. Together, the refined models presented in this brief encompass 51 distinct factors (46 factors for sexual risk avoidance and 27 factors for sexual risk cessation) that are shown by research to influence outcomes related to sexual risk avoidance and cessation among youth.

The textbox on the left provides a brief summary of the steps used to develop the conceptual models. For additional detail on the methods, please see Appendix A.

Summary of methods used to develop conceptual models*

Initial conceptual models (2018-2019)

1. In consultation with experts, identified potential factors that may influence relevant behavioral outcomes.
2. Conducted in-depth literature review focusing on the list of potential factors.
3. Reviewed 88 relevant articles.
4. Assessed the relevance and rigor of each article using a defined set of criteria.
5. Assigned an evidence rating to each factor examined in the articles, based on an assessment of each article's relevance and rigor.
6. For each factor, reviewed and synthesized evidence of an effect or association between the factor and key outcomes.
7. Incorporated factors and outcomes with evidence into the initial models.

Refined conceptual models (2020)

8. For potential factors omitted from the initial avoidance model, examined the association between each factor and age at sexual initiation based on a secondary analysis of Add Health data.
9. For potential factors omitted from the initial cessation model and remaining potential factors for the avoidance model, conducted a supplementary literature search.
10. Reviewed 17 relevant articles, repeating steps 4 through 6.
11. To further examine non-sexual behavioral outcomes, reviewed findings from two recent reports on impacts of delayed sexual activity.
12. Incorporated factors and outcomes with evidence into the refined models.

*For additional detail please refer to Appendix A.

Model illustrations and practical applications

A full depiction of the factors influencing outcomes for sexual risk avoidance and cessation can be found in the below figures and related narratives for each model. The conclusions presented below represent a synthesis of findings from the 105 articles reviewed across both stages of the literature review, plus findings from the secondary data analysis.

The conceptual model figures indicate those factors that may be modifiable through educational interventions. These are factors that practitioners, such as schools and community organizations, or individuals, such as parents or peers, might be able to change through a program or other intervention. Program developers and staff may focus on the modifiable influencing factors when designing and improving program interventions. Policymakers may focus on promoting programming that addresses these factors.

A guide to the conceptual model figures

- The conceptual model figures display factors identified as influential on at least one of the key outcomes for sexually inexperienced youth (sexual risk avoidance) or sexually experienced youth (sexual risk cessation).
- Factors are marked as a protective or risk factor based on whether the evidence showed that the factor was a positive (protective) influence (+) on the intended outcomes or a negative (risky) influence (-).
- Factors that practitioners, such as schools and community organizations, or individuals, such as parents, might be most able to change or modify through intervention are marked with an "M" for "modifiable factor."
- Factors may interact with each other to influence outcomes, although the interaction is not depicted in the figures.

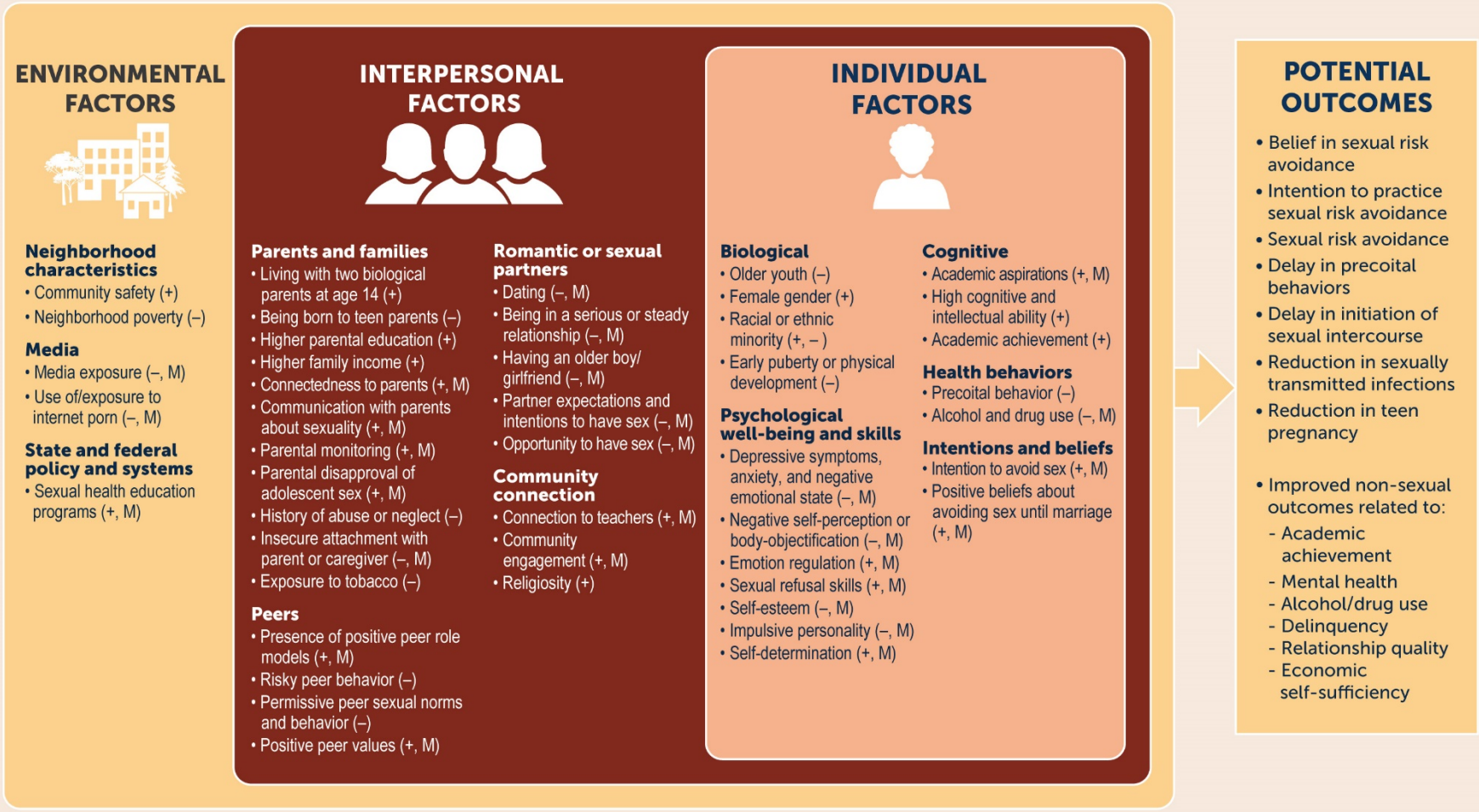
Sexual risk avoidance conceptual model

Factors at the environmental, interpersonal, and individual levels influence decisions among sexually inexperienced youth related to sexual activity. The factors identified through research to be associated with outcomes related to sexual risk avoidance are displayed in the conceptual model in Figure 2 and discussed below.

