



Sex and the Teen Brain

Disrupting What We Think We Know



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EXECUTIVE SUMMARY

To honor Dr. Doug Kirby for his lifetime contributions to the field, ETR launched an invited summit—known as the Kirby Summit—to foster collective dialogue on current research, promising interventions, and the role of policy to promote the sexual and reproductive health of young people. ETR and the Kirby Summit Advisory Panel selected **adolescent brain development and neuroscience** as the theme for the inaugural Kirby Summit, with the goal of translating the new and exciting gains in neuroscience research to sexual health programming for young people.

KEY MESSAGES

The Summit yielded three key insights that can further the transformation of sexual health programs. These findings highlight new opportunities for research and intervention development. Further information about each of these key insights is outlined in the full report.



1 Programs and theories that focus on teens must address developmental changes in adolescence, including how social, emotional and cognitive processing influence decision making.



2 Relationships are a fundamental context for adolescent sexual health.



3 Multiple support systems are essential to scaffold youth through positive growth and development.

RECOMMENDATIONS

A fundamental tenet of our work at ETR and, thus, a key principle of the Kirby Summit is the translation of findings into practice. We outline specific recommendations that researchers, program developers, professional development experts and funders can use to integrate findings from the Kirby Summit.

RESEARCHERS

- Assess, transform and evaluate underlying theories of SRH programs to enhance program emphasis on social-affective processes in adolescence.
 - Examine social and emotional levers for health-promoting behaviors, such as condom and contraceptive use.
 - Identify the characteristics of relationships that are health promoting or health damaging across the course of adolescence.
 - Cultivate transdisciplinary collaborations to further inform adolescent SRH field, such as the adoption of relevant sexual health-related measures in developmental neuroscience research.
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PROGRAM DEVELOPERS AND IMPLEMENTERS

- Empower adolescents with education about their own developing brains.
 - Engage adolescents' inherent social and emotional motivation to protect their sexual health.
 - Develop activities that promote healthy risky taking and explore emotions, relationships, and sexual health.
 - Frame sexual health education in the context of peer and romantic relationships appropriate to young people's age and developmental stage.
 - Adopt a health-equity framework that acknowledges the distinct and interrelated roles of systems and institutions of power, relationships and networks, individual factors and neurobiological development on adolescent SRH outcomes.
 - Build social and environmental scaffolding into adolescent SRH programs, including parent education, access to services that facilitate health-promoting behaviors, and the development of positive adult-youth relationships.
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TRAINING AND TECHNICAL ASSISTANCE PROVIDERS

- Provide guidance for educators and other trusted adults on the findings and limitations of adolescent developmental neuroscience research.
 - Provide opportunities for educators and other trusted adults to assess and re-set personal assumptions about adolescent sexual development through open, honest dialogue with teens.
 - Integrate key messages on cognitive and social-emotional processes and peer and romantic relationships into training designs.
 - Disrupt current thinking about adolescent sexuality and advocate for positive, research-informed approaches that support healthy adolescent development.
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FUNDERS

- Emphasize the importance of addressing social-emotional processes in announcements for new initiatives.
 - Fund development opportunities for adapting or augmenting existing program activities to address social-emotional processes, importance of peer and romantic relationships, and the role of systems of support in teen decision making.
 - Support training and technical assistance that includes sound science-based practices, including developmental neuroscience, for implementers.
 - Provide training and technical assistance to grantees on adaptations for existing programs
 - Support transdisciplinary expert meetings and conversations that further the translation of developmental neuroscience into SRH programs and implementation.
 - Support small- and large-scale transdisciplinary studies that develop and test innovative concepts using principles of developmental neuroscience in SRH programs and strategies.
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As the field of developmental science advances, specifically our understanding of brain development, the application to the sexual and reproductive health field will continue to evolve. We invite you to keep up to date on new information, resources and events at our webpage www.etr.org/kirby-summit/.



