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Rethinking School-Based Health Centers as Complex Adaptive Systems

Maximizing Opportunities for the Prevention of Teen Pregnancy and Sexually Transmitted Infections

Alison Moriarty Daley, MSN, APRN, PNP-BC

This article examines school-based health centers (SBHCs) as complex adaptive systems, the current gaps that exist in contraceptive access, and the potential to maximize this community resource in teen pregnancy and sexually transmitted infection (STI) prevention efforts. Adolescent pregnancy is a major public health challenge for the United States. Existing community resources need to be considered for their potential to impact teen pregnancy and STI prevention efforts. SBHCs are one such community resource to be leveraged in these efforts. They offer adolescent-friendly primary care services and are responsive to the diverse needs of the adolescents utilizing them. However, current restrictions on contraceptive availability limit the ability of SBHCs to maximize opportunities for comprehensive reproductive care and create missed opportunities for pregnancy and STI prevention. A clinical case explores the current models of health care services related to contraceptive care provided in SBHCs and the ability to meet or miss the needs of an adolescent seeking reproductive care in a SBHC. **Key words:** *adolescent-friendly care*, *complex adaptive systems*, *contraception*, *school-based health centers*, *sexually transmitted infections*, *teen pregnancy prevention*

TEEN PREGNANCY is a major public health care concern for the United States. A myriad of factors are identified in the literature that either contribute to or prevent unintended pregnancies and sexually transmitted infections (STIs) in this population. Prevention efforts are diverse and identify many different strategies, including but limited to, comprehensive sexuality education and adolescent-friendly reproductive services.[1,2] School-based health centers (SBHCs) across the nation provide comprehensive primary health and mental health services to teens in an adolescent-friendly manner. However, many SBHCs are restricted from providing contraceptive services.[3] This article discusses the benefits of rethinking SBHCs as complex adaptive systems (CASs) for providing care to adolescents and their potential to emerge as a community resource to augment prevention efforts aimed at teen pregnancy and STIs.

Author Affiliation: *Yale University School of Nursing, Yale-New Haven Hospital Adolescent Clinic and Hill Regional Career High School, School-Based Health Center, New Haven, Connecticut.*

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Correspondence: *Alison Moriarty Daley, MSN, APRN, PNP-BC, Yale University School of Nursing, 100 Church St South, PO Box 9740, New Haven, CT 06536 (alison.moriartydaley@yale.edu).*

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COMPLEXITY SCIENCE

Complexity science integrates the multiple, interrelated interactions between health care agencies and the individuals who access their clinical services.[4-6] Although initially rooted in the sciences (mathematics, physics, and biology), complexity science has been applied to many diverse disciplines including management, economics, medicine, and manufacturing, as well as nursing. It is often used to consider problems or phenomena in a different manner. In contrast to the reductionist view of science that seeks to explain phenomena through the understanding of individual parts, CASs focus on the holistic interplay among the many different aspects or attractors and focus on the whole system.[4,7] They contain multiple components, some obvious and others less so, which are dynamic in nature and able to respond to the changing needs of their patients as they are discovered or encountered.[5] CASs include the essential elements of *diversity, self-organization, embeddedness, distributed control, emergence,* and *coexistence between order and disorder*.[4,5] Examples of CASs include primary care clinics, a school, or peer group and are often depicted as a web, with each component interconnected and interrelated, able to adapt or change as necessary,[4] and operate at a point "far from equilibrium."[4(p37)] Equilibrium, or perhaps the status quo, cause the system to be unable to respond, change, or interact as necessary.[4,5] Cilliers (1998) explains it is "the robust nature of complex systems, their capacity to perform in the same way under different conditions that ensures their survival.[(pix)]

Certainly adolescents live on the edge of chaos, between childhood and adulthood, and face daily decisions that have an impact on their everyday lives as well as their future. Their bodies, cognitive abilities, relationships, and interactions with the world, peers, family, and community are changing constantly.[8] Adolescents are figuring out not only who they are as individuals, but also how they fit into the world around them by integrating what they have experienced and then assimilating this knowledge into their own personal beliefs, values, desires, and opinions.[9] Clinical services provided to adolescents need to appreciate the unique challenges faced by adolescents and be able to be *adaptive* to their ever-changing needs.