Environmental factors—neighborhood, media, and policy. Neighborhood characteristics, along with media and policy, influence sexual risk avoidance at the environmental level. As identified in the literature, **living in an unsafe community** or a **high-poverty neighborhood** was associated with early sexual initiation. **Exposure to sexually explicit media** through the Internet, TV, and movies emerged as a risk factor for sexual initiation, increased sexual activity, and increased permissive attitudes about sex during adolescence. In particular, **exposure to Internet pornograph**y was associated with permissive sexual attitudes. The reviewed evidence also suggested that some **sexual health education programs** help delay sexual initiation. It was beyond the scope of this review to examine the relative effectiveness of different types of programs or program content on key behavioral outcomes.

Interpersonal factors—parents and families, peers, partners, and connection to community. Family, peers, and other individuals who have close relationships with youth can have potentially large influences on their behavior. Relationships and social networks can provide support or leave youth feeling pressured or isolated. In the model, higher **family income**, higher **parental educational attainment**, and **living with both biological parents at age 14** were associated with delayed sexual initiation. Youth whose **parents were teens at the time of their birth** and **youth that lived with cigarette smokers** (irrespective of youth's own smoking habits) initiated sex earlier. Additionally, **connectedness to parents** through routines such as eating dinners with family and having secure emotional bonds was a protective factor against cognitive susceptibility to initiating sex—i.e., personal readiness for the onset of sex and having high expectations that it will occur—and consequent initiation of sex. Similarly, **parental monitoring**, as reflected in the number of weekly hours that youth are not alone at home, and **parental values that disapprove of adolescent sex** were both protective factors against sexual initiation among adolescents. Research also suggested that when parents communicate with adolescents about topics such as relationships, sex, and/or condom use before they become sexually active, adolescents may be more likely to delay sexual activity. Although the specific content of such conversations was not measured in the reviewed research, findings showed that **communication with parents about sexuality** can serve as a protective factor against sexual initiation. Experience of **abuse** (sexual, physical, or emotional) or **neglect** in childhood was associated with a younger age at sexual initiation. Growing up with an **insecure or anxious attachment with parents or caregivers** was associated with the probability of engaging in sexual behavior with someone who was not a romantic partner, such as an acquaintance or stranger. Having attachment issues with parents or caregivers also magnified the extent to which maltreatment experiences in childhood impacted later behavioral outcomes.

Figure 2. Conceptual model for sexual risk avoidance



Sexual risk avoidance is defined as not engaging in consensual sexual activity. The figure displays factors identified through a literature review and secondary analysis of Add Health data as influential on sexually inactive youth on at least one of the potential outcomes. Only those factors identified as having sufficient evidence are included. Factors fall into three interrelated categories: environmental, interpersonal, and individual. They are grouped in order from distal to proximal in relation to the outcomes. Factors are marked as a protective factor or a risk factor based on whether the evidence showed that the factor was a positive (protective) influence (+) or a negative (risky) influence (–) on potential outcomes related to sexual risk avoidance. In one case (racial or ethnic minority), evidence was mixed on the directionality of the influence. Given this, we labeled this factor with both a (+) and a (–). Factors may interact with each other to influence outcomes. Factors that are considered potentially modifiable by program intervention are marked with an "M".

The behavior and values of peers can affect youth's decision-making processes, including around intentions and behaviors related to sex. **Permissive sexual norms and behaviors among peers** in youth's social network were related to initiation of sexual activity, while having **positive peer role models**, such as friends who exhibit healthy behaviors and **peers with positive values** were protective factors. Positive peer role models were linked with delayed sexual initiation, particularly for youth ages 13 to 17. General **risky behavior among peers**, such as alcohol and drug use, and having a greater proportion of friends with sexual experience was associated with higher risk of sexual debut.

Romantic involvement and the characteristics, expectations, and intentions of partners were related to youth's sexual behaviors. For example, youth were more likely to initiate sexual activity when they were **dating or in a serious relationship**, and if they had a **romantic partner more than three years older** than themselves. **Partners' expectations and intentions to have sex** can act as a risk factor for initiating sexual activity, particularly for females. Female adolescents often reported having initiated sexual activity to meet their romantic partners' expectations. Finally, **the opportunity to have sex**—namely youth believing that there was a strong possibility that during the next year someone "might try to get (them) to have sex with them"—was associated with early initiation for middle school youth.

In addition, youth's **connectedness to their community** can influence sexual risk avoidance behavior outcomes. For example, youth engaged in their community, such as through volunteer service and participation in extracurricular activities, were less likely to have sex and engage in sexual risk behaviors. **Religiosity**—most commonly described as participating in religious activities—was also protective and was associated with a higher rate of avoidance of sexual intercourse. A **connection to teachers**—youth feeling that teachers care about them—can also act as a protective factor that delays sexual initiation.

Individual factors—biological, psychological, and cognitive characteristics, along with behaviors, intentions, and beliefs. Alongside the environmental and interpersonal factors, individual factors have strong associations with sexual risk avoidance behaviors. Biological factors such as **age**, **gender**, and **race** emerged as influential on sexual initiation on their own, as well as through moderating the relationships between other factors and outcomes. For example, as the age of youth increases, the likelihood of sexual initiation also increases. Gender influenced behavior differently for females and males, with adolescent males more likely to report an early sexual debut. The effect on sexual behavior outcomes of being a member of a racial or ethnic minority varied among studies. Being African American predicted increased sexual activity. Additionally, Hispanic youth were more likely to delay initiation than African American youth, but studies found mixed findings on whether Hispanic youth were more likely to delay initiation than White youth. **Early puberty or physical development** is also linked to earlier sexual initiation.

