

Review

A Call to Action: Developing and Strengthening New Strategies to Promote Adolescent Sexual Health

Martha J. Decker ^{1,*}, **Nancy F. Berglas** ¹ and **Claire D. Brindis** ^{1,2}

¹ Philip R. Lee Institute for Health Policy Studies and Bixby Center for Global Reproductive Health, University of California, San Francisco, 3333 California Street, Suite 265, San Francisco, CA 94143-0936, USA; E-Mails: nancy.berglas@ucsf.edu (N.F.B.); claire.brindis@ucsf.edu (C.D.B.)

² National Adolescent and Young Adult Health National Resource Center, University of California, San Francisco, 3333 California Street, Suite 245, San Francisco, CA 94143-0503, USA

* Author to whom correspondence should be addressed; E-Mail: mara.decker@ucsf.edu; Tel.: +1-415-476-3375; Fax: +1-415-476-0705.

Academic Editor: Naomi Farber

Received: 7 July 2015 / Accepted: 22 September 2015 / Published: 5 October 2015

Abstract: Through considerable efforts and investments of resources, adolescent pregnancy and birth rates in the United States have decreased significantly over the past two decades. Nonetheless, large disparities persist for many populations of youth. Reducing unintended adolescent pregnancies is considered a “winnable public health battle,” but one that will require innovative thinking and continued persistence. This paper reviews the recent research literature and innovative programmatic efforts to identify six promising strategies that address the challenge of adolescent pregnancy in new ways. These strategies aim to: (1) understand and address the complexity of adolescent lives; (2) expand the provision of quality sexual health education; (3) engage youth through technology and media; (4) increase access to contraceptives and other sexual health services; (5) create tailored interventions for populations with special needs; and (6) create a supportive policy environment. By building upon lessons learned from past efforts, we can move the field toward the development, strengthening, and promotion of future strategies that enhance the sexual well-being of all adolescents.

Keywords: adolescent pregnancy; sexual health; reproductive health; sex education; contraception; policy

1. Introduction

Adolescent pregnancy and birth rates in the United States and in many high-income countries have decreased significantly in the past two decades [1,2]. Since its peak in 1991, the adolescent birth rate in the United States has declined by a remarkable 57% for female ages 15 to 19, with declines among all racial and ethnic groups [1,3]. This reduction has been attributed to a variety of proximate determinants, including improved contraceptive use, delay of first sex, and decreased sexual activity [4,5]. Other underlying factors may include increased access to comprehensive sexual health education and a transition from the abstinence-only model; media depictions of teen pregnancy and childbearing; changing demographics; and economic changes [4,6,7].

Despite this overall progress, unintended pregnancy among adolescents has persisted as a preeminent public health challenge, with certain populations and areas disproportionately affected [7]. Large disparities remain in adolescent birth rates as well as access to reproductive health information and services. These disparities are associated with geographic location [1], socioeconomic status [8], and race and ethnicity [3,9], among other characteristics. For example, adolescents in rural areas are more likely to give birth than teens in urban areas [10] as are young Black and Hispanic females as compared to white females [9]. When other variables, such as income and education, are accounted for, many of these disparities by race/ethnicity or location are reduced. Other adolescent populations facing disproportionately high birth rates are those that are also at increased risk for other negative health outcomes and who are underserved by the existing health and educational systems. Adolescents who are homeless, runaway, in foster care, or in the juvenile justice system have higher rates of pregnancy and sexually transmitted infections (STIs) than other sexually active adolescents [11–13].

The Centers for Disease Control and Prevention has deemed adolescent pregnancy one of a small number of “Winnable Battles” for public health; that is, a public health issue with established evidence-based interventions that has the potential for far-reaching change [14]. Organized, strategic interventions are required to develop a broad and multilayered approach to address the complexities underlying unintended adolescent pregnancy and promote the sexual health and well-being of all adolescents.

Building on the progress thus far and recognizing the continued need for further advances, this paper presents six key strategies to further improve and accelerate the current downward trend of adolescent birth rates. These proven and promising strategies are drawn from recent research and programmatic efforts that address adolescent pregnancy at multiple levels, from individual adolescents’ knowledge and personal development to larger systemic issues such as health care access. This ecological approach to adolescent reproductive health and sexuality recognizes the concurrent interactions and multi-directional influence of the community, school, family, peers, and individual on health behaviors and outcomes [15]. The six strategies, summarized in Table 1, address the broader community and developmental concerns of youth, increase knowledge and skills through sexual health education, use new technology and media to access information, increase availability of reproductive health services, tailor services to the needs of specific groups, and create a more supportive policy environment. In some cases, these strategies have been recommended and incrementally implemented for decades, but still have ways to improve or be more broadly enacted. Others are newly emerging and need further development to best harness their

power and potential. Strengthening existing strategies and developing new ones requires synergies across disciplines and a systematic approach to implementation.

Table 1. Summary of key strategies to promote adolescent sexual health and examples of innovations from research and practice.

Strategy	Innovations
1. Understand and address the complexity of adolescent lives	<ul style="list-style-type: none"> • Strengthening communities • Understanding family dynamics • Addressing relationship dynamics
2. Expand the provision of quality sexual health education	<ul style="list-style-type: none"> • Incorporating adolescent development • Embracing adolescent sexuality • Promoting healthy relationships • Integrating gender and rights
3. Engage youth through technology and media	<ul style="list-style-type: none"> • Accessing sexual health information online • Building computer- and web-based sex education • Connecting through social media • Creating entertainment-education for adolescents • Using mobile technology
4. Increase access to contraceptives and other sexual health services	<ul style="list-style-type: none"> • Building relationships between providers and adolescents • Promoting youth friendly services • Offering services in alternative settings
5. Create tailored interventions for special populations	<ul style="list-style-type: none"> • Engaging males • Serving youth with developmental disabilities • Strengthening services for youth in juvenile detention • Reaching unstably housed and foster youth • Providing inclusive services for sexual minority youth • Responding to the needs of immigrants • Supporting expectant and parenting adolescents
6. Create supportive policy environment	<ul style="list-style-type: none"> • Promoting best practices and evidence-informed policies • Working at the local level • Protecting adolescent confidentiality and access to care

For all of the suggested strategies, the needs, opinions, and voices of youth must be at the center of development and assessment. Seeking and incorporating the perspectives of youth themselves is critical to ensuring that programs and policies are appropriate, engaging, and effective.