Complexity science is well suited for examining the health care services in SBHCs aimed at teen pregnancy and STI prevention because the needs of each adolescent are vastly different, influenced by a variety of external and internal factors, and change over time. Therefore, clinical services need to be responsive and *adaptive* to both the needs of each individual and the population. Complexity science provides a lens to examine the interplay of the clinical services available to adolescents through SBHCs, the unique health care needs of the adolescents using these services, and whether current SBHC services create gaps in pregnancy and STI prevention efforts.

BACKGROUND AND SIGNIFICANCE

Much of the decline in adolescent birth rates in the United States since 1991 has been attributed to the impact of sex education, increased access to contraceptive services, more effective use of contraception by adolescents, and strong public service messages.[1,2,10-12] Teen birth data for the United States demonstrated a steady decline from 1991 until experiencing a 5% increase between 2005 and 2007.[12] Current data reveal a reversal of this increase; the teen birth rate for 2010 is 34.3, the lowest rate ever recorded.[12] However, even at this all-time low rate, the United States has the highest teen birth rate of all industrialized countries and an estimated $9.1 billion is spent annually on teen childbearing.[13] The majority of teens report their pregnancies to be unintended.[14-17] The potential ramifications of early parenthood are formidable and frequently impact the educational, developmental, social, mental health, and financial outcomes for the teen mother, her child, her family,[13,18] and her community.[19] The rates

of gonococcal and chlamydial infections are also highest among adolescents and young adults[20]; the annual rate of new AIDS diagnoses among 15- to 19-year-old males has nearly doubled in the past 10 years.[21] These rates validate that many teens engage in unprotected sexual activity that results in STIs and the risk of pregnancy.[12,14,20] Compounding these issues, many teens also struggle with missed opportunities for health care intervention because of concerns about confidentiality, access to services, or insurance status that makes it all the more difficult to establish and maintain a therapeutic relationship in the health care system.[22,23] The current economic and health care environment in this country is likely to limit contraceptive services and sex education programs for adolescents and stresses the importance of making existing health services for teens as responsive, efficient, flexible, and effective as possible.[24]

SCHOOL-BASED HEALTH CENTERS

School-based health centers provide primary health and mental health services in a school setting. They are commonly sponsored by existing community health care agencies, such as hospitals, community health centers or local health departments, and are available to all students.

"SBHCs exist at the intersection of education and health and are the caulk that prevents children and adolescents from falling through the cracks. They provide care—primary health, mental health and counseling, family outreach, and chronic illness management—without concern for the student's ability to pay and in a location that meets students where they are: at school."[25]

The number of SBHCs has grown significantly in the United States over the past 2 decades; in 1990, there were 200 SBHCs in 45 of the 50 states.[26] Today, more than 2000 SBHCs offer a range of health and mental health care services to preschool, elementary, middle, and high school students, and, in some cases, to family members and faculty, in 47 states, the District of Columbia, Virgin Islands, and Puerto Rico.[3] The majority of SBHCs are located within the school building (96%) and in urban areas (57%).[3] Twenty-seven percent of centers are located in rural areas and 16.1% in suburban areas.[3] The vision of SBHCs is to provide students with the health care they need to be successful in school by reducing barriers to services.[25] Research has demonstrated the effectiveness of SBHCs by improving access to health care services and delivering preventive care, including reproductive health care (contraception and STI screening and counseling) and mental health services, to adolescents who are often difficult to reach in other settings.[27,28]

Three predominant staffing models for SBHCs exist. The primary care model (25.4%) is staffed by a nurse practitioner or physician's assistant with medical supervision by a physician.[3] The role of the physician is typically administrative.[3] Mental health services are not included in this model. Additional clinical support is provided by nurses (registered nurses or licensed practical nurses), medical assistants, health aides, outreach workers, health educators, or dental professionals.[3] The primary care-mental health model, the most common of the SBHC models (39.7%), combines both primary health care services and mental health services via licensed clinical social workers, psychologists, or substance abuse counselors to the services of the primary care model.[3] The most comprehensive of the models is the primary care-mental health PLUS (34.9%) model. Primary care and mental health services are augmented by the addition of nutritionists, social service case managers, or health educators.[3]