Psychological well-being and skills and cognitive ability can also influence youth engagement in sexual activity. **The ability to regulate emotions** was a protective factor for adolescents to avoid sex. In contrast, **depressive symptoms** and **negative self-perception** were risk factors associated with early sexual intercourse. Additionally, having higher **self-esteem** was associated with earlier initiation of sex. (Higher self-esteem was measured as having strong, positive feelings about yourself, including believing you have many good qualities and much to be proud of, along with liking yourself the way you are, and feeling socially accepted.) An **impulsive personality** was identified as a risk factor for sexual initiation; on average, youth who are more likely to make decisions or take action without fully thinking through the consequences initiated sex earlier than youth who did not have impulsive tendencies. Reviewed evidence also suggested **sexual refusal skills**—the ability to say no to unwanted sexual advances—were protective for youth and generally increased the probability they would choose not to have sex. For female youth, having a strong sense of **self-determination** (believing that they have control over what happens to them, rather than that their lives

Factors identified and added to sexual risk avoidance model during refinement

- Being born to teen parents (-)
- History of abuse or neglect (-)
- Insecure attachment with parent or caregiver (-)
- Exposure to tobacco (-)
- Opportunity to have sex (-)
- Self-esteem (-)
- Impulsive personality (-)
- Positive peer values (+)
- Connection to teachers (+)
- Self-determination (+)

(-) risk factor, (+) protective factor

depend on outside forces like fate or luck), was a protective factor against ever having sex. Higher levels of **cognitive ability** and **academic achievement** and **aspiration** were also protective factors for avoiding sex.

Youth's health behaviors, along with their intentions and beliefs about sex, influenced sexual risk avoidance outcomes. Reviewed evidence suggested that illegal **alcohol and drug use** and **precoital behaviors** (such as touching another person under his or her clothes) were associated with early sexual initiation. On the other hand, **intentions to avoid sex** and having **positive beliefs about avoiding sex until marriage** were associated with delayed sexual initiation.

Sexual risk cessation conceptual model

The environmental-, interpersonal-, and individual-level factors influencing sexual risk cessation overlap in many cases with the factors that influence sexual risk avoidance. However, instead of influencing youth to avoid initiating sex, the factors in the sexual risk cessation model influence sexually experienced youth to discontinue engaging in sexual activity (Figure 3). The specific outcomes, such as recent sexual intercourse and the number of romantic or sexual partners, reflect that youth may progress toward cessation through intermediate outcomes. For instance, some sexually experienced youth might gradually decrease the frequency of sex and eventually discontinue having sex, whereas others might immediately discontinue sex. In this section, we discuss how identified factors influence sexual risk cessation outcomes for youth who have already initiated sex.

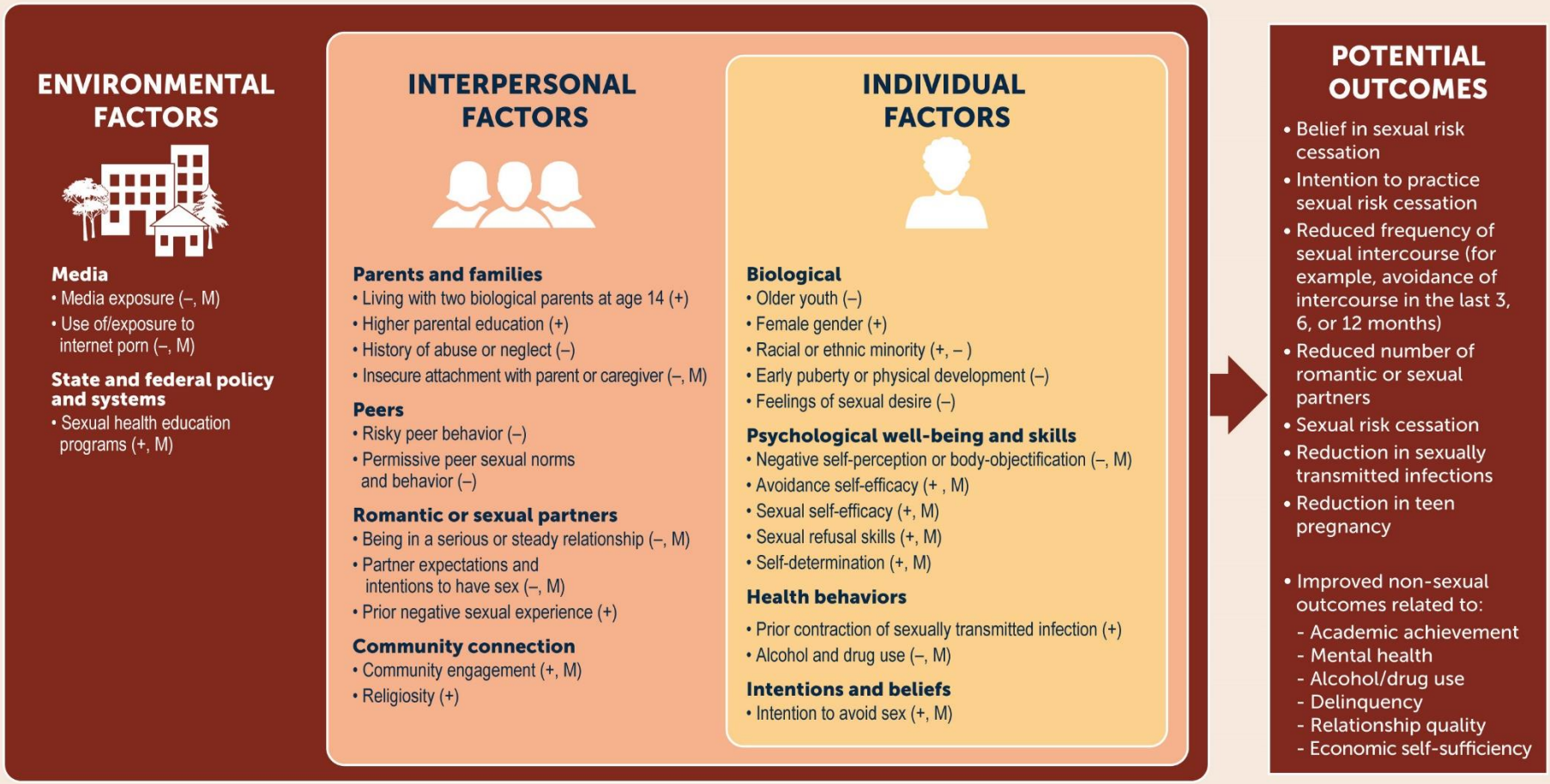
Environmental factors—media and policy. As with sexual risk avoidance, youth **exposure to media** content through the Internet, television, movies, and magazines was a risk factor for increased sexual activity and increased permissive attitudes about sex during adolescence. The **use of or exposure to Internet pornography** also emerged as being associated with numerous sexual risk outcomes, including increased likelihood of having recent sex partners, ever having engaged in anal sex, and increased risk of use of alcohol and other drugs at most recent sex. Literature found that **sexual health education programs** can help achieve the intended sexual risk cessation outcomes, but do not always do so.