2. Understand and Address the Complexity of Adolescent Lives

How adolescents progress through their development is greatly affected by the social, economic, cultural and familial context in which they live [16]. A socioecological perspective recognizes that adolescent well-being is contingent upon multiple aspects of the physical and social environment as well as personal characteristics [17]. Adolescents are constantly navigating multiple environments from their local neighborhood to school to virtual locations, all with different social networks and norms. The choices that adolescents make are strongly influenced by their own personal values as well as the customs and values they see among their peers, family, and community. Adolescents are situated on a

continuum of risk, which may change over time, and have varied levels of knowledge and needs for services. Programs and policies must contend with this complexity to address the underlying causes of adolescent pregnancy effectively.

2.1. Strengthening Communities

Worldwide, youth who have more educational and economic opportunities available to them are more likely to delay sexual initiation and to use contraception when they become sexually active [18]. Communities with higher social capital, which includes trust, cooperation, common goals, and supportive interactions among members, have been shown to have lower teen pregnancy rates [19,20]. Similarly, youth who live in neighborhoods with high poverty, higher rates of violence, and lower social capital are more likely to experience teen pregnancy [21]. Social capital can be built by creating safe spaces for families and residents to interact, promoting partnerships across youth-serving agencies in the community, and generating widespread community awareness that supports investment in youth as an instrumental component of community development. Connecting teen pregnancy and pregnancy prevention into broader community issues creates a more comprehensive approach to addressing adolescent health and development. Ecological approaches recognize the intertwined influences of family, peers, schools, media and policies on the behavior of adolescents, and aim to create positive effects by engaging multiple levels of an adolescent's environment synergistically [22,23].

Within the field, interventions addressing multiple determinants of sexual behavior should result in greater impact, but the development and evaluation of such interventions remains rare [22]. In one example, the *Children's Aid Society-Carrera* program in Harlem provided a multi-year afterschool program including job training, sports, and arts and resulted in lower rates of sexual initiation and pregnancy for adolescent female participants, relative to a comparison group [24]. Further research is needed to identify best practices and measure outcomes of neighborhood initiatives.

2.2. Understanding Family Dynamics

Adolescent childbearing is also strongly influenced by family characteristics, structures, and interactions [7]. Parental-child connectedness and parental supervision, for example, decrease the risk of adolescent pregnancy [25]. In one survey of youth, the majority stated that parents are the strongest influence on their decisions about sex, and that they want more open communication about sexual and reproductive health from their parents [26]. Parents need to have these conversations with their children early and often. Programs that work directly with parents to build effective communication skills around sexuality, support parent-adolescent relationships, and help parents develop monitoring strategies have shown promise [27]. Because many youth do not live with both biological parents, programs need to work with other adult caregivers and role models to ensure that youth receive sufficient mentoring, supervision, and communication about personal values and sexuality.

In addition, adolescents who are from families where their mothers or siblings were teen parents are more likely to become teen parents themselves [7,28]. Programs that identify and work with adolescents who have a family history of teen pregnancy can provide information and support. In California, for example, female participants in the former *Adolescent Sibling Pregnancy Prevention*

Program not only had significantly lower rates of pregnancy and sexual initiation than comparison females, they also had reduced school truancy [28].

2.3. Addressing Relationship Dynamics

Across the years of adolescence, young people develop closer connections to their peers and, in time, typically engage in sustained romantic relationships with partners [16], half of them sexually intimate [29]. Sexual relationships may be serious or transitory, with contraceptive and condom use differing based on relationship type [30]. Navigating the dynamics of a new relationship, including negotiating sexual activity and contraceptive use, can be challenging, especially for those dating older partners. Unequal power dynamics between partners can impact every aspect of a relationship, particularly around decision making and the threat of violence [31]. Intimate partner violence disproportionately affects adolescents and young adults [32]. Young women who experience intimate partner violence are less likely to use condoms or other contraception, resulting in a greater risk of unintended pregnancies and STIs [33]. In addition to addressing healthy relationships as part of sex education and parent-child communication programs, clinical settings can play an important role in screening and interventions for violence and reproductive coercion [34]. Interventions focusing on young men may help reduce sexual and physical violence or coercion that can lead some young women to feel pressured to have sex [35]. In addition, the importance of active consent prior to engaging in sexual activity has gained traction in programs and policies, particularly in university settings. Further work is needed to determine how to best present this concept to adolescents.

3. Expand the Provision of Quality Sexual Health Education

All adolescents are in need of medically accurate, developmentally appropriate, and relevant information and guidance to help them successfully face decisions about their sexuality, relationships, and sexual health. Parents are, and will always be, an essential source of information and values-clarification during this period, but the role of formal sex education in the classroom or other settings remains critical. Sex education offers an opportunity for young people to gain knowledge, dismiss persistent myths, practice communication and negotiation skills, question portrayals of sex and gender in the media, and contextualize their broader experiences as they make their own individual choices. However, there is often a disconnect between these components and what is actually provided to most adolescents. Nearly all adolescents (95%) in the United States receive some formal sex education in a school, community, or faith-based setting by the time they are 18 [36], but this statistic masks the great variability in both the quality and frequency of sex education that adolescents receive [37], as well as the different goals and content that underlie approaches to sex education.

