

# UCSF

## UC San Francisco Previously Published Works

### Title

Improving Adolescent Health Policy: Incorporating a Framework for Assessing State-Level Policies

### Permalink

<https://escholarship.org/uc/item/26g1g91t>

### Journal

Annual Review of Public Health, 35(1)

### ISSN

0163-7525

### Authors

Brindis, Claire D  
Moore, Kristin

### Publication Date

2014-03-18

### DOI

10.1146/annurev-publhealth-032013-182455

Peer reviewed

# Improving Adolescent Health Policy: Incorporating a Framework for Assessing State-Level Policies

Claire D. Brindis<sup>1</sup> and Kristin Moore<sup>2</sup>

<sup>1</sup>Philip R. Lee Institute for Health Policy Studies and National Adolescent and Young Adult Health Information and Innovation Center, University of California, San Francisco, California 94143-0936; email: Claire.Brindis@ucsf.edu

<sup>2</sup>Youth Development, Child Trends, Bethesda, Maryland 20814; email: kmoore@childtrends.org

Annu. Rev. Public Health 2014. 35:343–61

First published online as a Review in Advance on January 2, 2014

The *Annual Review of Public Health* is online at [publhealth.annualreviews.org](http://publhealth.annualreviews.org)

This article's doi:  
10.1146/annurev-publhealth-032013-182455

Copyright © 2014 by Annual Reviews.  
All rights reserved

## Keywords

policy analyses, state and federal policy formation

## Abstract

Many US policies that affect health are made at the state, not the federal, level. Identifying state-level policies and data to analyze how different policies affect outcomes may help policy makers ascertain the usefulness of their public policies and funding decisions in improving the health of adolescent populations. A framework for describing and assessing the role of federal and state policies on adolescent health and well-being is proposed; an example of how the framework might be applied to the issue of teen childbearing is included. Such a framework can also help inform analyses of whether and how state and federal policies contribute to the variation across states in meeting adolescent health needs. A database on state policies, contextual variables, and health outcomes data can further enable researchers and policy makers to examine how these factors are associated with behaviors they aim to impact.

## BACKGROUND

Several research-based perspectives can inform policy. Ecological theory recognizes that adolescent behavior is shaped by the environmental contexts in which they live—the family, home, school, and community (12). In turn, these environments are influenced in the United States by federal, state, and local policies that ideally contribute to ensuring safety and protection from conditions that undermine youths' physical and mental health (3, 7, 8). A life-course perspective points to the importance of these years as a critical developmental stage that impacts both current and adult health status. With the growing awareness that noncommunicable conditions, such as obesity and diabetes, heart disease, and cancers, are impacting adult health, adolescence is being increasingly recognized as an important point of policy and programmatic intervention, as many of these behaviors emerge before adulthood (49, 69).

Because many of these conditions have behavioral components, policies that aim to promote positive and lessen damaging behaviors are key in the development of more effective strategies, interventions, and investments (7). Additional themes include the social and economic determinants of health and health disparities because factors such as poverty, a lack of viable opportunities, and poor schools have been found to affect a broad array of health risks, such as substance use, violence, and injuries for young people (48, 56).

This review draws on these perspectives to discuss the multifaceted issues that different stakeholders, including policy makers, researchers, providers, youth, families, and advocates, need to consider as they develop policies within a complex policy environment. It also presents a framework for assessing how policies directed at distal factors (those furthest away) and proximal factors (those closest) to the health behavior change outcomes. Monitoring and assessing whether policies that were mandated were adequately funded and implemented at the programmatic level is also an important step before studying the potential impacts of policies. A specific example, teen child-bearing, is used to illustrate how state policy factors could be analyzed and to present guidelines for future policy analysis.

## WHY ADOLESCENTS?

Although adolescence is a time of positive physical, social, psychological, and cognitive growth, it is also a time of tremendous experimentation that has lifelong health consequences, including the adoption of behaviors that place youth at risk: tobacco use, alcohol and substance use, sexual activity, and poor nutrition (54, 58, 62). With increasing recognition of the life-course impacts of these behaviors, adolescence becomes an important period for health promotion, prevention, and intervention (50). Adolescents represent a relatively small proportion of the US population (14%) (66); however, they often need to compete for limited resources with older, homogeneous, and politically powerful segments of society (63), compelling policy makers to carefully consider the evidence about what works and what does not.

## Adolescent Subgroups?

Among US adolescents, policy-relevant differences have been documented across developmental age groups and social and economic subgroups. Developmental differences across age subgroups are marked; for example, adolescents ages 10 to 14 compared to 15- to 17- or 18- to 19-year-olds have different patterns of health-related and risk-taking behaviors, cognitive maturity, resources, and independence. For instance, individuals who begin smoking as younger adolescents have a higher probability of becoming addicted and being lifelong smokers than those who start smoking

in their late teens (64), suggesting the increased value of prevention and early intervention. Similarly, although all adolescents and adults need regulations to prevent driving while under the influence of alcohol and other substances, implementation of graduated driving and zero alcohol tolerance laws recognize the unique aspects of adolescent development, with younger drivers facing far greater restrictions (54).

Second, dramatic differences exist in health status and risk-taking behaviors across gender, race/ethnicity, geographic, and socioeconomic subgroups of adolescents, given the structures of opportunities available as young people grow up (1, 31, 51). Research finds that low-income youth are more likely to engage in unhealthy behaviors, regardless of ethnic/racial origin (5). Factors related to disparities also include inequities in access to health care, healthy foods, and safe community settings (5, 15).