Interpersonal factors—parents and families, peers, partners, and connection to community. **Living with two biological parents at age 14** was associated with less-frequent sexual activity and fewer pregnancies experienced in the early 20s, particularly among White youth. **Higher parental education**, defined as having a mother with a high level of education, was a protective factor for achieving the intended sexual risk cessation outcomes, especially for younger adolescents. The higher the level of a mother's education, the more likely a youth was to decrease sexual activity. Relationships with parents and caregivers were also linked with sexual risk cessation outcomes. **A history of abuse or neglect** was associated with an increased number of sexual partners and a probability of engaging in sexual behavior with someone who was not a romantic partner, for example, a casual acquaintance. These effects were particularly pronounced among African American female youth. As with sexual risk avoidance, having grown up with an **insecure attachment** to parents or caregivers also magnified the influence of other factors on outcomes related to sexual risk cessation. In particular, it exacerbated the negative impact of maltreatment experienced in childhood, which was associated with an increased number of sexual partners, especially for males. Insecure attachment was also associated with the probability of engaging in sexual behavior with someone who was not a romantic partner, especially for males.

Peers in youth's social networks influence youth's decision making as well as their intentions, norms, and behaviors related to sexual risk cessation. **Risky peer behavior**, such as alcohol or drug use, and **permissive peer sexual norms** were identified as factors that increased the probability of youth's cognitive susceptibility to engaging in sexual behavior, including sex without condoms and sex while using drugs.

Romantic involvement and sexual partners' expectations and intentions were also shown to influence sexual risk cessation–related outcomes. **Being in a serious or steady relationship** was identified as a risk factor for engaging in sexual activity, and the literature included evidence that living with a partner made it particularly difficult for young adults to disengage from sexual activity. **Partners' expectations and intentions to have sex** can act as a risk factor for continuing to engage in sexual activity. Having a **prior negative**

Figure 3. Conceptual model for sexual risk cessation



Sexual risk cessation is defined as discontinuing consensual sexual activity after having engaged in it. This figure displays factors identified through a literature review as influential for sexually active youth on at least one of the potential outcomes. Only those factors identified as having sufficient evidence are included. Factors fall into three interrelated categories: environmental, interpersonal, and individual. They are grouped in order from distal to proximal in relation to the outcomes. Factors are marked as a protective factor or a risk factor based on whether the evidence showed that the factor was a positive (protective) influence (+) or a negative (risky) influence (-) on potential outcomes related to sexual risk cessation. In one case (racial or ethnic minority), evidence was mixed on the directionality of the influence. Given this, we labeled this factor with both a (+) and a (–). Factors may interact with each other to influence outcomes. Factors that are considered potentially modifiable by program intervention are marked with an "**M**".

sexual experience, such as being mistreated or used by a partner, having a partner who was unfaithful, or having experienced physical harm (such as rape, assault, or sexual coercion), was associated with an increased desire to discontinue sexual intercourse.

Finally, youth's sense of connection to their community played a role in decisions related to sexual risk cessation behaviors. As with sexual risk avoidance, **community engagement** and **religiosity** acted as protective factors. Studies indicated that youth who were engaged in their communities, such as through volunteer service activities and participation in extracurricular activities, were less likely to engage in sexual risk behaviors. Greater religious ties were also associated with increased choice to discontinue sexual intercourse after having already experienced it and decreased sexual activity, especially for males and Hispanic youth.

Individual factors—biological and psychological characteristics, along with behaviors, and intentions and beliefs. Various types of individual characteristics emerged as an influence for sexual risk cessation. In terms of biological factors, among those who had already initiated sex, **being older** increased the risk of recent sexual activity (in the past 3, 6, or 12 months), frequency of sexual activity, and pregnancy. Female **gender** was a protective factor for sexual activity, as adolescent males were more likely than females to be sexually active. However, some studies found female adolescents were more susceptible to sexual coercion and harassment. Literature found that **feelings of sexual desire**—measured as sexual interest, frequency of thoughts about sex, and reporting greater levels of pleasure from having sex—was a risk factor for continuing to engage in sexual activity, particularly for sexually experienced African American females.

Several factors related to psychological well-being and skills were found to influence sexual risk cessation outcomes. **Negative self-perception** or **body-objectification** was a risk factor. Qualitative studies indicated that a motivation to improve self-perception influenced a desire to discontinue sexual intercourse among African American youth. The literature also suggested that this factor was particularly influential for females, regardless of race. **Avoidance self-efficacy, sexual self-efficacy and refusal skills**—the ability to stay disengaged from sexual activity, say no to unwanted sexual advances and negotiate condom use—were protective, as these characteristics increased youth's avoidance of intercourse and decreased their number of sexual partners and the probability of engaging in unprotected sex. Youth, particularly females, with a sense of self-determination (belief that their own actions, not external forces, determine what happens to them) were less likely to become pregnant as teenagers.

Youth's health behaviors also influenced sexual risk cessation outcomes. In addition, having had **a prior diagnosis of a sexually transmitted infection** deterred youth from seeking and engaging in subsequent sexual encounters. **Drug or alcohol use** was associated with an elevated risk of having had two or more sexual partners. Finally, youth's intentions and attitudes were associated with sexual risk cessation. **Intending to avoid sex** was a protective factor in the sexual risk cessation model.