HISTORY OF SCHOOL-BASED HEALTH CENTERS RELATED TO REPRODUCTIVE CARE

School-based health centers are particularly well positioned to provide comprehensive reproductive care because they are easy to access, open during the school day, offer reliable availability, able to provide frequent follow-up, confidential, developmentally focused, and available without cost to

patients.[29-31] The initial high school SBHCs in the 1970s were opened to combat the high teen pregnancy rates.[32] Reproductive services were *embedded* in the primary health care services available in SBHCs. Forty years later, despite the successes of these pioneer clinics, many SBHCs have faced continued restrictions on reproductive services. Many clinics have *adapted* with alternative strategies, such as partnerships with other community resources to provide contraceptive services to adolescents receiving care through SBHCs. But even this has fallen short, with many adolescents foregoing the care they need or desire because of concerns about confidentiality, transportation, cost, procrastination, not making an appointment at the alternative site, fear of discovery by parents, and lack of familiarity with agencies and providers to which they were referred.[33] Zimmer-Gembeck and colleagues[33] also found that adolescents who had access to on-site dispensing of contraception were significantly more likely to select a contraceptive method sooner after a family planning visit and use a selected method consistently for 90 days or more than those who did not have access to on-site dispensing of contraceptives.[33] It is important to note that this study found that on-site dispensing of contraception did not increase the number of sexually active female adolescents, which is a common fear of communities and parents.[33]

SCHOOL-BASED HEALTH CENTERS: COMPLEX ADAPTIVE SYSTEMS

The characteristics of SBHCs CASs will be discussed throughout this section and highlighted in the Table. Typically, SBHCs provide a *diverse* menu of health and mental health primary care services including physical examinations, care of acute and chronic illnesses, immunizations, health education and screenings, mental health care, issue-oriented support groups, substance abuse counseling and in fewer, reproductive health care.[3,26] School-based health centers are *embedded* in a larger health care agency, such as a hospital or community health center, and are located within the school. Most remain administratively separate from the school and the services of the school nurse.[34] Students access services through a signed consent provided by a parent or guardian.[34] The clinicians and staff of the SBHC are knowledgeable about adolescent development, receptive to the *nonlinear* ways teens present and participate in care, and prepared to target health education and prevention to the specific concerns of their patients.[35] Additionally, teens learn to be active and increasingly more independent participants in their health care while ultilizing the SBHC.[36]

The availability of reproductive health services in SBHCs, especially contraceptive services, varies greatly and is influenced by numerous factors. Many SBHCs that serve adolescents (n = 877) provide reproductive services including pregnancy testing (81%); STI education, screening and treatment (68%); human immunodeficiency virus counseling (63.7%) and testing (17.9% serum, 41.6% oral, and 13.2% OraQuick); and contraceptive counseling (70%).[3] Each of these services is available less often than other clinical services provided by SBHCs.[3] Contraceptive services are the most variable and often omitted of these services. Hormonal contraception (eg, oral contraceptive pills and depot medroxyprogesterone acetate) and less often, condoms are limited; 60% of SBHCs providing services to teens are restricted from on-site prescribing of contraception.[3] These restrictions limit SBHCs' ability to respond to the inherent *order and disorder* of adolescent reproductive needs. The National Assembly on School-Based Health Care Consensus data also identify the majority of SBHC users as members of minority and ethnic groups who are uninsured or underinsured and have limited financial resources.[3] A lack of readily available reproductive health care in SBHCs is a missed opportunity that may place an already vulnerable population at increased risk for unintended pregnancy and STIs.

An á la carte menu of services is available for each adolescent utilizing the SBHC.