INTRODUCTION

Over four decades, Dr. Douglas Kirby researched the risk and protective factors that influence young people’s sexual behavior, explored possible theories of behavior change, and designed and evaluated dozens of adolescent sexual and reproductive health (SRH) interventions. His insatiable curiosity about understanding “the reasons why” young people engage in sexual risk behavior was fundamental in his approach to developing effective interventions. His untimely death in 2012 created a noticeable tear in the fabric of the sex education field. In 2013, a group of sexual health experts gathered to discuss ways to honor our beloved colleague, friend, mentor and expert in the field of sex education and adolescent health.

To honor Dr. Kirby for his lifetime contributions to the field, ETR and our partners launched an invited summit—known as the Kirby Summit—to foster collective dialogue on current research, promising interventions, and the role of policy to promote the sexual and reproductive health of young people. The Kirby Summit Advisory Panel selected **adolescent brain development and neuroscience** as the theme for the inaugural Kirby Summit with the goal of translating the new and exciting gains in neuroscience research to sexual health programming for young people. This report presents findings from the inaugural Kirby Summit that took place in February 2016.

BACKGROUND

Adolescence: A Period of Transformation

Adolescence is typically defined as beginning at puberty and ending with the transition to traditional adult social roles, such as partnership and marriage, financial independence and parenthood. Adolescents will undergo major physical, cognitive and emotional changes that prompt them to seek out and establish new relationships and identities¹. Peers, media and social institutions, such as school and workplaces, assume gradually greater roles in shaping attitudes and behaviors throughout adolescence.² Positive and negative health experiences in adolescence lay the foundation for health and well-being in adulthood and for the health and well-being of future generations.¹ As a result, this period presents a critical opportunity for educating and supporting young people as they learn about and begin to navigate new relationships and behaviors such as sexual activity.



Sexual and Reproductive Health in Adolescents

Commendable efforts have been made to improve the sexual and reproductive health of young people. The adolescent pregnancy rate in the U.S. has steadily decreased since 1990, and fewer teens are engaging in unprotected sexual behavior that can lead to sexually transmitted infections (STI) and HIV.³ Yet disparities persist. Sexual health outcomes and behaviors systematically vary by geography, socioeconomic status, race and ethnicity, sexual orientation, gender identity, and involvement in juvenile justice and foster care.³⁻⁵ These disparities indicate that health outcomes are highly influenced by a number of social factors, including the impacts of discrimination, access to social support and the availability of affordable and reliable health care and education.

A major response to adolescent sexual and reproductive health has focused on replicating and increasing the

number of programs with evidence of effectiveness in reducing behaviors related to adolescent pregnancy and STIs.⁶ Dr. Kirby made substantive contributions to summarizing the literature on effective programs and unpacking their characteristics.⁴ Such programs have demonstrated short-term modifications in sexual behaviors (e.g. age of sexual debut, frequency of unprotected sex, number of sexual partners, etc.), yet few have resulted in lasting changes to pregnancy and STI outcomes.⁴ Lessons from analyses of the characteristics of effective programs suggest that strategies based on their underlying theories—which emphasize a deliberate, rational decision-making process—are not sufficient on their own to produce long-term behavior modification.⁷⁻⁹ The next iterations in sexual health programming, therefore, can benefit from sciences that examine adolescent decision making within the context of this transitional period of life.

Brain Development in Adolescents

Recent gains in developmental neuroscience have brought attention to the application of this research for adolescent health researchers and professionals.^{1,10-12} Next to infancy, adolescence is the most dynamic period for brain development.¹³ Growth and connection of different networks in the brain during this phase fosters creativity and adaptability in young people but also leaves them more vulnerable to social influences.¹¹ Despite common misconceptions, by the middle teen years (age 15-16), young people are capable of activating similar levels of cognitive control as adults, as long as the context is calm. The nonlinear development of their affective and cognitive processes, however, can produce challenges for emotional regulation and impulse-control when aroused by fear, excitement or the presence of peers.^{10,11} As teens become increasingly autonomous, adults continue play an important role in supporting young people as they navigate new and important social contexts outside the family sphere.