Factors identified and added to sexual risk cessation model during refinement

- History of abuse or neglect (-)
- Insecure attachment with parent or caregiver (-)
- Feelings of sexual desire (-)
- Self-determination (+)
- Avoidance self-efficacy (+)
- Sexual self-efficacy (+)
- Sexual refusal skills (+)

(-) risk factor, (+) protective factor

Outcomes considered in the models

Both models include a range of behavioral and nonbehavioral outcomes. The outcomes were initially identified by the research team, guided by expert input, and supported by the reviewed information sources. In both models, outcomes are ordered as sexual intentions, sexual behaviors, and non-sexual outcomes. Programming that addresses the factors included in the models may potentially lead to improvements in any of outcomes. However, the analysis described above focuses primarily on factors found in the research to influence behavioral outcomes related to avoidance and cessation.

Sexual intentions. Both conceptual models include beliefs and intentions about sexual behaviors as outcomes. The sexual risk avoidance model additionally includes precoital behaviors (like touching). These outcomes often are associated with sexual behavior outcomes—for instance, increased intentions to avoid sex may be linked to delayed sexual initiation.

Sexual behavior and health outcomes. Within the reviewed literature, sexual behavior outcomes were most common. Outcomes linked to sexual risk avoidance frequently included delay of sexual initiation. For sexual risk cessation, decreased number of sexual partners, a decrease in frequency of sex, and discontinuation of sexual activity were the most commonly studied outcomes. This category of outcome also encompasses the health-related outcomes of pregnancy and sexually transmitted infections.

Non-sexual behavioral outcomes. Both models list several non-sexual behavior outcomes. These include academic achievement and mental health outcomes, along with alcohol and drug use and other measures of delinquency (like gang involvement). Finally, relationship quality (which includes outcomes such as relationship satisfaction, cohabitation, marriage, and divorce) and economic self-sufficiency in adulthood were included as outcomes in both models.

The factors in the model influence the outcomes in complex, interconnected ways, as many of the factors are associated or mediated by other factors. Likewise, the outcomes may influence each other—for instance, increased intentions to avoid or discontinue sex are linked to sexual behavior outcomes.

Similarities and differences between the refined sexual risk avoidance and sexual risk cessation conceptual models

- More factors are associated with sexual risk avoidance outcomes than sexual risk cessation outcomes, potentially due to more limited research on sexual risk cessation.
- Factors at the interpersonal and individual level are more prevalent than environmental factors for both sexual risk avoidance and cessation.
- The role of interpersonal factors that reflect relationships between parents and youth was more pronounced for sexual risk avoidance than sexual risk cessation, potentially due to limited research on sexual risk cessation.

Relationships between factors

The complex and dynamic environment in which we live makes it difficult to disentangle the influence of a single factor on youth sexual behavior. The ways that youth reach outcomes are complex and differ based on individual circumstances and experiences. The process used to develop the sexual risk avoidance and sexual risk cessation conceptual models identified a wide range of specific factors that studies suggest influence youth sexual behavior, and also highlighted several interactions between certain factors and youth sexual behaviors.

High family income moderated the relationship between not having sex and high school graduation. That is, avoiding sex was positively associated with high school graduation among youth from high-income families, but not among youth from low-income families.

Another moderator related to **gender**. Some factors had more influence on outcomes for female youth, and others on outcomes for male youth. Factors associated with risky behavior for **females** included having an older boyfriend, partner's expectations and intentions to have sex, low cognitive ability, and negative self-perception or body objectification.

In terms of **racial and ethnic differences**, some factors were particularly influential and protective among White youth, and less so among Hispanic or African American youth. For example, factors that were influential and protective among White youth included cognitive and intellectual ability, closeness with parents, living with two biological parents at age 14, and peer role models. One factor that may be especially influential and protective for African American youth was positive self-perception.

Age moderated the relationship between various factors and outcomes related to sexual risk avoidance and cessation. Factors influential and protective for sexual risk behavior of younger youth included positive peer role models, parental monitoring, parental education, and age of romantic partner.

Factors omitted from the models and study limitations

Through the literature screened into our study and discussions with experts, we identified, considered, and discussed many factors as potential influences on sexual risk avoidance or sexual risk cessation. For some of these factors, the literature review or secondary data analysis suggested that there was a null association between the factor and outcomes related to sexual risk avoidance or cessation. Factors with a null association in the research we reviewed include housing stability, permissive parental sexual norms, availability of family planning services and general risk-taking (on outcomes related to sexual risk avoidance), self-esteem (on outcomes related to sexual risk cessation), and general self-efficacy (on outcomes related to sexual risk

avoidance or cessation). These factors are omitted from the models.

For some potential factors, however, there was not enough evidence in the literature we reviewed to assess their potential influence on the targeted outcomes. In other cases, studies did examine a factor, but we determined that the evidence was inconclusive, for example, because multiple studies found conflicting results, the questions used to measure the factors were inadequate, or the quality of the studies was insufficient.

Table 1 highlights potential factors that were not included in one or both models due to inconclusive evidence in the literature we reviewed or a lack of identified literature. For example, our literature search did not identify any studies with a rigorous research design that examined the relationship between exposure to public health campaigns or use of social media on outcomes related to sexual risk avoidance. Moreover, there is limited research, in general, on how current adolescents interact with newer forms of social media. Therefore, we designated the evidence for these factors as inconclusive. Our study also revealed that literature on sexual risk cessation was more limited than literature on avoidance, and therefore, we were not able to assess evidence on the influence of 12 factors on outcomes related to sexual risk cessation. The factors shown in Table 1 may or may not influence sexual risk avoidance or cessation. More research is necessary to determine their influence.

It should also be noted that additional research would be beneficial to better understand the nature of the influence of particular factors on youth sexual behavior. For example, younger generations of youth are more likely to access internet pornography than the youth studied in our information sources. Additional research may help understand how increased access to internet pornography is likely to influence youth sexual behavior. Similarly, literature and our secondary analysis indicate that higher self-esteem, which is usually perceived as a positive characteristic, is also a risk factor for early initiation of sex. This association could reflect unobservable characteristics such as arrogance, self-centeredness, or a sense of entitlement, as well as the level of self-esteem. Additional research related to how self-esteem relates to youth sexual behavior may help program developers enhance youth's self-esteem in ways that encourage healthy and risk avoidant behaviors.

Similarly, more research on attachment vulnerability may be helpful to identify groups of youth who are more likely to have insecure attachments with parents or caregivers, such as foster youth or youth in communities with a high incidence of alcohol or drug abuse. Identifying these youth might then help program developers better tailor their curriculum to meet the needs of youth with insecure attachments.