Table. The Complexity of School-Based Health Centers

Complex Adaptive System Properties[5]	School-Based Health Center Complex Adaptive System Properties/Examples
Embeddedness	Part of school, community, and larger health care system; health and wellness impact the ability to learn and stay in school
Diversity	Wide range of services available (physical examinations, acute visits, pregnancy tests, sexually transmitted infection screening, comprehensive reproductive care, mental health counseling, and issue-oriented support groups)
Distributed control	Shared decision making between teen and clinician; collaboration with school and school nurse to provide health education and health care services
Nonlinear	Responsive and flexible to the health needs of individual, partner, school, and population
Adaptable	Health and mental health services change as the adolescent's needs change and/or public health needs change in the school or community; available regardless of insurance status; provides educational materials in a variety of formats (posters, pamphlets, counseling, classroom presentations) to enhance awareness and meet diverse needs
Emergence	Recognizes gaps in care (need for onsite contraceptive services, lack of insurance) and responds to emerging needs
Order-disorder	Clinical services change as needs of individual and/or population change
Self-organization	School-Based Health Center responds to health challenges as they occur; introduces new information or care as it is needed or regulations introduced

Clinical services are provided on the basis of the individual needs of the adolescent in combination with those identified by the clinician and, in many cases, also a result of either a formal or informal referral by the school nurse, a family member, social worker, teacher, partner or friend. The teen can use the services to best *adapt* to their individual needs. For example, a teen may maintain a relationship with their pediatric provider, but access the SBHC for an urgent visit, because of co-payment concerns for an acute visit, or for a "private" concern, such as STI or pregnancy testing, that they were not comfortable sharing within the context of the pediatric practice or the service is not available in that setting.

The menu of available health care services provided by SBHCs is often a result of negotiations between the school district and the sponsoring health care agency.[34] State health laws in about two-thirds of the United States and District of Columbia allow minors to consent for contraceptive services; however, the circumstances under which they can consent vary from state to state.[37] Twenty-one states and District of Columbia explicitly allow all minors to consent for contraceptive care.[37] Minors can also consent for family planning services at sites funded by Medicaid or federal Title X Family Planning Programs.[38] Despite these allowances for adolescents to access contraceptive care, changing SBHC policy to include prescription and dispensing of contraception is often met with obstacles and restrictions.

Most limitations on SBHC contraceptive services are the result of school district policy (57%) and are likely to be more restrictive than state or local health laws.[3] School-based health centers that have been successful changed their policies to allow on-site con-

traceptive and condom access are those that have been open for greater than 10 years and earned the trust of patients or guardians, parents, school administrators, faculty/staff, and the community.[39] As a result, they were able to examine the needs of their population, determine the existing gaps in services, and then *self-organize* and respond to the contraceptive needs of their patients.[4,5,39]

Choices for adolescents about contraception and pregnancy are both multifaceted and personal. Many of the influences regarding pregnancy and prevention are not immediately apparent to the clinicians providing counseling or health care services to adolescents. Complexity science refers to these unknown and highly influential factors as *shadow systems*.[5,40] These influences can be discovered more effectively through an extended, collaborative, and consistent relationship with an SBHC clinician.[41] Opportunities for problem solving, health education, and even strategies for negotiation with partners can *emerge* as a result of these relationships. Care can then be individualized for each adolescent through *distributed control* (*shared decision making*). Even with this highly personalized care, gaps exist and can prevent more optimal services for pregnancy and STI prevention.

CLINICAL CASE

A clinical case of Annie Anyteen will guide the discussion of the most common clinical practice models available to adolescents in SBHCs. Each clinical practice model will be examined in regard to its ability to meet or miss Annie's needs.

Annie Anyteen is 16 years old and a sophomore in high school. She comes to the SBHC today for her annual physical examination for volleyball. She is a conscientious student and hopes to go to college and become a nurse. Annie has used the SBHC several times since her freshman year for various reasons including a physical examination 1 year ago, acute visits for a rash and a "bad cold," and a sports-related ankle injury last season. She has been healthy since her last visit and reports only a cold since that time. During the history, the clinician learns that Annie is in a new relationship with a male partner and is interested in contraception, "just in case—I am not having sex, but want to be prepared." The remainder of the history and physical examination are within normal limits and the nurse practitioner decides Annie is a candidate for the contraceptive method of her choosing.

Annie's request for contraception is one that is echoed in SBHCs across the country. Three common clinical practice models, with respect to contraceptive access within SBHC, exist: model A, no contraceptive access; model B, contraceptive counseling without prescription or dispensing of contraception; and model C, contraceptive counseling and access to contraception directly within the SBHC. Each of these models will be discussed in terms of the SBHC as a CAS and the ability of each to respond to Annie's request for "contraception, just in case" and her knowledge about STI prevention.