### **Shaping Policy Options that Respond to Adolescents' Unique Needs**

Determinants of adolescent health are shaped less by current health care than by a nation's investments in children and adolescents, the level of income inequality among demographic subgroups, and educational opportunities, which in turn impact social mobility (68). These upstream investments are imperative both because of the intrinsic importance of health during adolescence and because health behaviors in adolescence shape health during adulthood (15, 17). Thus, safe and supportive families, peers, schools, and community institutions are instrumental in shaping adolescents' life trajectories (13, 67).

### **Policy Focus on Promotion, Prevention, and Intervention**

Policies at the individual, family, school, and community levels could help offset disparities such as poverty (9, 29). Policies aimed at increasing the number of US adolescents who have health insurance coverage, for example, can enhance prevention, treatment, or amelioration of a variety of health issues (2, 24, 25). Uninsured children and adolescents are six times less likely to receive needed care and three times more likely to use expensive emergency department care than their insured counterparts (2, 40). Thus, policy efforts to improve effective care by increasing access to health insurance, requiring better care coordination, and family-centered care, for example, through the Affordable Care Act of 2010 (ACA), could result in higher-quality care for children and adolescents, while simultaneously reducing disparities (24, 25).

Data that monitor whether adolescents and their families successfully enroll in the insurance programs, receive the benefit packages that they are supposed to receive, and access the types and content of care they need, as well as health outcomes, are needed to determine the ACA's success (25, 40).

### **Maximizing the Role of Policy**

Policy decisions that affect the options available for young people, their behavioral decisions, and their overall environment (26, 33) exist not only in the formal federal and state laws, regulations, and funding for a specific array of clinic-based guidelines developed by professional organizations, such as the Agency for Healthcare Research and Quality and the Centers for Disease Control and Prevention (CDC), but also in the informal decisions made by providers, program managers, and institutions in their interpretation and implementation of formal policy.

Although federal policies may drive or fund state action, there are often gaps in the length of time that it takes before federal policies are fully adopted by states. For example, it took over

20 years before federal policies establishing the legal ceiling for alcohol consumption were adopted by all states. At other times, for example, the Supreme Court has ruled against federal mandates, as reflected in their recent decision to enable states to opt out of requiring expanded Medicaid coverage under the ACA (25), impacting adolescents living in nearly half of the country. Even when similar policies are adopted at both the federal and state levels, policy implementation across and within states may shape their success. Also, monitoring implementation of a formal policy requires system capacity to track whether the intent of the law has been adequately fulfilled (6, 33). Furthermore, unfunded or underfunded mandates severely compromise policy success, and term limits implemented in many states preclude the types of institutional memory that would inform policy actions aimed at ameliorating long-standing health problems (10). Another challenge for policy makers is the potential for one set of policies aimed at adults to have unintended consequences for adolescents, as reflected in recent medical marijuana policies. Decriminalization could, if poorly regulated and enforced, increase access to illicit marijuana and drive down its price, thereby leading to increased consumption and problems among young people, inadvertently “sending the wrong message” to young people about the drug’s risks (4, 22, 32, 70).

### The Intertwined Roles of Federal and State Policy

Many health programs are partially or largely federally funded, including Medicaid and the Children’s Health Insurance Program, and follow federal rules, whereas other policies are set at the state level, or even at the city or county level. For example, states have sole authority over graduated drivers’ licenses and confidentiality laws affecting adolescents. This contributes to variability across, and often within, states in features such as income eligibility and benefits.

The interrelationship between the federal and state governments is also reflected in several funding partnerships between federal and state agencies, including the US Health Resources and Services Administration (HRSA), the CDC, and the Substance Abuse and Mental Health Services Administration, all of which support a variety of cooperative agreements with states (e.g., the Title V Maternal and Child Health Block Grant Program within HRSA). The mental health block grants fund states in developing community-based services and supports for children and youth with serious emotional disturbances. For these and other federal agencies, responsiveness to local and state needs, as well as state-level priorities and allocation of fiscal and other resources, inherently contributes to wide variability, although this variability can be used by researchers to assess the implications of such policy variation across states and over time (26).

### How Is Policy Shaped?

Federal and state policy makers are motivated to develop effective policies but often face uneven evidence because there is limited data or research to inform their present decisions. Shaping policy occurs through an American political process, which is deeply rooted in firmly held beliefs, including incremental policy formation, pluralism, civil rights, and federalism (8). An understanding of how these tenets work in the policy arena highlights what policy options are perceived to exist and where policy makers, advocates, and other stakeholders can come together to support improved health policy formation.

**Incrementalism.** Traditionally, prior policy represents the basis for new policy decisions and directions, but building repeatedly on an outdated platform can lead to piecemeal services when new eligibility, geographic, financing, or health requirements are established, resulting in a

patchwork of regulations and funding levels (55). This poses challenges for providers, officials, families, and adolescents in need of services. Also, there are often insufficient resources for full policy and program implementation, resulting in many adolescents being left out of programs.

**Pluralism.** A widely shared American public policy philosophy is that public policies are best shaped through public debate among multiple interest groups. Increasingly, a variety of social forces, including social and other media, term limits, the high costs of political campaigns, the increasing availability of funding spent by special interest groups, and the emergence of newly mobilized “grassroots” groups, have contributed to a complex policy environment (8).