This study did not support an assessment of causality, the magnitude of effects, or the relative influence of factors, across studies or within levels of the social ecological model. Because our literature review included articles that used a range of analytical approaches, including quantitative studies (such as randomized controlled trials, longitudinal studies, and cross-sectional studies) and qualitative studies (such as systematic reviews and analyses of qualitative data), we were not able to assess the magnitude of the effect of factors across the articles. This limitation prevented us from identifying the most or least influential factors, either in general or for specific subgroups of youth. Likewise, a

Table 1. Factors with insufficient evidence for inclusion in the refined models that may warrant further research

Inconclusive evidence
• Exposure to public health campaigns • Use of social media (sexual risk avoidance) • Exposure to alcohol or drugs (sexual risk avoidance) • Connection to positive adult role model (other than parent or teacher) (sexual risk avoidance) • Public commitment to avoidance • Access to contraception (sexual risk avoidance) • Availability of family planning services (sexual risk avoidance) • Impulsive personality (sexual risk cessation)
No literature identified (sexual risk cessation)
• Exposure to alcohol, tobacco or drugs • Housing instability • Permissive parental sexual norms • Access to contraception • Availability of family planning services • General risk-taking • School characteristics • Values • Connection to positive adult role model • Use of social media • Positive peer values • Being born to teen parents

full examination of the complex interactions between various factors and the target outcomes was beyond the scope of this project.

Practical implications and next steps for research

The conceptual models for sexual risk avoidance and cessation offer a blueprint for understanding the factors that influence youth outcomes related to avoidance and cessation of sexual risk behaviors. Multiple factors at the environmental, interpersonal, and individual levels influence the target outcomes, and many of these factors can be modified through educational intervention.

The models may be used by a variety of stakeholders. First, practitioners and developers may use the models to refine programming to target the modifiable factors that research shows influence outcomes related to sexual risk avoidance or sexual risk cessation. In particular, the conceptual model for cessation has informed the development of a program model and curriculum module designed to support sexually experienced youth in discontinuing sexual risk (Crowley et al. 2020). Similarly, the conceptual model for avoidance is currently informing the development of a program model for sexual risk avoidance education (SRAE), which will serve as a resource for practitioners who deliver SRAE. Policymakers can also use the models to inform future funding priorities so that future programming reflects the modifiable factors identified by the models.

Meanwhile, researchers may use the conceptual models to identify topics for future study, based on the limitations and gaps in the conceptual models. First, testing the causal influence of some of the factors through experimental evaluations of programs or program components designed to modify the factors could help guide ongoing improvements to curricula and programming. Second, the field might benefit from additional research on the factors omitted from the models, particularly those with inconclusive evidence or no literature (Table 1). Third, research to assess the relative magnitude of the influence of specific factors could help determine which factors may be most important for influencing target outcomes. Fourth, an examination of the relative importance of influencing factors for particular subgroups of youth, such as gender, race/ethnicity, or age, could help identify how the influence of factors varies by subgroup. Fifth, studies that identify how the influencing factors interact, and the trajectories or pathways that youth may take on the way to key outcomes, would place the field in a stronger position to support youth. Finally, qualitative examinations of the implications of the models for practice could help guide efforts to improve and strengthen the program strategies that target influencing factors.

Overall, these additional research efforts could help enhance the field's ability to apply lessons from the conceptual models to practice in ways that help youth avoid sexual risk and attain optimal health.

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Section A includes all the sources included in our in-depth literature review. Section B includes all other sources cited in the memo. Tables A.1, A.2, and A.3 indicate which sources contributed to the evidence for each factor category.

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Appendix A

Information sources and analysis methods

To develop and then refine the conceptual models, we examined evidence from several information sources to identify specific factors that influence outcomes related to sexual risk avoidance and sexual risk cessation. This appendix describes our information sources and methods. Tables A.1, A.2, and A.3 indicate the source articles that contributed to the evidence for each factor category in the models.

A. Initial literature review and analysis methods (2018–2019)

- **Identifying potential influencing factors and related literature**. Through consultation with experts and feedback from federal stakeholders, we identified potential factors that might influence sexual risk avoidance and cessation behaviors and related outcomes. These factors and outcomes informed the development of a detailed set of search terms that guided the identification of articles focused on youth sexual activity and related decision making. With assistance from a professional library scientist, we searched a wide range of academic databases, as well as select websites, to identify articles that reflected varied analytic approaches and perspectives. We initially identified almost 1,000 articles to screen for review.
- **Screening articles for potential review.** We assessed whether each identified article met four of five criteria. This resulted in narrowing articles for potential review to 248. The five criteria were:
    1. Relevant target population (youth and young adults ages 13 to 24)
    2. Relevant to the development of the conceptual models, having one or more of these features:
        a. Focused on key behavioral outcome(s), such as sexual avoidance, sexual delay, reduction in sexual activity, and sexual risk cessation
        b. Focused on factors, decision-making process, and/or skills related to key outcomes
        c. Discussed behavior change theory (or theories) relevant for sexual risk behavior
        d. Examined public health campaigns or messaging related to sexual and other risk behaviors
    3. Focused on a U.S. population
    4. Published in peer-reviewed journal (from 2003 to the first quarter of 2018) or underwent a rigorous quality review (for example, government reports)
    5. Adhered to scientifically based research standards—that is, "standards that apply rigorous, systematic, and objective methodology to obtain reliable and valid knowledge and present findings and make claims that are appropriate to and supported by the methods employed." (These research standards are articulated in the Education Sciences Reform Act of 2002 [PL 107-279, Sec 102].)
- **In-depth review and abstraction.** From the pool of 248 articles for potential review, we prioritized 88, selecting those that (1) had a sample size larger than 200, (2) were generalizable to a national context, and (3) discussed multiple factors and outcomes of interest. In our review, we abstracted detailed information from each article. The citations for reviewed articles are included in Section A of the Reference List.
- **Analysis process.** To determine which factors to include in the initial conceptual models, we:
    1. Assessed the relevance and rigor of each article. Using a defined set of criteria that accounted for the range of analytical approaches in the reviewed literature, we used a decision process to separately assess quantitative and qualitative articles. We assigned each article a quality-of-evidence rating using a 5-point scale: Very high (5), High (4), Moderate (3), Low (2), and Very low (1). Our rating protocol gave greater weight to quantitative studies with rigorous research designs.
    2. **Assigned an evidence rating score to each factor**. We identified a list of 56 factors that each article examined as potentially influencing, associated with, or correlated with a sexual risk avoidance or sexual risk cessation behavioral outcome. We assigned each factor the rating score from the article that examined it. If a factor was examined in multiple articles, we calculated the average rating across relevant articles to determine the score.
- **Identified factors to include in initial models based on evidence.** We established a quality rating cutoff, which was one standard deviation (0.48) below the average rating for all factors (2.83). For each factor that met the cutoff, we examined the presence of an effect or association between the factor and outcomes. From this, we identified 38 distinct factors for inclusion in the initial conceptual models (36 for sexual risk avoidance and 20 for sexual risk cessation). We also identified 17 factors for which there was insufficient evidence to include them in the initial conceptual models.