What happens next will depend on the ability of the SBHC CAS and the clinician to be responsive to the needs of Annie and serves as the launching point for a discussion regarding the multifaceted and highly individual approach to teen pregnancy and STI prevention by SBHCs. Three possible approaches to Annie's request for contraception are based on the current practice patterns of SBHCs are presented.[3]

In many respects, each of the 3 models achieved a very important first step; they were adolescent-friendly and *adaptive* enough that Annie engaged in care and asked for contraception. The SBHC also affords many opportunities to engage Annie's partner in prevention and screening efforts, as well as the population of the school at large because partners and peers can be important influences on adolescent's decisions. In model A, Annie is informed by the clinician that the contraceptive services she is requesting are not available at the SBHC and she will need to go elsewhere. The SBHC clinician may be able to discuss with Annie benefits of remaining abstinent,

evaluate her knowledge of STIs and prevention strategies, provide appropriate education and anticipatory guidance related to safer sex, review other factors that may place her at risk for unplanned or unprotected sex such as drug or alcohol use, and direct Annie to places where she can receive contraceptive services. The possible opportunities missed are many; first and foremost, Annie's success in preventing an unintended pregnancy and STIs will depend on her ability to access another clinical service and obtain contraception or make the decision not to become sexually active. Many factors may impact her ability to get to an alternative source of care, including the location of the clinical service, her comfort level, concerns about confidentiality, insurance coverage, and hours of operation; all components of the SBHC in which she is successfully receiving other primary care services.

The potential ramifications of missing this opportunity with Annie for preventive care are many. Eighty-five percent of women will experience a pregnancy following 1 year of unprotected sexual activity.[42] Research demonstrates that significant delays, often 6 to 18 months, exist between sexual debut and adolescents seeking contraceptive services.[43] Concerns related to confidentiality contribute significantly to teens either delaying or not seeking care.[44-46] In addition, many teens may not receive information related contraceptive choices because of clinician disapproval, restrictions on services, or comfort level of the health care provider.[22,43,47] Decisions about reproductive services are often influenced by beliefs that limiting sexuality education and clinical services will discourage sexual activity among teens. Abstinence-only education has not proven to be effective in decreasing rates of sexual activity or increasing condom use,[1,11] and restrictions on contraceptive services, with the intent of preventing sexual activity, have also not proven to be effective.[46,48] The rates of gonorrhea and chlamydia are highest among female adolescents and many also acquire human papillomavirus infection during their teen years.[20] The limitations imposed on reproductive services for teens likely contribute to the risk for pregnancy and STIs.

The SBHC clinician in model B discusses sexual decision making including the merits of abstinence, the available contraceptive methods for preventing pregnancy and STIs, and assists Annie to narrow her choice to a best fit, but informs Annie that the current restrictions on SBHC services will require her to obtain the contraception from another location. This model is somewhat more flexible in meeting Annie's request. The clinician can provide reproductive care, STI screening and treatment, pregnancy tests, contraceptive counseling, condoms (in some cases), and follow-up but is restricted from dispensing or providing prescriptions for hormonal contraception. To obtain contraception, Annie needs to visit another community resource for the method itself or a prescription. This model is arguably more flexible than model A, but still falls short of actually *self-organizing* to meet Annie's request. The restriction of prescribing or providing contraception on-site places an additional hurdle for Annie to negotiate to obtain contraception, avoid an unintended pregnancy, and protect herself from STIs. For many adolescents, negotiating unfamiliar health care agencies can be overwhelming and creates significant delays or even missed opportunities for receiving services. The lack of contraceptive services in the SBHC can also convey the message that contraception, unlike other health services, is not important or that the clinician is not qualified to provide these services. Assisting Annie to negotiate another community health services, takes considerable time and commitment on the behalf of the clinician. The nurse practitioner will need to educate Annie about what services are available, help her to make an appointment, determine insurance coverage, and provide directions for her to get to her appointment. Even if Annie is able to obtain a prescription for contraception from another source, she may still need to pick up her prescription or obtain refills from a

pharmacy, another service she may not be familiar with or able to access without transportation, money or insurance to cover the cost of the method; fears about confidentiality may also prevent her from obtaining contraception. Conversely, if Annie is successful in obtaining contraception, will she be able to continue to receive care in multiple locations, access appropriate follow-up, and have her concerns addressed in a timely manner?