Researchers, policymakers, funders, and advocates have dedicated considerable effort to identifying sex education programs that have had a positive impact on adolescents' sexual behaviors and have created collections of evidence-based interventions that communities can select for replication. Effective programs outline clear goals, address multiple risk and protective factors, create a youth-friendly environment, engage youth in multiple activities to build communication and negotiation skills, and employ quality teaching methods [23,38]. Rigorous studies have identified little evidence to support the efficacy of abstinence-only education programs in their primary goal of delaying adolescents' age of

sexual initiation [39]. In contrast, research has consistently found that discussions of contraceptive and condom use in sex education programs do not increase adolescents' likelihood of having sex, as some feared [38].

A new generation of approaches aspires beyond the narrow focus of teen pregnancy prevention and STI prevention programs, promoting broad-scale efforts that integrate discussions of gender, sexual orientation, healthy relationships, pleasure, and media literacy [40–42]. European approaches to adolescent sexuality have long emphasized comprehensive sex and relationships education that incorporates these topics, builds skills, and values individual responsibility in sexual decision-making [43]. Much has already been learned about sex education through decades of research and practice, and much more can be done to increase access to quality programming in all communities. These comprehensive, health-promoting approaches to sex education will require further conceptualization, implementation, and research moving forward.

3.1. Incorporating Adolescent Development

Too often, programs address the potential vulnerabilities of adolescents without embracing their individual strengths and assets as a means to encourage healthy sexuality [44]. New work is emerging on the developmental appropriateness of sex education that incorporates critical research from developmental and brain science and informs goals, content, and timing. Most sex education interventions do not address the emotional and motivational factors that affect adolescents' sexual decision-making, even though these play an essential role in their sexual risk behaviors [45]. Youth need to understand the types of decisions they may need to make “in the moment,” for example by role-playing the potential for being swept away within a party context or having unprotected intercourse as a result of alcohol use and pressure from a new partner. Sex education programs can also work with adolescents to address the competition between their short-term and long-term goals (e.g., physical intimacy vs. pregnancy prevention). Programs using a positive youth development approach recognize youth resources and protective assets rather than focusing exclusively on risk. These programs can help youth to strengthen relationships and abilities, develop a more positive view of their future through academic and career opportunities, and interact with supportive adults. Youth learn to act on the complementary skills and knowledge provided through sex education to better negotiate sexual activity and contraceptive use and avoid unhealthy relationships [46]. Promoting resiliency for youth who have been exposed to risk or negative experiences can help them to successfully respond to challenges [47]. Additional work is needed to understand how program developers and sex educators can integrate the latest findings from developmental and brain science and lessons learned from positive youth development efforts into practice.

3.2. Embracing Adolescent Sexuality

Most existing sex education interventions, regardless of the guiding framework, view restraint from sexual activity as the ideal sexual behavior for adolescents. Some, however, suggest a positive view of sexuality that sees consensual sex in adolescence as developmentally normative and even healthy [42]. These proponents argue that a positive view of adolescent sexuality does not ignore the impact of pregnancy or disease, but rather assumes that most youth have the capacity to deal with these risks.

It reflects the experiences of Western Europe, where adult acceptance of adolescent sexuality results in adolescents' planning for their sexual experiences, setting boundaries and wishes, negotiating interactions with partners, and seeking support from parents and other caregivers when needed [40]. The integration of these concepts and values in the U.S. context has been rare.

3.3. Promoting Healthy Relationships

Typically, sex education programs have targeted information and skills-building to the individual adolescent outside the context of romantic relationships. A focus on intimate relationships may help youth contextualize lessons about sexual behaviors, as well other important facets of relationships, such as respect, trust and communication, including communication regarding protected sexual activity. In response to the disproportionate rates of intimate partner violence among adolescents and young adults, a number of education programs have been developed that aim to prevent victimization and perpetration through changing social norms and increasing awareness of services. For example, *Safe Dates*, a school-based dating violence prevention program, has been rigorously evaluated and found positive long-term effects on psychological, physical and sexual dating violence victimization and physical violence perpetration [48]. By broadening its content to address both healthy and unhealthy relationships, sex education can also promote positive social norms. Coyle, *et al.* [49] examined relationship characteristics as “instructional leverage points” for sex education with younger adolescents. Findings suggest that grounding sexual behaviors in the context of relationships that adolescents are currently or soon will be experiencing can strengthen their ability to access and use information about sex and contraception when needed.

3.4. Integrating Gender and Rights

International efforts have led the way in developing approaches to sex education that unify discussions of sexual health, gender, and human rights for adolescents [50,51]. These gender- and rights-based interventions are guided by an understanding of the critical role of gender and power dynamics in sexual behaviors and by the principle of youth as holders of their own sexual rights [52]. They recognize gender equality and social context as critical factors in sexual health and offer opportunities for adolescents to learn about, discuss, and reflect these issues. A recent systematic review of intervention studies indicated that addressing gender and power in program content result in greater program effectiveness [53]. In the United States, positive effects have been found in clinic-based interventions with adolescent girls in Atlanta [54], as well as a school-based intervention in Los Angeles [55], though few others have been developed or rigorously evaluated to date.

4. Engage Youth through Technology and Media

There is little question of the prominent role that media and technology play in the lives of today's adolescents for purposes of communication, entertainment, creativity, and information. Ninety-two percent of teens report using the internet every day, and more than half are online several times a day [56]. By understanding how media and technology are used by adolescents, we can better harness their potential as tools for improving adolescent sexual health [57,58]. Advocates and program developers

have long promoted reaching teens “where they are”; the worlds of media and technology are a further step toward that vision.