Adolescents are often marginalized in these debates; however, their engagement in risk-taking behaviors, such as sex and substance use, often places them in the center of public discussion. Although comprehensive, integrated approaches to sexuality education and reproductive health services have been found by researchers to benefit adolescents, interest groups, such as those focused on abstinence-only education, often dominate the debate (34, 38, 39). Interest groups supportive of more comprehensive policies related to adolescent reproductive health have also spent considerable resources and engaged in advocacy efforts, resulting in increasing, but uneven, access to reproductive health services, including the distribution of condoms and emergency contraception (6, 11).

**Civil rights and civil liberties.** Civil rights, defined as citizenship rights, and civil liberties, defined as freedom of speech, are among core values mirrored in policy formulation, such that the rights of opposing groups have to be weighed against one another (8). The rights of adolescents to access confidential care for mental health, substance use, and reproductive health are often at odds with those who believe that adolescents do not have such rights. Although minors are encouraged to engage parents or other supportive adults, in the end, policy makers have long recognized that there are segments of the population where such engagement is likely not to occur, placing these adolescents at a clear disadvantage, not only to themselves, but to others (21, 23).

As a result of policy makers’ ambivalence about young people’s civil rights and liberties, protection of adolescent confidentiality reflects a patchwork of federal, state, and case law (23). All states have minor consent statutes providing specific protections in areas such as sexually transmitted disease testing and diagnosis, pregnancy testing, contraceptives, and abortion. However, specific confidentiality provisions and services vary nationally, with the courts sometimes ruling on the part of parental versus adolescent privacy rights (21, 23).

**Federalism and devolution.** US policy is shaped by the power-sharing relationship between the states and the federal government, often a source of tension. With the formation of Medicaid and Medicare, the federal government became increasingly involved in health care, providing direct financial support to states and localities for health, education, and social service programs (52, 55, 61). However, there have also been major efforts to reduce dependence upon the federal government, reorganizing funding into more “flexible” block grants, often with fewer resources. The trend toward devolution lessened the role of the federal government in administering funds and curtailed federal mandates in an effort to provide states with greater flexibility in implementing federally funded programs (55). As a result, there is wide variability among states in the interpretation of federal mandates and the implementation of policies, which impacts adolescents’ access to services based on where adolescents live. With demographic shifts, including increasing numbers of adolescents living in the South, West, and Southwest, where states have fewer resources, it is likely that advancing a health agenda for adolescents will continue to be uneven (65).

The effect of policies on adolescents may be difficult to discern, as programs serving this population are split across levels of government and within each level, as well as across departments and agencies. An analysis describing US executive branch agencies with a role in adolescent health listed 84 different departments, institutes, centers, offices, and divisions with programs serving adolescents (53). As adolescent health issues are also impacted by educational and social service components, it is likely that this number of agencies could be even greater (62).

## Adolescents' Policy Needs

Policy makers might like to identify a “silver bullet” policy with large and broad effects, but research has found that complex factors shape health behavior, and developing effective strategies is not simple. Policy makers face the challenge of creating universal policies that respond to the broad needs of many, while also attempting to create tailored policies for marginalized youth, including homeless, incarcerated, and undocumented youth (30, 42, 48).

Thus, these strategies require a combination of policies aimed at different levers: primary and secondary prevention, proximal and distal factors, contributors to both physical and mental health, common antecedents to health problems, and the multilevel and multisectoral environments in which adolescents live. For example, unintended pregnancy, childbearing, and sexually transmitted infections—often interrelated outcomes—are impacted by policies directed at distal factors, such as health insurance that shapes access to care, as well as through proximal influences at the level of the individual, peers, and the family, such as policies regarding adolescents' ready access to confidential services (16, 18, 20, 37).

## Interrelated and Overlapping Policy Issues

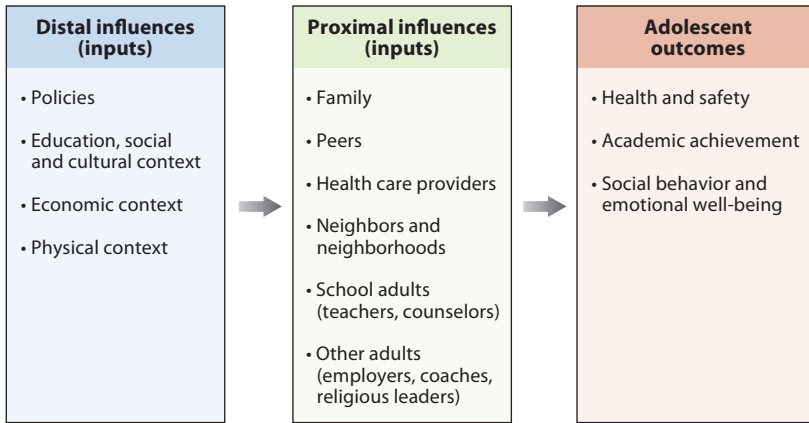
Policy makers frequently focus on one particular issue, for example, reducing alcohol use, although health-compromising behaviors are often interrelated and varied risk-taking behaviors have similar underlying causes (19). Moreover, research indicates that positive development encompasses multiple domains, including social behavior, emotional development, educational and cognitive achievement, as well as health and safety (43); positive development in one domain is regularly found to contribute to positive development in other domains, including health and safety (45).