Finally in model C, Annie and the clinician discuss each method and decide which would best suit her needs. Emphasis is placed on evaluating Annie's knowledge of safer sexual practices, knowledge gaps are filled with factual information and practical strategies for success; however, in addition, the clinician gives Annie the desired method, instructs her on proper use and possible side effects, provides condoms, and makes an appointment for her to return in 4 weeks for follow-up. Annie is also instructed to return to the SBHC at any time to ask questions. This model provides the care Annie requested and is able to provide contraception within the context of the other services available at the SBHC. The nurse practitioner is able to discuss possible options, determine an appropriate fit for Annie in terms of safety, convenience, privacy concerns, lifestyle, and the influence of Annie's *shadow systems.* In addition, Annie already has a relationship with the nurse practitioner and may be better able to return to the SBHC to discuss concerns, side effects, refills, and receive the additional support needed to avoid an unintended pregnancy and STIs. Model C demonstrates the flexibility necessary of the SBHC and the clinician to meet the ever-changing health needs of adolescents and *emerge* with a comprehensive approach to teen pregnancy and STI prevention.

DISCUSSION

Despite the recent decrease in teen births in the United States, the rate remains highest among industrialized countries.[19] Three in 10 girls in the United States will become pregnant by the age of 20 years.[49] The consequences of teen pregnancy and birth can cause formidable challenges for teens, their families, and communities, including but not limited to school failure and chronic poverty.[49] Furthermore, 50% of all new STI diagnoses occur in adolescents, yet they only account for 25% of the population.[50] Many STIs can have lifelong consequences despite timely diagnosis and treatment. The health of adolescents depends on appropriate access to health education and care that is specific and responsive to their needs and concerns as they *emerge*. School-based health centers possess the essential elements of CASs and, in many cases, the flexibility to contribute notably in teen pregnancy and STI prevention efforts. However, SBHCs need to be allowed to *self-organize* and to better assist teens to make educated, informed decisions about sexual activity and contraceptive use.[4] Research has demonstrated that an adolescent-friendly approach to care meets teens where they are and encourages self-efficacious behaviors.[1,30] Prevention efforts not only need to focus on the teen's desires regarding pregnancy and STI prevention, but also need to recognize the myriad of factors that influence the teen at the individual, family, community, and societal levels. Prevention efforts, available á la carte, that allow for *shared decision making* between the clinician and the teen, will better meet the needs of the teens, target areas for intervention, and assist in the delivery of patient-focused services and follow-up. The all-too-common mechanistic, preset menus that determine which clinical services teens can or cannot access, do not work for every patient, every time and miss valuable prevention opportunities. Savvy, industrious teens may seek an alternative source of care that can be responsive to their needs, for others, the gaps result in missed opportunities for prevention and timely intervention.

As the intricacies of health care reform are discussed, nurses must advocate for reproductive services that are responsive to the dynamic needs of teens and provide necessary evidence on the effectiveness of these

services. Lifting restrictions on contraceptive services at the SBHC, local, state, and national level will allow clinicians the flexibility to better meet the sexual health needs of teens and become an even more important resource in teen pregnancy and STI prevention efforts. The current restrictions placed on the services available to teens in SBHCs have not proven to change adolescents' decisions about engaging in sexual activity, but create insurmountable hurdles, encourage secrecy, stifle communication, limit *shared decision making* between clinicians and patients, and facilitate unprotected sexual activity—all of which contribute to the rate of unintended pregnancies and STIs in this population.[12,14,20] The restrictions also require significant time and commitment by clinicians to assist teens in negotiating alternative community resources and ultimately limit their scope of professional practice; neither of which is efficient or effective. Rethinking the utility of SBHCs as an important community resource for comprehensive adolescent primary care services and pregnancy prevention efforts will enhance their ability to prevail against less effective sources of health care that are not as sensitive, dynamic, responsive, or flexible to the unique health care needs of adolescents.

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