Embracing media and technology offers many advantages for the promotion of adolescent sexual health. They can offer adolescents anonymity in seeking information about sensitive subjects at the moment of need, connect isolated youth with like-minded peers, and potentially skirt the ideological battles of school-based sex education by offering information and potential interventions online. Nonetheless, concerns about adolescents’ consumption of media and technology—both in quantity and content—must be taken seriously. Adolescents may be exposed to sexually explicit images, unwanted sexual advances and solicitation, cyber-bullying, and unsafe online relationships. There is almost no evidence on the impact of new media exposure on adolescent sexual health [59], but there are important risks to be considered and investigated.

Adolescents need support and education to become savvy consumers of media. They may undervalue the importance of connecting face-to-face with an adult who listens to them and considers their individual needs. They need guidance to locate sexual health information that is accurate, appropriate, and relevant. A key question for the future will be how to unite the power of media and technology with the known successes of in-person support and services.

4.1. Accessing Sexual Health Information Online

A new national survey found that the vast majority of adolescents have gone online to seek health information, whether to research a school assignment, learn to take care of their health, check symptoms, or find information for friends and family [60]. A number of high quality, youth-friendly sexual health websites have been developed or expanded in recent years—including *Sex Etc.*, *Scarleteen*, *StayTeen*, *Go Ask Alice*—that provide unbiased comprehensive information on relationships, sexual behaviors, contraception and condoms, violence, and other topics [61]. The National Campaign’s *Bedsider.org* incorporates a website, social media, mobile technologies and games that allow young women to compare methods of contraception, find nearby health centers, and sign up for birth control or appointment reminders sent by email or text. Young women who learned about *Bedsider* were less likely to have unprotected sex and more likely to use an effective contraceptive method compared to similar women in a control group [62].

There are currently no guidelines for online sexual health information to help ensure that content is accurate and appropriate for youth. Such guidelines could expand the inclusion of topics beyond those of pregnancy and STI prevention, such as sexual orientation, gender identity, healthy relationships, and pleasure. Sexual minority youth, in particular, search for information online that they cannot easily access in their schools and communities [63]. Further research is needed to examine how teens search for and assess the credibility of websites to maximize the likelihood they will find information that is accurate, youth-friendly, respectful, unbiased, and relevant.

4.2. Building Computer- and Web-Based Sex Education

Some curriculum-based sex education is also incorporating technology, either through computer activities within a school program or as a separate option outside the classroom. Technology-based programs may fill critical gaps in information for youth in communities where comprehensive,

evidence-based interventions are not being implemented due to political pressures. They also have the potential for customizing individual content and incorporating interactive features, which may promote engagement in learning and reinforcement of lessons learned in the classrooms or clinician's office, for example. These efforts may also benefit from greater fidelity and decreased costs in implementation, as well as flexibility in dissemination relative to school-based interventions [64–66]. A notable challenge has been the recruitment and retention of participants throughout the course of an intervention, resulting in less intensity of exposure (dosage) than intended [64].

Technology-based programs have decreased sexual risk behaviors among participants, including reduced sexual activity, increased condom use, and reduced numbers of sexual partners [66]. Most evaluated interventions, however, have been geared toward older adolescents and young adults. A recent program, *It's Your Game-Tech*, was developed for younger adolescents from a standard curriculum and resulted in positive effects on knowledge, attitudes, self-efficacy and perceived norms about sex, but no overall effect on delaying sexual activity [65].

4.3. Connecting through Social Media

Social networking sites are used by nearly 90% of teens as a means of connection and communication, with most teens having a presence on more than one site [56]. Girls, in particular, are major consumers of social media. While social networking sites are extremely popular and widely used in advertising, their feasibility and effectiveness as a means of sexual health promotion is not clear. Organizations have tended to use social networking to promote clinic locations and hours, advertise health campaigns, refer to services, and connect groups of teens with similar interests (e.g., peer health educators), but not commonly as a means to provide comprehensive sexual health information [67]. Concerns about privacy seem to hamper teens' interest in a more interactive intervention approach via social media [58,60]. The *Just/Us* intervention for high-risk youth successfully recruited and delivered STI prevention messages using Facebook, which resulted in positive effects on condom use in the short-term, although results were not sustained six months later [68].

4.4. Creating Entertainment-Education for Adolescents

The entertainment industry has devoted considerable airtime to the depictions of adolescent sexuality through scripted and reality television, often without any discussion of risk. In contrast, entertainment-education programs aim to change awareness, attitudes and behaviors through theory-based educational content framed in an engaging way. Entertainment-education programs have long been used in other countries to promote safe sex behaviors [69]. Likeminded efforts within in the U.S. have been rare, particularly for adolescents, although this trend is beginning to shift. Sexual health organizations and Latino advocacy groups collaborated on the development of Hulu's teen drama series *East Los High*, which portrays the turbulent effects of relationships, sex, pregnancy, and HIV on its young Latino characters. Among the most popular of recent reality shows, MTV's *16 and Pregnant* and *Teen Mom* follow adolescents through their pregnancies and early stages of parenthood. Some researchers have estimated that the shows resulted in a nearly 6% reduction in teen births over an 18 month period, or one-third of the overall decline in the United States during that time period [6,70].

4.5. Using Mobile Technology

The vast majority (88%) of adolescents have access to a mobile phone, and nearly three-quarters (73%) have access to a “smartphone” with internet capability [56]. Text messages offer a fast and inexpensive way to communicate and connect adolescents with sexual health information. Adolescents are well-versed in its use, with most (63%) sending texts daily [56]. There are few differences in mobile phone access by gender or race/ethnicity, although youth from lower-income families are less likely to own a phone with internet and texting capabilities [56].