## Decisions Faced by Policy Makers

Policy makers face a variety of decisions that can be informed by research.

**What to target?** Which aspect of the adolescent and young adult environment (individual, family, school, workplace, community) should policy directives target—factors that are proximal to an issue or more distal? Which is likely to have the largest effect? Which is most cost-effective? For example, regarding obesity, policies eliminating soft drinks in vending machines can more directly affect the students' choices than eliminating subsidies for corn farmers, although both policies could help.

**Select primary or secondary prevention programs?** Primary prevention policies aimed at, for example, substance use focus on reducing the number of adolescents who experiment with drugs. Secondary prevention programs can provide counseling for youth, who may be substance users, and tertiary prevention treatment can serve those who are addicted. What policies or resources are best targeted at each type of prevention?



**Figure 1**

Conceptual framework of distal and proximal influences on adolescent outcomes. Both distal and proximal positive influences favorably affect adolescent outcomes. Framework developed by Child Trends.

**What evidence exists to shape policies?** US policy makers are increasingly pursuing policy options with the strongest available scientific evidence. Evidence from formal program evaluations, ranging from randomized clinical trials to observational studies, has become increasingly important to policy makers who focus funds on programs that have been evaluated and found to work (44). Experimental manipulation of policies (as opposed to programs) at the state level is quite rare, although natural experiments can provide important insights into the implications of policy change (60). For example, research suggests that policies seeking to reduce teen pregnancy that are directed to a broad array of points of intervention (comprehensive sex education, family planning services, and out-of-school-time youth development approaches) are more likely to be successful than those narrowly focused on one entry point (20, 34, 38).

### A Conceptual Framework for Assessing the Contribution of Policies to Health Outcomes

To guide research on the efficacy of policies related to health, a framework is needed to suggest hypotheses and develop analytic models. Analyses of individual policies, as well as the potential interactions across different policies at both the distal and proximal levels, can provide policy makers with valuable evidence regarding the effectiveness of plans they implement (see **Figure 1**).

**Distal factors.** The distal factors include (a) the economic context; (b) the educational, social, and cultural context; and (c) the physical context, described as follows:

- Policies aimed at improving the economic context in which adolescents and young adults live and that shape their social and cultural context can affect the options they have available. Greater economic adequacy, for example, improves the ability to afford healthy foods, a safe neighborhood, adequate housing, and enriched educational experiences.
- Educational and other social policies also affect youth’s opportunities. For example, funding affects the educational resources and materials available. Policies also affect knowledge, attitudes, practices, and cultural norms regarding behavior (for example, policies that require education about mental health, diet, alcohol, and drugs).



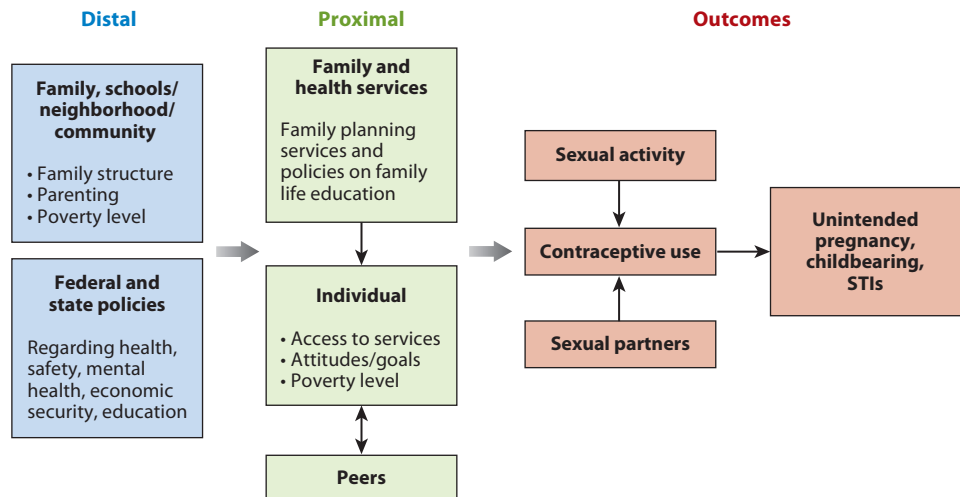
- Crime, pollution, and a lack of transportation and recreation can affect levels of stress and well-being. Although such factors are difficult to change and may only have a diluted effect on outcomes for youth, small effects may cumulate to affect multiple outcomes at varied ages, which may warrant a research investment (41).

**Proximal factors: family, peer, and other community contexts.** Varied policies aimed at affecting proximal influences can have a direct impact upon health behaviors. For example, tobacco tax policies have been found to discourage cigarette purchases, helping to reduce the incidence of adolescent and also adult smoking and thus lessen adolescents' access to family role models who smoke. Similarly, economic and agricultural policies also shape the availability of fresh fruits and vegetables. And a lack of funding for after-school sports programs and for programs to mitigate economic instability along with high levels of nonmarital childbearing in the surrounding community may reduce the number of positive role models (62).