Information sources and analysis methods (continued)

B. Model refinement process and methods (2020)

We conducted additional analyses to refine the conceptual models, focusing on the evidence for factors omitted from the initial models and on whether to add behavioral outcomes to the models. We relied on three information sources and used a multistep analysis process, described below.

- **Secondary data analysis on the association between the omitted factors and sexual initiation.** In 2019, as part of an HHS-funded study, Mathematica conducted a secondary analysis of data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). The goal was to examine the relationship between age at sexual initiation and the 15 factors that were excluded from the initial sexual risk avoidance conceptual model due to insufficient evidence identified in the initial literature review ("omitted factors") (Unpublished manuscript 2019). Add Health is a nationally representative, longitudinal data set with five waves of data, and it follows the same youth over a roughly 14-year period. The sample for the analysis included 10,425 youth who were in grades 7 to 11 in the first survey wave and had not initiated sex, and the analysis followed them through the fourth wave, when they were ages 24–32.
- Drawing on these first four waves of the survey, the Mathematica team used ordinary least squares regression to assess the relationship between age at sexual initiation and each factor. Add Health includes a set of measures related to all but two of the factors excluded from the initial conceptual model on sexual risk avoidance. The regression analysis controlled for baseline and demographic characteristics. Although the analysis is not causal, its longitudinal nature allowed for an assessment of the temporal order of the factors (measured before initiation) and age at eventual initiation. We used the findings of this study to refine the conceptual model for sexual risk avoidance by:
    1. Assessing the rigor of this study using the same criteria applied during the initial literature review
    2. Assigning an evidence rating of High (4 out of 5) to this study and considering it as rigorous
    3. Assessing how each factor was constructed and defined in the analysis—that is, which and how many survey items were used to measure each factor—and the magnitude of effects of the individual survey items used in each factor
    4. Adding six factors to the sexual risk avoidance model that the Add Health study found to have a statistically significant effect on age at sexual initiation
- **Supplemental literature search and review.** To examine additional evidence on the factors omitted from the initial conceptual models, we conducted a second literature search in 2020, which covered the period between 2010 and the first quarter of 2020. For sexual risk avoidance, the review prioritized articles that examined the omitted factors for which the Add Health analysis did not find evidence of an association with sexual risk avoidance outcomes. For sexual risk cessation, the review aimed to identify articles that examined the factors omitted from the initial cessation model. We identified a little over 100 new articles and selected 17 studies for in-depth review. Repeating the process used in the initial literature review, we assessed the evidence on factors that were omitted from the initial models.
    1. For the sexual risk avoidance model, we referred to the supplementary literature review if the Add Health secondary data analysis provided inconclusive evidence for a factor.
    2. For the sexual risk cessation model, the literature was the primary source of new evidence. We included factors in the refined conceptual model if the reviewed supplemental literature included:
        a. At least one article with an evidence rating of High or Very high, or
        b. At least two articles with an evidence rating of moderate or above
    3. Although we did not explicitly search the literature for additional factors beyond the potential factors that we previously identified, we considered the evidence for additional factors if the articles we reviewed examined relevant factors not previously identified. We used the same decision process to rate the evidence for any additional factors to determine whether these factors could be included in one or both models.
    4. Through the above steps, we identified 10 additional factors to include in the refined conceptual model for sexual risk avoidance. Two of these factors were newly identified. We identified seven factors to include in the refined conceptual model for sexual risk cessation, two of which were newly identified factors.

Information sources and analysis methods (continued)

- **Analysis of benefits of delayed sexual activity**. In 2018 and 2019, for another study, Mathematica staff conducted a literature review and an economic analysis on the benefits of delayed sexual activity and analyzed the association between delayed sexual activity and nine outcome domains: pregnancy and childbearing, STIs, substance use, delinquent behavior and criminal activity, mental health, economic self-sufficiency, and relationships (Rotz et al. 2020a, 2020b). The literature review report synthesized findings on the causal effects of delayed sexual activity, and the economic analysis examined the impacts of delayed sexual activity on outcomes in the nine domains. During the refinement stage, we used the findings of this study to review evidence on the non-sexual behavioral outcomes included in the conceptual models:

    1. We assessed the rigor of this study using the same set of criteria applied during the initial literature review.
    2. We assigned an evidence rating of Very high (5 out of 5) to this study and considered it as rigorous.
    3. If the study suggested effects on an outcome that was already included in the conceptual models, we considered that the inclusion of that outcome was well justified and kept the outcome in the models. (We kept all outcomes in the models.)
    4. If the study suggested effects on an outcome that had not been included in the initial conceptual models, we decided to include it in the refined version of the models presented in this brief. We added two outcomes in one or both models. Specifically, we added relationship quality as a non-sexual outcome in both models, since delayed initiation has been found to be linked to lower dissatisfaction in later romantic relationships as adults. We also added the number of romantic or sexual partners as a behavioral outcome in the sexual risk cessation conceptual model.

C. Expert input

We engaged 10 experts at three points during the development and refinement of the conceptual models:

1. Eight experts participated in a group advisory meeting during the early phase of reviewing literature and conceptualizing the models.
2. Five of the eight experts who attended the early meeting participated in individual follow-up calls on theoretical aspects and behavioral theories of change.
3. Five experts, four of whom were involved in the initial engagement, provided written comments on the refined conceptual models.

Throughout the process, experts provided input on theoretical frameworks relevant to the sexual risk avoidance and cessation models, influencing factors and outcomes, literature gaps to consider, relationships and distinctions between the sexual risk avoidance and cessation concepts, implications of the models for curriculum development and programming, and key topics and priorities for future research.