Text-based interventions have been developed to increase sexual health knowledge, promote access to services, and ultimately promote healthy sexual behaviors. These are often developed as partnerships between technology and public health entities. YTH partnered with the San Francisco Department of Public Health to develop *SEXINFO*, a text messaging service designed to connect African American youth with information on STIs, contraception and services [71]. The *BrdsNBz* North Carolina Text Line responds to youth’s texts about sex, relationships and puberty with confidential, individualized responses from a trained health educator within 24 h and is expanding its reach to other states [72].

5. Increase Access to Contraceptives and other Sexual Health Services

Much of the great decline in teen births in recent years has been attributed to gains in adolescents’ use of more effective contraceptive methods [4]. Increasing access to contraception, as well as other sexual health services, has been an important and successful public health strategy for reducing the negative consequences of risk sexual behaviors. With the advent of long-acting reversible contraceptive methods (LARCs, *i.e.*, the IUD and implant), there are opportunities to build on these positive trends and continue the recent declines in adolescent pregnancy. The landmark *Contraceptive CHOICE Project* in St. Louis, for example, resulted in significantly reduced rates of pregnancy, birth, abortion through the provision of free contraception and education regarding LARC methods to adolescents [73].

Many adolescents, however, struggle to access to the high-quality sexual health services they need to protect themselves from sexual risks. Numerous barriers to care persist, including adolescents’ lack of awareness of local service availability and eligibility, out-of-pocket costs if adolescents do not access subsidized reproductive health services, limited access to transportation, inconvenient service hours, embarrassment, and concerns about confidentiality. In addition, health care providers and pharmacists may be uncomfortable providing contraceptive services to adolescents. When barriers are overcome, sexual health services can have a tremendous impact on adolescent health. With the implementation of the 2010 Affordable Care Act, there are greater opportunities to eliminate traditional barriers to accessing reproductive health care through the inclusion of annual preventive visits and providing contraceptives without co-payment [74].

5.1. Building Relationships between Providers and Adolescents

Health care providers are important sources of sexual health information, counseling and services for adolescents. The provider-patient relationship is critical to creating a positive and satisfying visit that results in improved use of contraception. Adolescents can be hesitant to ask about sexual health issues,

and too often providers do not initiate these conversations due to personal discomfort, concerns about legal or ethical issues, or limited time [75]. The more that clinicians raise topics related to sex, sexuality, and violence during confidential health care visits, the greater the likelihood that adolescents will share personal information regarding their need for contraceptive care and other support. Assuring confidential services also contributes to greater engagement and continuity of care [76].

The attitudes of providers can have an impact on an adolescent's contraceptive choice and continuation [77]. For example, although LARC methods are recommended as a first-line choice for adolescents, providers are less likely to recommend LARC to adolescents in comparison to older clients [78,79]. Providers may view LARC as inappropriate for adolescents due to perceived physiological constraints, costs, or the perception that adolescents will discontinue use prematurely [80]. Provider attitudes towards LARC for adolescents can be improved by disseminating evidence for LARC for adolescents, dispelling misconceptions, and training providers on insertion techniques [80]. Similarly, some providers assume pelvic exams are required in advance of contraceptive provision or that return visits are required for continued receipt or refills of contraceptives.

Clinical practice guidelines can help providers understand their role in promoting adolescent sexual health, but providers may not follow them due to lack of familiarity, uncertainty with how to implement guidelines in practice, inconsistency between guidelines, personal disagreement with specific guidelines, lack of confidence, or disbelief that guidelines will lead to behavior change [81]. In addition, these guidelines have notable gaps. For example, they often do not address the role of providers in helping to screen and refer for additional health issues that impact reproductive health services and patient compliance, such as mental health and substance use, or better integration of STI and HIV/AIDS screening and treatment as part of the reproductive health visit. Efforts are needed to consolidate evidence-based guidelines, clarify their purpose to providers, and promote their use in clinical practice.

5.2. Promoting Youth Friendly Services

Health services must be appropriate, acceptable, equitable, and effective to meet the needs of adolescents [82]. A proliferation of evidence-based research has emerged to provide a framework for how youth-friendly services should be provided to improve access, utilization, and increased returns to health facilities [83,84]. Strategies aimed at reaching these goals include appropriate clinic hours (after school and weekends), transportation, measures for confidentiality, non-judgmental provider attitudes, ability to obtain all services at one site, and free or low costs of services [83]. For example, California's *Family Planning Access, Care, and Treatment (Family PACT)* program offers a "one-stop shop model" linking the ability to enroll adolescent clients at point of service, confidentiality protocols, removal of cost barriers, culturally sensitive services, and comprehensive reproductive health services for both females and males [85,86]. A number of studies have shown youth-friendly interventions can improve awareness, access, and use of reproductive health services, and increase follow up returns [83]. A national survey of publicly-funded family planning facilities found that facilities with staff trained in youth friendly services had increased rates of discussions about contraceptives and increased contraceptive and LARC provision to adolescent clients in comparison to non-youth-friendly sites [84].

5.3. Offering Services in Alternative Settings

Adolescents with the greatest barriers to accessing health services in formal health facilities may be better served through alternative or out-of-facility health services including school-based health centers, mobile clinics, and street-based outreach. There is strong evidence supporting that out-of-facility services can be feasible, acceptable, and effective when providing reproductive health services for youth [87]. For example, a Louisiana statewide program used street outreach workers to deliver education and distributed over 500,000 condoms over a two-year period to neighborhoods with youth at high risk for adolescent pregnancy and STIs [88]. This program significantly increased the proportion of youth reporting condom use at last sex in comparison to neighborhoods without the interventions [88]. Similarly, school-based health centers can be a key access point to expand exposure to reproductive health education and counseling [89]. Studies show school-based health centers that provide on-site reproductive health services can increase use of contraceptives, reduce pregnancy and repeat pregnancy, and decrease drop-out rates and absenteeism of pregnant and parenting teens [90–92]. While school-based health centers are an attractive option, there are fewer than 2500 sites across the United States [93]. In California, a web-based condom access project allows youth aged 12 to 19 years to find teen-friendly locations where condoms are available for free, or confidentially request that condoms be sent to them by mail if they live in counties with high STI rates [94].