In addition, public and private insurance coverage, Medicaid, and the Children's Health Insurance Program directly influence access to factors that influence physical and mental health and safety. State confidentiality policies impact adolescents' access to care, including contraceptive services, substance abuse counseling, and mental health services. Even though assurance of confidentiality has been found to influence the level of adolescents' personal disclosure and clinic continuity (27), recent research documents the lack of opportunities by many adolescents who needed time alone with their provider (35). Moreover, parity for mental health services is often limited (14), and treatment for drug addiction and other substance use problems varies according to policies and availability of services (55).

### Example of Applying a Policy Framework: Teen Childbearing Analysis

Adapting the framework depicted in **Figure 1** to the issue of adolescent childbearing, **Figure 2**, provides an approach to analyzing distal and proximal factors and the relationship between different



**Figure 2**

Conceptual model suggesting how policies might be linked to adolescent pregnancy and sexually transmitted infections (STIs), including HIV/AIDS. Framework developed by Child Trends.

types of policies and health outcomes (43, 67). A series of steps for conducting state-level analyses is suggested:

- 1. Review relevant research.** A first step is to conduct or locate a comprehensive review of relevant research on the factors contributing to the outcome, e.g., adolescent pregnancy, to suggest the pathways by which policy does or could affect adolescent reproductive behavior. Research has documented the effects of a wide range of policies pertaining to both the antecedents, such as poverty, family context, and school failure, and the more direct effects, such as access to confidential reproductive health care, on adolescent childbearing (47, 59).
- 2. Review relevant policies and assess concordance with research findings.** What are the state laws governing reproductive health care and contraceptive access, for example, Medicaid and prenatal care services; the Women, Infants, and Children program; food stamps; and child care? Also, educational funding at the state level may affect academic failure, a precursor of adolescent childbearing (16, 67).
- 3. Identify policy-related data.** Although the determinants of adolescent pregnancy are numerous, the measures of relevant policies tend to be compiled in silos. US birth and pregnancy data at the state level are collected by the National Center for Health Statistics. Employment data are collected by the US Census Bureau. Information on means-tested programs is published by the House of Representatives Ways and Means Committee. The US Department of Education compiles data on state educational practices and funding, while the federal Health Resources and Services Administration has information on state health care policies.
- 4. Analyze the data.** The options for analysis are discussed below.

## ANALYZING/ASSESSING STATE-LEVEL POLICIES

The following sections describe how state-level data and analyses are useful.

### Descriptive Analyses

Descriptive data allow policy makers to compare and contrast the policies that exist in varied states. Although causal conclusions cannot be drawn, these results can be associated with varied mental, social, and physical health, as well as educational outcomes achieved in different states and can suggest differences that policies may have made in contributing to the outcomes achieved.

Both process and outcome data can be used to analyze how the introduction of different policies may have contributed to changes over time. For example, if policy makers allocate additional resources for adolescent family planning services, then pre- and postimplementation policy analyses can be conducted to determine the effectiveness of these expenditures: Is there an increase in the number of adolescents being served? Is there a decrease in the number of teenagers giving birth? Is there variation in program users between different ethnic/racial groups within particular areas of the state or across states?

### Multivariate and Longitudinal Analyses

Analyses of state-level data to disentangle whether and how state policies contribute to variations in adolescent outcomes are also valuable. For example, analyses might explore whether there is a relationship between funding for substance abuse prevention education and a reduced incidence of substance use among teenagers over time, net of controls for social and economic differences across states. Alternatively, data needed to test the researchers' hypotheses can be added into a microdata file (data for individual adolescents) according to the young person's state of residence,

or models that include variables measured at the state level can be assessed in correlational analyses or in multivariate models. Ideally, to control for confounding factors, state contextual data, such as measures of unemployment and poverty, should also be gathered. Additionally, there is a need to assess the fit between the policy and the available evidence. Existing policies may provide students with the knowledge and skills they need to delay early childbearing, but the policy may be directed to students in the senior high school grades when data indicate that the onset of sexual behavior occurs earlier.

Although causal conclusions cannot be drawn, having this information over time and across a number of states can help policy makers identify approaches that are associated with positive or negative trends. Examining why certain ethnic and racial groups thrive in one state, compared to others with a similar demographic profile who do not, provides insights into policies that could contribute to diminishing disparities.

Several complementary tools are useful for analyzing the implications of policies at the state level and can be an important starting point for future analyses. The CDC has established the Youth Risk Behavior Surveillance System (YRBSS) (which gathers information in school settings) and the Behavioral Risk Factor Surveillance System (BRFSS) (which gathers information through household telephone interviews) to document state-level, population patterns in personal health behaviors that have been shown to play a major role in premature morbidity and mortality ([http://www.cdc.gov/brfss/about/about\\_brfss.htm](http://www.cdc.gov/brfss/about/about_brfss.htm)).

Another tool, developed by the University of California, San Francisco's National Adolescent and Young Adult Health Information and Innovation Center (NAHIC), Profiles of Adolescent and Young Adult Health (<http://nahic.ucsf.edu/resources/resources-tools/>) presents national and state profiles of key measures of adolescent and young adult health, reflecting the 21 critical health objectives for adolescents and young adults, derived from Healthy People 2010. National and state adolescent data are summarized in a series of tables and text by overall gender and race/ethnicity across each of the health issues, accompanied by information on the differences and similarities at the state and national level. It enables users to assess recent progress in adolescent health by presenting data and narrative summaries highlighting the baseline years of 1998–1999 and the final 2007–2009 years for each of the objectives. Where possible, patterns among groups within a state are compared to national patterns, although information for each state varies and is not always available for every objective.