Table A.1. References by type of environmental factor category

Reference	Environmental Factor Categories		
	Media	Neighborhood Characteristics	State and Federal Policy and Systems
Arcidiacono et al. 2012		X	
Bleakley et al. 2018	X		
Boone 2015	X		
Collins et al. 2004	X		
Collins et al. 2010	X		
Coyne et al. 2019	X		
Doniger et al. 2001	X		
Kirby & Lepore 2007		X	X
Kugler et al. 2017		X	
L'Engle & Jackson 2008	X		
Martino et al. 2006	X		
Merrill & Liang 2019	X		
Noar et al. 2009	X		
Noar et al. 2010	X		
Noar 2006	X		
Oman et al. 2003		X	
Santelli et al. 2017		X	X
Santelli et al. 2007		X	
Popkin et al. 2009		X	
Van Stee et al. 2012	X		
Ward et al. 2011	X		

Table A.2. References by type of interpersonal factor category

Reference	Interpersonal Factor Categories			
	Parents and Families	Peers	Romantic or Sexual Partners	Community Connection
Abbott & Rochelle 2008	X		X	X
Abma & Martinez 2017	X		X	X
Arcidiacono et al. 2012	X			X
Ascend and Barna Group 2016				X
Bazargan et al. 2006		X		
Bleakley et al. 2018	X			
Bradley et al. 2012	X		X	X
Buhi et al. 2011	X			
Byers et al. 2016				X
Caputo 2009	X	X		X
Collins et al. 2004	X			X
Collins et al. 2010	X	X		
Dancy et al. 2010	X			
Fasula et al. 2018	X			
Halpern et al. 2006	X			X
Jaccard 2004			X	
Jardin 2015	X			
Jumping-Eagle et al. 2008	X			
Kaiser Family Foundation 2003		X	X	
Kirby & Lepore 2007	X	X	X	X
Kugler et al. 2017				X
L'Engle & Jackson 2008	X			
L'Engle et al. 2006	X			X
Marin et al. 2006		X	X	
Martinez et al. 2011	X			X
Mueller et al. 2010		X		X
O'Donnell et al. 2010	X			
Oman et al. 2003	X	X		X
Pearson et al. 2012	X			
Popkin et al. 2009	X			
Rasberry et al. 2009				X
Rector & Johnson 2005	X			
Sabia & Rees 2009	X			
Sabia 2006	X			

Reference	Interpersonal Factor Categories			
	Parents and Families	Peers	Romantic or Sexual Partners	Community Connection
Scott et al. 2011	X			
Sieving et al. 2006	X	X	X	
Smith et al. 2014		X		X
Suleiman 2013			X	
The Center for Relationship Education 2010				X
Thibodeau et al. 2017	X			
Tolma et al. 2008	X	X		X
Tsuyuki et al. 2019	X			
Uecker 2015		X		
Uecker et al. 2015	X			
Unpublished 2019	X	X		X
Van Der Pol 2007				X
Voisin & Neilands 2010		X		
Ward et al. 2011				X
Weed et al. 2008			X	
Wu & Martin 2015	X			X
Ybarra & Mitchell 2005	X			
Zimmer-Gembeck & Helfand 2008	X		X	

Table A.3. References by type of individual factor category

Reference	Individual factor categories				
	Biological	Cognitive	Psychological Well-being and Skills	Intentions and Beliefs	Health Behaviors
Abbott & Rochelle 2008	X	X		X	X
Abma & Martinez 2017	X			X	
Arcidiacono et al. 2012		X		X	
Ascend and Barna Group 2016	X			X	
Ballonoff et al. 2015	X				
Bazargan et al. 2006	X				
Birch 2011	X			X	
Bleakley et al. 2018	X	X			
Bradley et al. 2011	X		X		
Bradley et al. 2012	X	X	X		X
Buhi et al. 2011	X			X	
Byers et al. 2016	X				X
Caputo 2009	X	X	X		
Carpenter 2011				X	
Chin et al. 2012	X				
Collins et al. 2004		X			
Collins et al. 2010	X				
Dewitte 2009	X				
Gloppen et al. 2010			X		
Halpern et al. 2006	X				
Houck et al. 2016a	X	X	X		
Houck et al. 2016b		X	X		
Jaccard 2016			X	X	
Jumping-Eagle et al. 2008	X				X
Kaiser Family Foundation 2003					X
Kirby & Lepore 2007	X		X	X	X
Kugler et al. 2017	X	X			
L'Engle & Jackson 2008	X	X		X	
L'Engle et al. 2006	X	X	X	X	
Lindberg et al. 2016					X
Loewenson et al. 2004	X				
Lowry et al. 2017	X				X
Majer et al. 2004					
Marin et al. 2006	X				

Reference	Individual factor categories				
	Biological	Cognitive	Psychological Well-being and Skills	Intentions and Beliefs	Health Behaviors
Martinez et al. 2011	X			X	
Noar et al. 2010	X				X
Oman et al. 2003	X				
Ott et al. 2010	X				
Pearson et al. 2012	X	X	X	X	X
Poobalan et al. 2009	X				
Popkin et al. 2009	X				
Protogerou et al. 2014	X				
Rasberry et al. 2009	X			X	
Rector & Johnson 2005	X				
Rosenbaum 2006	X				X
Rue et al. 2012	X				
Sabia & Rees 2009	X	X	X		
Sabia 2006		X	X		
Santelli et al. 2007					X
Scott et al. 2011	X	X			X
Sieving et al. 2006	X				
Smith et al. 2014				X	X
Suleiman 2013	X	X	X		
The Center for Relationship Education 2010				X	
Tolma et al. 2008	X				
Uecker 2015	X	X	X		
Uecker et al. 2015	X	X			
Unpublished 2019			X		
Van Der Pol 2007	X			X	
Vasilenko 2017	X				
Voisin & Neilands 2010	X	X			
Ward & Linke 2011		X			
Weed et al. 2005			X		
Weed et al. 2008			X		
Weed et al. 2011			X		
Wheeler 2010	X	X			
Wu & Martin 2015	X	X			
Zimmer-Gembeck & Helfand 2008	X	X	X	X	X
Zimmerman et al. 2014		X			