Our expanding understanding of adolescent brain development highlights exciting opportunities for application to sexual health programming, yet little translation work in this area has been attempted.⁹ Given the current gaps in achieving sustainable outcomes in young people and the potential benefits of adolescent health programs to extend into adulthood and beyond,¹ the sexual health field is primed for innovative and transdisciplinary collaborations that address adolescent sexual health within the context of this transformational period of life.



2016 INAUGURAL
KIRBY SUMMIT

ETR launched the inaugural Kirby Summit on February 24th and 25th, 2016, in Menlo Park, California, supported by grants and resources from the Packard, Grove and Hewlett Foundations. We convened 29 experts from the fields of sexual and reproductive health, adolescent development and developmental neuroscience to explore the implications and application of adolescent brain development and neuroscience research for adolescent sexual health programs. The Summit participants represented numerous disciplines focused on adolescence and health, and included researchers, program developers, professional development professionals and funders.

The Summit addressed three key questions over the course of one and a half days:

Q: What are the *implications of developmental neuroscience for understanding adolescent sexual health* and sexual risk taking?

Q: How might the latest developmental neuroscience research inform the *core messages about healthy adolescent sexual development* and risk behavior?

Q: How can developmental neuroscience strengthen *the design of new and existing sexual health promotion interventions and/or policies* related to sexual health?

To explore these questions, experts engaged in small- and large-group discussions, applied neuroscience findings to existing activities from sexual and reproductive health interventions, and explored innovative approaches for designing new interventions and approaches to improving adolescent sexual health.

KEY MESSAGES from the KIRBY SUMMIT

Kirby Summit discussions yielded three key insights that can further the transformation of sexual health programs: the importance of social, emotional and cognitive factors in adolescent decision making; relationships as motivational drivers and context for behavior; and the role of families and trusted adults in supporting adolescent

decision making. These findings highlight new opportunities for research and intervention development. As the field of developmental science advances, specifically our understanding of brain development, the application to the sexual and reproductive health field will continue to evolve.



Summit Key Message 1

Programs and theories that focus on teens must address developmental changes in adolescence, including how social, emotional and cognitive processing influence decision making.

Around the time of puberty, developmental changes in the limbic regions of the brain (associated with social-emotional processes) and cognitive control regions (associated with improved attention and inhibition) lead to increased novelty- and sensation-seeking behaviors that peak in mid-adolescence.¹¹ These changes encourage adolescents to seek out and navigate new social contexts and explore their own adult identity outside their family of origin. The neurodevelopmental changes occurring during this time result in young people experiencing an intensification of emotional and social learning. Both the anticipated and actual rewards from these experiences drive behavioral choices, more so during adolescence than in childhood or adulthood.^{10,11}

How effectively young people engage their social and cognitive processing systems during decision making differs depending upon the situation.¹¹ For example, in the classroom, 16-year-old Jordan can describe the risks of unprotected sex and can identify where and how to get condoms or contraception if deciding to have sex with a partner. However, when Jordan is alone with a partner, the immediate social and emotional rewards of intimacy exert more influence than the known risks Jordan identified earlier in class. Even with the same information and rational decision-making skills, the immediate rewards of intimacy and pleasure while with a partner may outweigh the benefits Jordan associated with condom use in the classroom. When young people have less experience with a situation, they are less effective at predicting the emotional outcome. Jordan may be better able to predict what it will feel like to increase

an emotional connection to the partner and less able to predict the feelings associated with contracting an STI or navigating unplanned pregnancy.

Perhaps the single greatest take-away from the Kirby Summit is that adolescent behaviors are strongly motivated by social and affective experiences and that our current SRH programs—and the theories on which they are based—do not fundamentally reflect this very normal aspect of development.

A long-standing belief that adolescents are more likely to engage in “risk” behaviors has led to the misconception that adolescents are less capable than adults of making rational decisions.¹⁴ As a result, many of the behavior change theories that drive adolescent sexual and reproductive health programs are rooted in rational decision-making models.⁹ These models emphasize the “cognitive” component of social-cognitive theories by focusing on skills to assess and avoid risks; for example, activities where students memorize and practice a deliberate multi-step process for saying “no” to sex.