Child Trends' State Child Welfare Policy Database (<http://www.childwelfarepolicy.org/>) includes information on state policies across recent decades, as well as demographic, social, and economic contextual factors. It is available for analysis, possibly using the proposed framework in this paper. These data allow researchers to describe the array of approaches across states and to examine how state policies are associated with patterns and trends for a number of adolescent and young adult health outcomes. **Table 1** summarizes a variety of additional federal and state policy sources and their impact upon adolescent health outcomes.

## **FUTURE DIRECTIONS: OVERCOMING CHALLENGES IN CONDUCTING POLICY RESEARCH AND ANALYSES OF STATE-LEVEL DATA**

### **Availability of State-Level Data**

As noted above, information on relevant state policies, outcomes, and contextual factors is rarely available in any single source. State-level data are compiled by a variety of organizations, and thus, the way questions were asked, as well as the organizations or individuals who collected, coded, and analyzed the data, varies.

**Table 1 Key organizations with state-level data on policies and services, by topics relevant to adolescent health**

Organization	Website	What they do
<b>General/contextual</b>		
Annie E. Casey Foundation: Kids Count Data Center	<a href="http://datacenter.kidscount.org/">http://datacenter.kidscount.org/</a>	This foundation provides data by state and across states on hundreds of measures of child and adolescent well-being. It allows users to search by topic or location and create profiles, maps, graphs, rankings, or raw data. It also includes city- and community-level data.
Centers for Disease Control and Prevention (CDC): School Health Policies and Practices Study (SHPPS)	<a href="http://www.cdc.gov/healthyyouth/shpps/index.htm">http://www.cdc.gov/healthyyouth/shpps/index.htm</a>	This national survey is periodically conducted to assess school health policies and practices at the state, district, school, and classroom levels. It includes state-level summaries, state report cards, fact sheets, and policy trends.
CDC, National Center for Health Statistics, VitalStats	<a href="http://www.cdc.gov/nchs/vitalstats.htm">http://www.cdc.gov/nchs/vitalstats.htm</a>	This database allows users to access and create tables, charts, and maps for over 100 different birth variables using a tool called VitalStats. It aims to make all vital statistic data, such as birth weight, maternal characteristics, and prenatal care, available through the site. In addition, it has access to vital statistics reports, such as the National Vital Statistics Report, which report state-level data.
National Center for Children in Poverty	<a href="http://www.nccp.org/">http://www.nccp.org/</a>	This public policy center is dedicated to promoting the economic security, health, and well-being of America's low-income families and children. The center uses research to inform policy makers and practitioners of family-oriented solutions and public resources available from states and the federal government to promote positive outcomes for children and families.
National Bureau of Economic Research (NBER), Health Economics Program	<a href="http://www.nber.org/programs/he/he.html">http://www.nber.org/programs/he/he.html</a>	The NBER's Health Economics Program emphasizes studies on the economics of substance use, the economics of obesity, economic models of the determinants of health, and the determinants of the cost of medical care.
Kaiser Family Foundation, State Health Facts	<a href="http://kff.org/statedata/">http://kff.org/statedata/</a>	Kaiser's portal provides state-by-state information on health policies, especially regarding HIV/AIDS. It also allows comparisons of health policies, costs, children's health, health coverage, and more between the states. Each state's page includes links to the legislative website for that state.
Data Resource Center for Child and Adolescent Health	<a href="http://childhealthdata.org/content/Default.aspx">http://childhealthdata.org/content/Default.aspx</a>	This website allows one to access and analyze data from the National Survey of Children's Health (NSCH) and the National Survey of Children with Special Health Care Needs (CSHCN). Both provide information on each of the 50 states and the District of Columbia. The NSCH provides a broader set of health and well-being measures, whereas the CSHCN focuses more on families with children who have special health care needs.
CDC, Youth Risk Behavior Surveillance System (YRBSS)	<a href="http://www.cdc.gov/HealthyYouth/yrbs/index.htm">http://www.cdc.gov/HealthyYouth/yrbs/index.htm</a>	The Youth Risk Behavior Surveillance System (YRBSS) monitors priority health-risk behaviors and the prevalence of obesity and asthma among youth and young adults. The YRBSS includes a national school-based survey conducted by the CDC and state, territorial, tribal, and local surveys conducted by various education and health agencies and tribal governments.

(Continued)