Internationally, countries have implemented policies to allow oral contraceptives to be available over-the-counter. These global efforts provide evidence that over-the-counter accessibility meets safety criteria, improves access to contraceptives, and encourages contraceptive continuation in comparison to prescription-based requirements [95]. A recent survey found that 73% of female adolescents in the United States support over-the-counter access to oral contraceptives, with 61% stating that they would be interested in obtaining oral contraceptives this way [96]. Although emergency contraception is available without a prescription in the United States through providers and pharmacies, many adolescents continue to have limited knowledge of this option. Increasing awareness of emergency contraception, improving provider and pharmacist attitudes towards its provision, and decreasing logistical challenges is an important step in expanding access for adolescents, particularly in rural areas and in countries where it remains restricted or illegal [97,98].

6. Create Tailored Interventions for Special Populations

While all adolescents should receive quality sexual health education, be treated with respect by health providers, and have access to affordable contraceptives and other services, certain groups remain notably underserved through existing programs and policies. Some adolescents are at a much higher risk for a range of negative health outcomes, including substance abuse and violence, that directly impact their reproductive behaviors and outcomes. Others have been neglected or overlooked through traditional curricula, research, and provider biases. Speaking with adolescents about their specific needs and using data to identify populations at greater risk can help to tailor interventions to make them more appropriate and responsive.

Several groups of adolescents are at disproportionate risk for pregnancy as well as other related health issues and require new approaches to better meet their needs. Some adolescents may belong to multiple

categories such as an individual who runs away and also interacts with the juvenile justice system. For all of these groups, their unique circumstances and experiences should inform the development of tailored interventions. Clinic staff and health educators working with adolescents must be aware of the differing backgrounds of the youth they serve. While they are not able to fully respond to all of the social, educational, and developmental issues these youth may have, they can play an important role in helping to identify community programs for referrals and can also work with programs to be a referral resource when they serve young people who need health care. Furthermore, programs should be evaluated on their appropriateness and effectiveness for the different groups, with further consideration of additional factors including geography, age of the adolescent, and race/ethnicity.

6.1. Engaging Males

While the critical role that adolescent and young men play in avoiding unintended pregnancy and STIs, as well as promoting healthy relationships, has been noted for decades, relatively few resources have been designated for this population. Like their female counterparts, adolescent males who father a child are less likely to complete high school and are disproportionately African-American and Hispanic [99]. Partner dynamics, gender norms, and relationship context all have a strong influence on sexual and contraceptive behaviors, and research suggests that involving both partners in contraceptive decision-making increases the use of effective methods and dual protection through the use of condoms and another method [100]. Nonetheless, reproductive health services and services often exclude young men [101], and males using these services may perceive services as oriented towards female needs. Services can be designed to be more “male-friendly” by including more comprehensive services, facilitating positive provider attitudes towards adolescent males (including young fathers), and holding male-only clinic hours.

Efforts also need to emphasize young men’s shared responsibility and promote their active involvement in sexual and reproductive decisions, the prevention of STIs, and responsible parenthood. Successful outreach strategies for reaching young men include working in male-only settings, such as juvenile halls, and hiring male outreach staff who reflect the community [102]. Programs that focus on helping young men grow into responsible adults, partners, and fathers, teach skills such as interpersonal communication, job readiness, and health service utilization; and may include service learning opportunities [103]. For young fathers, programs should provide co-parenting strategies and support in balancing new responsibilities.

6.2. Serving Youth with Developmental Disabilities

Although many youth with developmental disabilities are, or have strong intentions of becoming, sexually active, they have lower knowledge about sexual health and are less likely than other adolescents to talk with parents or peers about pregnancy, STIs, and sexuality [104,105]. Those who are sexually active are at higher risk of pregnancy than their peers and have lower confidence in their capacity to have safe sex [106]. Adolescents with developmental disabilities have less access to media information, can have difficulties with abstract thinking and relationship negotiation, and often experience limited personal agency or dependence on caregivers [106]. Many teachers and adult caregivers are untrained or feel uncertain about ethical constraints of teaching about the topic, are limited to teaching short,

physiologically factual interventions, or face challenges building skills that transfer beyond the classroom [105,107]. Few sexual health programs with students with developmental disabilities have been evaluated, resulting in limited guidance for health educators, special education teachers and parents [108]. Sexual health programs that are designed for and reflect the experiences of students with developmental disabilities are needed, along with adaptation tools for general sexual health programs.

6.3. Strengthening Services for Youth in Juvenile Detention

Youth residing in juvenile justice facilities consistently report high rates of sexual risk behaviors including number of partners, inconsistent use of condoms, and early sexual debut [109,110]. A study in Texas detention centers found that over 30% had already been or gotten someone pregnant [111]. They also report high rates of substance use, which increases odds of sexual risk behaviors including having sex with multiple partners, exchanging sex for money or drugs, and inconsistent condom use [109,112]. Furthermore, many youth in detention have serious mental health issues, often co-occurring with substance abuse [110]. For many youth in the juvenile justice system, the incarceration period represents their only significant contact with the health care system [110]. Therefore, this presents a unique opportunity to test, treat, educate, and connect high-risk youth to health care services and community resources [113]. A sex education program that includes motivational interviewing and a focus on substance use has shown positive outcomes in this setting [114].