What we know about social-affective and cognitive processes in the adolescent brain suggests that this approach is limited. Adolescents are, in fact, able to understand and reason through the risks and consequences of behavior as well as adults.¹⁵ However, in exciting or arousing situations (think relationships and sex!), adolescent decision making is more likely to be motivated by emotions and feeling.^{10,16} Some developmental scientists believe that if youth apply rational decision-making approaches, weighing the pros and cons may even lead them to engage in risk behaviors because the immediate benefits (e.g., gaining social status or intimacy) could outweigh the long-term risks.¹⁷

By drawing on the social and emotional aspects of decision making processes in adolescence, we can address issues that

are most salient to young people and capitalize on these developmental peaks as motivators. Young people may be more likely to choose health-promoting behaviors when they are motivated by something they feel strongly about. For example, the TRUTH Campaign effectively prevents adolescent tobacco use by channeling youths' desires for autonomy and individuality and empowering them to "rebel" against the tobacco industry.¹⁸ A more recent study used the same technique to motivate teens to choose healthier foods by framing healthy eating as an act of defiance.¹⁹ Equally compelling techniques could be used to motivate young people to protect their sexual health.



Summit Key Message 2

Relationships are a fundamental context for adolescent sexual health.

Adolescents' expanding social world parallels the functional development of the "social brain." The social brain is a complex network of brain regions associated with recognizing facial expressions and gestures, evaluating others' thoughts and feelings, predicting others' actions and communication.²⁶ As a result, this time period is optimal for growth and learning, both through formal education and direct experience with friendships and romantic relationships.

The trajectory of adolescent friendships and romantic relationships, along with the developing social brain, have significant implications for re-shaping sexual health education. Puberty primes young people for increased interest in relationships and social status as a part of discovering their own place in the social world. Along with increased sensation seeking and reward sensitivity during this period, adolescents are more likely than adults to take risks when in the presence—or even the suggested presence, of peers.¹⁴ In one study, three groups—adolescents, college students and adults—performed equally on a simulated driving task when

alone; however, when peers were in the room, adolescents were twice as likely and college students were 50% more likely than adults to take more risks when performing the task.²⁷ For adolescents, the presence of peers activates the reward circuitry of the brain-heightening the emotional rewards of risk taking with peers.²⁸

Kirby Summit participants recognized that sexual and reproductive health programs that already address peer norms could expand discussions on the role of emotions, social contexts and peers' behaviors and attitudes on sexual decision making. Given that adolescents care about their relationships with peers, perhaps more so than in any other period in life, programs can leverage those relationships as meaningful motivators for teaching young people about sexual health. One way to capitalize on these motivations is through the implementation of effective peer programs that both promote pro-social attitudes, behaviors and knowledge and include opportunities for reflection.^{29,30}



One future direction for research identified by the Summit participants included the examination of relationship characteristics that are health promoting or health damaging. Romantic relationship patterns learned in adolescence (such as timing and context of sexual behavior, infidelity and breakups) can impact future relationships.^{31,32} Therefore, it is critical that we identify health-defining relationship behaviors and address them early, when young people are developing new friendships, and before they become romantically and sexually involved with partners. New information about the timing of relationship patterns can also assist intervention planning. For example, adolescent relationship breakups may create opportune moments to promote healthy reflection because adolescents want to learn how to successfully navigate future relationships.



Summit Key Message 3

Multiple support systems are essential to scaffold youth through positive growth and development.

Neuroimaging studies show that brain development spans from puberty into the mid-twenties.³³ This extended period of growth presents both advantages and vulnerabilities, and provides greater opportunities for families and other trusted adults to support young people. Developmental pathways of social-affective and cognitive control systems during adolescence lead to increased social motivation and the desire to take risks and have new experiences, especially when in the presence of peers. Crone and Dahl¹¹ theorize that, over time, patterns emerge that produce positive or negative trajectories. On the one hand, healthy risk taking and exploration build social skills and competence that are important for success in adulthood. Conversely, negative patterns emerge when young people respond routinely to unhealthy incentives (e.g., drugs, alcohol or violence) or when young people become disengaged from their peers or dejected. Both divergent trajectories stem from the same developmental tasks of promoting autonomy, exploring identity and navigating social hierarchies. Adolescents also encounter the greatest exposure to social determinants, including interpersonal and structural violence, that impact their immediate and future health.¹ Our role as adults in the field of adolescent health is to create social support systems for young people as they engage in and navigate risk taking and exploration.