**Table 1 (Continued)**

Organization	Website	What they do
<b>Unintentional injury</b>		
American Academy of Pediatrics (AAP)	<a href="http://www.aap.org/advocacy/statelegrpt.pdf">http://www.aap.org/advocacy/statelegrpt.pdf</a>	The AAP publishes a State Legislation Report outlining state activity on many issues related to children's health and safety.
CDC, School Health Profiles	<a href="http://www.cdc.gov/HealthyYouth/profiles/index.htm">http://www.cdc.gov/HealthyYouth/profiles/index.htm</a>	This project is sponsored by a branch of the CDC and includes a survey conducted biennially by state and local bodies. The survey monitors these agencies at the middle school and high school levels regarding tobacco use prevention, unintentional injuries and violence, physical activity and food service, involvement in school health programs, and school health education.
Mothers Against Drunk Driving (MADD)	<a href="http://www.madd.org/drunken-driving/state-stats/">http://www.madd.org/drunken-driving/state-stats/</a>	MADD provides information on drunk driving and licensing laws by states as well as state policies aiming to reduce motor vehicle injuries and deaths.
National Conference of State Legislatures, State Traffic Safety Legislation	<a href="http://www.ncsl.org/research/transportation/state-traffic-safety-legislation-database.aspx">http://www.ncsl.org/research/transportation/state-traffic-safety-legislation-database.aspx</a>	This traffic safety legislation database permits searches for laws by state or topic.
CDC, Web-Based Injury Statistics Query and Reporting System (WISQARS)	<a href="http://www.cdc.gov/injury/wisqars/index.html">http://www.cdc.gov/injury/wisqars/index.html</a>	WISQARS is an interactive database system that provides customized reports of injury-related data from the National Center of Health Statistics (NCHS) and the violent death data from the National Center for Injury Prevention and Control's National Violent Death Reporting System.
<b>Violence</b>		
CDC, School Health Policies and Practices Study (SHPPS)	<a href="http://www.cdc.gov/healthyyouth/shpps/index.htm">http://www.cdc.gov/healthyyouth/shpps/index.htm</a>	The School Health Policies and Practices Study (SHPPS) is a national survey periodically conducted to assess school health policies and practices at the state, district, school, and classroom levels. SHPPS was most recently conducted in 2006. State- and district-level data collection for the 2012 study is underway. School- and classroom-level data collection will take place in 2014.
CDC, Web-Based Injury Statistics Query and Reporting System (WISQARS)	<a href="http://www.cdc.gov/injury/wisqars/index.html">http://www.cdc.gov/injury/wisqars/index.html</a>	WISQARS is an interactive database system that provides customized reports of injury-related data from the National Center of Health Statistics (NCHS) and the violent death data from the National Center for Injury Prevention and Control's National Violent Death Reporting System.
Brady Campaign to Prevent Gun Violence	<a href="http://www.bradycampaign.org/">http://www.bradycampaign.org/</a>	This advocacy organization seeks to prevent gun violence and promote better gun policies, tracks federal and state legislation on gun laws, and is not adolescent specific. But researchers can sort policies to find the adolescent-specific ones.
<b>Substance abuse and mental health</b>		
Suicide Prevention Resource Center	<a href="http://www.sprc.org/states">http://www.sprc.org/states</a>	This center provides state-by-state information about suicide prevention efforts and resources. It includes links to legislation on this issue and external resources by state.
American Academy of Child and Adolescent Psychiatry	<a href="http://capwiz.com/aacap/home/">http://capwiz.com/aacap/home/</a>	The academy keeps track of state and federal legislation regarding mental health.

(Continued)

**Table 1 (Continued)**

Organization	Website	What they do
Bazelon Center for Mental Health Law	<a href="http://bazelon.org/Where-We-Stand/Success-for-All-Children/Mental-Health-Services-for-Children/Mental-Health-Services-for-Children-Legislation.aspx">http://bazelon.org/Where-We-Stand/Success-for-All-Children/Mental-Health-Services-for-Children/Mental-Health-Services-for-Children-Legislation.aspx</a>	This center provided alerts and updates regarding mental health legislation but has not been updated since 2005.
Alcohol Policy Information System	<a href="http://alcoholpolicy.niaaa.nih.gov/APIS_Policy_Topics.html">http://alcoholpolicy.niaaa.nih.gov/APIS_Policy_Topics.html</a>	This site provides information on policy topics and state policies related to underage drinking.
CDC, School Health Policies and Practices Study (SHPPS)	<a href="http://www.cdc.gov/healthyyouth/shpps/index.htm">http://www.cdc.gov/healthyyouth/shpps/index.htm</a>	The School Health Policies and Practices Study (SHPPS) is a national survey periodically conducted to assess school health policies and practices at the state, district, school, and classroom levels. SHPPS was most recently conducted in 2006. State- and district-level data collection for the 2012 study is underway. School- and classroom-level data collection will take place in 2014.
The National Center on Addiction and Substance Abuse (CASA) at Columbia University	<a href="http://www.casacolumbia.org/templates/Home.aspx?articleid=287&amp;zoneid=32">http://www.casacolumbia.org/templates/Home.aspx?articleid=287&amp;zoneid=32</a>	CASA's research includes information on changes in state substance abuse spending patterns since 1998. It also helps design and evaluate substance abuse prevention programs. CASA studies and attempts to combat all substance abuse by converting its research findings and policy recommendations into large-scale, institutional change.
<b>Reproductive health</b>		
Kaiser Family Foundation, State Health Facts	<a href="http://kff.org/statedata/">http://kff.org/statedata/</a>	Kaiser's portal provides state-by-state information on health policies, especially regarding HIV/AIDS. It also allows one to compare health policies between the states. Each state's page includes links to the legislative website for that state.
CDC, School Health Profiles	<a href="http://www.cdc.gov/HealthyYouth/profiles/index.htm">http://www.cdc.gov/HealthyYouth/profiles/index.htm</a>	This project is sponsored by a branch of the CDC and includes a survey conducted biennially by state and local bodies. The survey monitors these agencies at the middle school and high school levels regarding tobacco use prevention, unintentional injuries and violence, physical activity and food service, involvement in school health programs, and school health education.
Guttmacher Institute, Resources, Adolescents	<a href="http://www.guttmacher.org/sections/adolescents.php">http://www.guttmacher.org/sections/adolescents.php</a>	The institute has an entire web section on adolescent reproductive health and provides information on HIV/AIDS, teen's reproductive rights, sex education, etc.
Guttmacher Institute, State Center	<a href="http://www.guttmacher.org/statecenter/updates/index.html">http://www.guttmacher.org/statecenter/updates/index.html</a>	The institute provides monthly updates on state legislation regarding reproductive health in general and has specific information on adolescents.
Sexuality Information and Education Council of the United States (SIECUS)	<a href="http://www.siecus.org/">http://www.siecus.org/</a>	This organization promotes sex education and access to sexual health services and also provides state profiles of sex education programs and nationwide policy updates.
Center for Law and Social Policy (CLASP)	<a href="http://www.clasp.org/">http://www.clasp.org/</a>	CLASP conducts research and policy analysis at the federal and state levels and provides state-by-state policy data. The topics they focus on are childbearing and pregnancy prevention among teens.