6.4. Reaching Unstably Housed and Foster Youth

Adolescents who are homeless, who have run away, or who live in temporary foster care settings face an increased risk for pregnancy, childbearing, and STIs [11,13,115,116]. Adolescents in foster care are more than twice as likely to become pregnant than those not in foster care [13,116]. Adolescents living on the streets often employ survival strategies that include trading sex for goods and protection, are more susceptible to forced sexual activity, and frequently have limited access to health services [115]. Relationship dynamics also play a role in the sexual behavior of young women who are marginally housed; many rely on their male partners for emotional and financial support, which limits their power in negotiating condom and contraceptive use [117]. Current research has noted the lack of effectiveness of most programs aimed at improving sexual and reproductive health outcomes of this population [118]. Because of the multiple factors that influence homeless adolescents' sexual health outcomes, it is important to take a holistic approach in addressing their needs [115,118]. This includes increasing access to clinical services and psychological counseling, as well as providing a safe space where they feel comfortable and respected [115,118]. Furthermore, training foster care parents, staff at shelters, and providers on how to effectively talk to adolescents about sex, pregnancy and related issues may help to lower sexual activity and pregnancy among this group, as well as to strengthen relationships [116].

6.5. Providing Inclusive Services for Sexual Minority Youth

Sexual minority youth, those who are lesbian, gay, bisexual, and transgender, (LGBT), are at increased risk for unintended pregnancy and STIs [119,120]. However, most sexual health programs for adolescents focus on sexual behaviors between heterosexual partners for the purpose of unintended

pregnancy and STI prevention [121]. Comprehensive sexual health education should be inclusive of sexual minority youth by including information regarding sexual orientation and gender identities, resources for LGBT youth, detailed information on STI prevention, and discussions of healthy relationships [121]. Medical institutions need to have policies and practices in place to identify LGBT-friendly providers or to provide professionals with the training necessary to increase their own level of comfort, as well as creating safe and welcoming environments for LGBT youth [122].

6.6. Responding to the Needs of Immigrants

Foreign born adolescents, particularly those of Hispanic origin, are disproportionately represented among total adolescent births [9,123]. Although foreign-born adolescents frequently initiate sexual intercourse later in life, they are less likely to use contraception and more likely to report a pregnancy as intended in comparison to U.S.-born adolescents [123,124]. When navigating relationships, decisions about sex, contraception, and pregnancy, immigrant and refugee youth may find themselves bridging two cultures and value systems [125]. Immigrants and refugees often experience language barriers, cultural discordance in reproductive health services, restricted access to health insurance or health care services, and limited perceptions regarding their ability to engage in decision making [125,126]. Evidence-based interventions targeted at foreign-born youth can decrease pregnancy risks by including culturally relevant sex education to address specific cultural and family structure issues [126]. While schools may not always be able to include this targeted approach, community programs may represent viable options where such topics can be discussed. Health care providers should receive training in the varied cultural norms in their community, have access to professional translation services, and strive to increase the diversity of their workforce [126]. Using *promotoras*, community-based health educators, is another promising approach to increase outreach and awareness of reproductive health services, though more research is needed on efforts with adolescents [125].

6.7. Supporting Expectant and Parenting Adolescents

Expectant and parenting adolescents often struggle with considerable challenges that accompany pregnancy and parenthood during this developmental period. These challenges include balancing school and parenting responsibilities, as well as obtaining social support from family, friends, and partners [127,128]. Additionally, adolescent mothers are at greater risk for a rapid subsequent pregnancy [129]. Several evidence-based strategies have been proposed to address the specific needs of this population. For instance, developing support systems within schools, including case management, daycare options, and school-based health centers to foster academic achievement and create pathways to post-secondary education and careers [91,127,130]. Offering immediate postpartum insertion of LARCs is another cost-effective approach to avoiding subsequent unintended pregnancies [131]. Existing programs are generally geared toward adolescent mothers and often exclude adolescent fathers. Creating male-friendly services, including specific male-sensitive outreach, rapport-building, ongoing case management, and co-parenting strategies will better support young fathers and increase their parenting involvement [101].

7. Create Supportive Policy Environment

Policies at the local, state, and federal level impact adolescents' access to reproductive health information and services as well as broader life choices and the communities in which they live. At every level, these policies may act as barriers or facilitators to reduced adolescent pregnancy.

7.1. Promoting Best Practices and Evidence-Informed Policies

At the local, state, and federal level, funding should reflect best practices from the field and the strongest available evidence from research studies. Because adolescent sexuality is a highly charged political and emotional topic, related governmental policies may be created with limited evidence of effectiveness or appropriateness. For example, the Colorado Family Planning Initiative significantly increased LARC use among young women, resulting in lower fertility and abortion rates [132]. Despite this impact and estimated cost savings, the state legislature voted not to provide additional funding to sustain the program.

At the federal level, the government has provided funding for state and local teen pregnancy prevention activities for several decades [133]. The Obama Administration has allocated millions of dollars annually for states and communities to replicate previously evaluated sex education interventions, as well as assess new innovative strategies that can add to the evidence base. Partisan debates between proponents of funding for abstinence-only education *versus* more comprehensive sex education programs have continued over the last decade, despite lack of evidence supporting the former in delaying adolescents' age of sexual initiation, their primary goal [39]. From 2005 to 2008, while many other programs were cut, federally funded abstinence-only programs received \$150 million [133].

Similarly, ideological debates regarding Title X, the federal grant program that provides family planning services for low income individuals, are common during budgetary planning, despite estimates of considerable cost savings through preventative services [134]. Recently, 16 states have proposed legislation that may block public funding for Title X [135]. It is likely that debates over public funding for sex education and reproductive health services will continue to reflect the ambiguity by legislative bodies regarding the support for such services.