Summit participants underscored the importance of encouraging healthy risk taking and learning from failures. The sensation of reward results from the release of dopamine after a thrilling or arousing experience.¹¹ Young people can experience the same sense of reward through

healthy exploration and positive risk taking and, therefore, be motivated toward pro-social skills and social competence over time.

Parents and other trusted adults can support adolescents in exploring an array of positive growth experiences that are novel, while promoting social and emotional learning. Scaffolding is a dynamic structure of adult guidance and support that gradually decreases as young people demonstrate increasing independence and mastery. When adults use this process to progressively let go, young people have the opportunity to learn, take risks and grow while maintaining access to a support system. One example of scaffolded learning is graduated driver's licenses. Young people begin with a learner's permit in which they can only drive with an adult under specific circumstances. A restricted license follows, which limits the types of passengers and driving hours. Once mastery is achieved, a young person is given a full license. Although scaffolded learning may be easier to implement with public behaviors such as driving, the sexual and reproductive health field could examine degrees of age-appropriate risk taking within relationships that promote step-wise learning and help youth avoid unintended health outcomes.



Adolescence is a natural time for exploring peer and romantic relationships, which helps youth build social and communication skills that contribute to healthy relationships. This period is also an opportune time to discuss sexual health and development. In fact, young people report that they are looking for guidance from their families and other trusted adults on sexual health issues.³⁴ Existing and new SRH programs can adopt components that encourage family-based sex education through early and regular conversations that recognize relationships and sexual health as a fundamental part of human development.

Protecting adolescents from all negative experiences is not the goal of scaffolding. In fact, learning from negative experiences is a critical component of growth. One important role for families and trusted adults is to support young people when they experience negative or health-harming behaviors, such as substance use, bullying or social isolation. A review of parental monitoring studies indicates that monitoring teens' friends and activities in the early teen years was protective of early sexual debut and contraceptive use; however, perceived parental over-control and stricter rules for teens were risk factors for ever having sex.³⁵ These findings suggest that scaffolding must support youth in ways that promote parental connectedness and avoid stifling normal adolescent exploration.



Further, we must also consider how adverse childhood experiences shape the developing brain and subsequent behavior. Ongoing exposure to adverse childhood experiences can affect brain regions associated with learning, memory and inhibitory control,³⁶ and youth exposed to adverse childhood experiences are more likely to experience teen pregnancy, multiple sexual partners and sexually transmitted infections.^{37,38} It is vital that interventions are tailored to address the different cognitive and affective engagement of youth who have experienced poverty and interpersonal and structural violence.

RECOMMENDATIONS for the Sexual & Reproductive Health Field

A fundamental tenet of our work at ETR and, thus, a key principle of the Kirby Summit is the translation of findings into practice. We outline here specific recommendations that researchers, program developers, professional development experts and funders can use to integrate findings from the Kirby Summit.

RESEARCHERS

Advances in neuroimaging technology and methods will produce new and more precise theories on the developmental trajectory of adolescent brain processes and resulting behaviors. In the meantime, existing developmental neuroscience studies provoke many new research questions for adolescent sexual behavior and provide opportunities for transdisciplinary collaborations. The following highlight recommended pathways of study for researchers in the adolescent SRH field:

- **Assess, transform and evaluate underlying theories of SRH programs to enhance program emphasis on social-affective processes in adolescence.**
- **Examine social and emotional levers for health-promoting behaviors, such as condom and contraceptive use.**
- **Identify the characteristics of relationships that are health promoting or health damaging across the course of adolescence.**
- **Cultivate transdisciplinary collaborations to further inform adolescent SRH field, such as the adoption of relevant sexual health-related measures in developmental neuroscience research.**

PROGRAM DEVELOPERS AND IMPLEMENTERS

Application of the Kirby Summit findings is rooted in the development and implementation of programs and strategies aimed at improving adolescent sexual health. Both existing programs and programs in development can benefit from existing SRH research supported by developmental neuroscience studies.