7.2. Working at the Local Level

At the local level, school districts often determine the specific sexual health curriculum offered or whether any is offered at all. Although 93% of parents nationwide support school-based sex education [136], school administrators and school boards often cite conservative local values as a rationale to not offer any programming. Parents and other local activists have successfully challenged school districts to ensure their children receive medically-accurate, age-appropriate sex education [137]. Similarly, the decision of whether or not school health clinics can dispense condoms and other contraceptives is typically determined by the school district. According to the National Assembly on School-Based Health Care, approximately half of school health clinics are prohibited from providing condoms or contraception to youth [93].

7.3. *Protecting Adolescent Confidentiality and Access to Care*

Fears about confidentiality keep many adolescents from disclosing sensitive health information and may prevent them from seeking care. The practice of sending explanation of benefits that detail patient and service information to policyholders can jeopardize minor's privacy rights. As the need for reproductive health services expands with increasing numbers of young adults receiving coverage through the Affordable Care Act, strategies for providers and insurers to maintain patient confidentiality are being developed in some states and health systems across the country. Widespread creation of an "opt in" approach to receiving an explanation of benefits, as well as attention to implementation and enforcement of policy changes are recommended [138].

In some states, new restrictive laws have significantly challenged individuals' access to reproductive health services including abortion, particularly for those with limited resources. Reproductive health legislation enacted in Texas has limited the services adolescents can obtain without parental consent and simultaneously decreased eligibility for undocumented immigrants [135]. Other states have enacted laws protecting the confidentiality of minors, enabling minors to seek services without parental involvement, and mandating that sex education provides information on contraception [139].

8. Conclusions

This paper highlights six promising strategies, drawn from recent research and programmatic innovations, that aim to decrease adolescent pregnancies and promote adolescent sexual health. The underlying causes of adolescent childbearing are complex and, therefore, our response must be multifaceted. Many of the risk factors for teen pregnancy—including poverty, limited educational and recreational opportunities, and limited access to health services—are themselves interconnected. While adolescent pregnancy rates have shown substantial improvement over recent decades, trends in related health issues, most notably STIs, have been mixed [140]. Rather than citing declining birth rates as a justification for reductions in funding, programs and policies need to persist in their efforts and expand their scope to encompass related issues of health and development. The field needs to grow beyond its traditional place of providing information-related programs, to a larger view that aims to support and nurture adolescents as they navigate important developmental stages and prepare for the transition to young adulthood. In many cases, adults working with adolescents will need further training and capacity building to encompass this broadened vision.

Each of the strategies proposed warrant further examination to ensure that they are appropriate for the selected population and maximize impact. Some of the promising interventions cited in this paper have been conducted only on a small scale. These require thoughtful preparation and analysis for successful replication and scalability. Other newer strategies, particularly those using technology and new media, need further program development and research to better understand their challenges and potential. The quest for evidence-informed programs is an important one. We need to continue to explore the types of efforts that can affect sexual behaviors, improve our existing programs, and replicate these promising practices in new contexts and with diverse populations of youth. To that end, significant resources need to be secured to ensure that comprehensive sex education and reproductive health programs are based on the substantial body of research that has already been undertaken. There is also

considerable room for growth, both in terms of improving the strength of the research evidence that is collected, as well as continuing to conceptualize new approaches for helping young people improve their sexual health. Including young people in the development of these strategies is critical to the acceptability and effectiveness of health messages and approaches.

At the local, state, and federal level, adolescent pregnancy prevention efforts will always compete with other funding priorities. Stakeholders representing multiple perspectives and with different backgrounds (including educators, policymakers, parents, and youth) must work together strategically. While the majority of the proposed strategies are proximal in their relationship to pregnancy prevention (for example, improved comprehensive sex education and access to reproductive health services), more distal factors are also key to diminishing the incidence of unintended pregnancy. These may include policies that support investments in education, violence prevention, and job training for both parents and adolescents.

Currently, much of the work and funding for programs targeting adolescents remain fragmented with little or no coordination. Too often those engaged in adolescent pregnancy prevention may not have an understanding of what strategies are needed in substance abuse prevention or violence prevention, even though these impact adolescent decision making. Underlying each of these potential risk related behaviors is the need for access to appropriate resources, mentoring and role models, and supportive environments. Reducing the silos between fields of research and interventions will bring critical components together, including elevating a focus on reducing disparities, promoting human rights, and encouraging responsible adolescent development. Similarly, improved efforts at communication and collaboration can more quickly diffuse lessons learned, promising interventions, and research results—thus, leading to a positive feedback cycle benefiting all involved.

In addition, sectors that are not traditionally considered as partners also need to be engaged. Providing internship opportunities for youth requires the involvement of local businesses, breaking the cycle of community violence necessitates the engagement of police and the justice system, and increasing academic success requires concerted efforts to assure equity in educational opportunities. Rarely are the public and private sectors brought together to leverage existing resources and approaches that treat the adolescent as a whole. When these varied sectors work together on a common vision, the potential for collective impact is much greater than the individual parts. This type of approach can address many of the underlying factors influencing youth decision-making and positively impact not only adolescent pregnancy rates, but also other critical issues necessary for a successful transition to adulthood.

It is critical that we continue to build on our considerable progress in reducing adolescent pregnancy. Through thoughtful examination, synthesis, and diffusion of the many lessons of recent research and innovations in practice, we will be able to make further advances in promoting the sexual health of all adolescents.

Acknowledgments

This research was supported in part by a grant from the Maternal and Child Health Bureau, Health Services and Resources Administration, USDHHS to the University of California, San Francisco Adolescent and Young Adult Health National Resource Center (U45MC27709).

The authors are grateful for the research and editorial assistance of Abigail Gutmann-Gonzalez, Anna Eisenberg, Lana Tilley, Amanda Mazur, and Stephanie Arteaga.

Author Contributions

The authors contributed equally to the research and writing of this paper. All authors have read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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