- **Empower adolescents with education about their own developing brains.**

- Engage adolescents' inherent social and emotional motivation to protect their sexual health. For example, use a rights-based approach to motivate young people to seek out and support others in seeking sexual health services. Research on young people's experiences of sex education and involving youth in the development of new programs can be used to determine topics and activities that are most salient—and, therefore, motivational—to young people.
- Develop activities that promote healthy risk taking and explore emotions, relationships and sexual health, including behavioral willingness to engage in sexual behavior; the influence of peer presence and thrilling or arousing contexts on behaviors; and the benefits of healthy relationships and intimacy.
- Frame sexual health education in the context of peer and romantic relationships appropriate to age and developmental stage. For example, explore the emotional drivers of behaviors at different stages of relationships, such as when a relationship begins or ends.
- Adopt a health-equity framework that acknowledges the distinct and interrelated roles of systems and institutions of power, relationships and networks, individual factors and neurobiological development on adolescent SRH outcomes.
- Build social and environmental scaffolding into adolescent SRH programs, including parent education, access to services that facilitate health-promoting behaviors, and the development of positive adult-youth relationships through policies and training of program and school staff.

TRAINING AND TECHNICAL ASSISTANCE PROVIDERS

Kirby Summit participants identified that adults in young people's lives – including parents and other family members, educators, counselors and youth advocates – are critical for enhancing the lifelong sexual health of young people. Investing in the relevant knowledge and skills of adults who work with youth is critical. These recommendations outline pedagogical and mindset considerations for professional development and training experts to improve trusted adults' abilities to support learning and healthy behavior:



- Provide guidance for educators and other trusted adults on the findings and limitations of adolescent developmental neuroscience research, including key messages about social and emotional development, importance of peer and romantic relationships, and role of multiple systems of support in teen decision making.
- Provide opportunities for educators and other trusted adults to assess and re-set personal assumptions, language and beliefs about adolescent sexual development, and challenge them to honor the developmental tasks of adolescents as normal and needed through open, honest dialogue with teens.
- Integrate key messages on cognitive and social-emotional processes and peer and romantic relationships into training designs. For example, include healthy relationships training for implementers (whether or not the program directly addresses relationships) and modify sensitive question protocols to address emotional and relationship elements of sexual health questions.
- Disrupt current thinking about adolescent sexuality and advocate for positive, research-informed approaches that support healthy adolescent development.

FUNDERS

Private organizations and governmental agencies that fund adolescent sexual and reproductive health research and programs play a significant role in the application of

research to adolescent sexual and reproductive health. The application of current and future research can be nurtured through adaptive, iterative approaches to existing SRH initiatives and in the exploration of new pathways through transdisciplinary collaborations.

- **Emphasize the importance of addressing social-emotional processes in announcements for new initiatives.**
- **Fund development opportunities for adapting or augmenting existing program activities to address social-emotional processes, importance of peer and romantic relationships, and the role of systems of support in teen decision making.**

- **Support training and technical assistance that includes sound science-based practices, including developmental neuroscience, for implementers.**
- **Provide training and technical assistance to grantees on adaptations for existing programs.**
- **Support transdisciplinary expert meetings and conversations that further the translation of developmental neuroscience into SRH programs and implementation.**
- **Support small- and large-scale transdisciplinary studies that develop and test innovative concepts using principles of developmental neuroscience in SRH programs and strategies.**



JOIN THE CONVERSATION!

The Kirby Summit was the first of many conversations on the intersection of developmental neuroscience and adolescent sexual and reproductive health. You can keep up to date on new information, resources and events at our webpage www.etr.org/kirby-summit/.





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