(Continued)

Table 1 (Continued)

Organization	Website	What they do
CDC, School Health Policies and Practices Study (SHPPS)	<a href="http://www.cdc.gov/healthyouth/shpps/index.htm">http://www.cdc.gov/healthyouth/shpps/index.htm</a>	The School Health Policies and Practices Study (SHPPS) is a national survey periodically conducted to assess school health policies and practices at the state, district, school, and classroom levels. SHPPS was most recently conducted in 2006. State- and district-level data collection for the 2012 study is underway. School- and classroom-level data collection will take place in 2014.
The National Campaign to Prevent Teen and Unplanned Pregnancy	<a href="http://www.thenationalcampaign.org/sla/resources.aspx">http://www.thenationalcampaign.org/sla/resources.aspx</a>	This national campaign provides information on state- and community-level resources and legislation attempting to prevent teen pregnancy. It also examines challenges to systems and families as well as the best practices in teen pregnancy prevention.
<b>Chronic diseases</b>		
CDC, School Health Profiles	<a href="http://www.cdc.gov/HealthyYouth/profiles/index.htm">http://www.cdc.gov/HealthyYouth/profiles/index.htm</a>	This project is sponsored by a branch of the CDC and includes a survey conducted biennially by state and local bodies. The survey monitors these agencies at the middle school and high school levels regarding tobacco use prevention, unintentional injuries and violence, physical activity and food service, involvement in school health programs, and school health education.
National Conference of State Legislatures, State Traffic Safety Legislation	<a href="http://www.ncsl.org/research/transportation/state-traffic-safety-legislation-database.aspx">http://www.ncsl.org/research/transportation/state-traffic-safety-legislation-database.aspx</a>	This health promotion database tracks legislation by state on issues such as obesity, tobacco use, physical activity, etc.
Center for Health and Health Care in Schools	<a href="http://www.healthinschools.org/">http://www.healthinschools.org/</a>	This is a nonpartisan resource center that examines school health programs and health care services. It monitors and reports on legislation at the local, state, and federal levels. The information it provides can be used to examine the reproductive health and chronic disease targets, among other health conditions.
American Academy of Pediatrics (AAP)	<a href="http://www.aap.org/advocacy/statelegprpt.pdf">http://www.aap.org/advocacy/statelegprpt.pdf</a>	The AAP publishes a State Legislation Report outlining state activity on many issues related to children's health and safety.

Government-sponsored data collection, such as the number of births to teenage mothers, is consistently captured at the state level. In contrast, the number of sexually active adolescents may be impacted by biases inherent in the setting in which the data are collected, as well as how the data are reported (28). For example, although the majority of adolescents attend school and may be able to answer CDC's YRBSS, a large proportion of at-risk youth may not attend school, resulting in the underrepresentation of key populations at risk of early childbearing. For other adolescents, the school context in which they answer the survey may affect their sense of safety in disclosing information, even if their teachers assure them of confidentiality. Moreover, not all states have obtained data for representative samples or have obtained information on all topics that comprise the YRBSS.

Other sources of state-level data also have strengths and limitations. Examples include the following:

- The Monitoring the Future Study (<http://www.monitoringthefuture.org/>) tracks the prevalence of trends in smoking and in alcohol and drug use among students, but it does not cover out-of-school youth.



- The National Survey of Children’s Health (<http://www.childhealthdata.org/learn/NSCH>) provides rich state-specific data reported by a parent or parent figure, but the perspective of the adolescent is not included.
- The National Survey of Family Growth (<http://www.cdc.gov/nchs/nsfg.htm>) collects national-level data on childbearing, contraception, and related aspects of maternal and child health from adolescents and women, but it does not provide state-level estimates.

Ideally, using several sources of data helps to assess whether trend data are consistent in measuring health status. When only national data are available, states can create a simulated state profile by comparing their state’s demographic profile to that of national trends for comparable populations. State-level policy data are also crucial. Sources include the School Health Policies and Practices Study (SHPPS), conducted by CDC, and the American Academy of Pediatrics State Legislation Report, which describes state efforts related to the safety and health of children.

### **Caveats Regarding Policy Implementation**

As noted above, if policies are poorly funded, the target population may never be reached, and the likelihood of success is diminished. Alternatively, a measure, for example, of the number of total contraceptive visits to a health care provider may represent an undercount if it does not adequately reflect all sources of data that capture youth receiving contraceptive services, including those going to pharmacies to purchase condoms.

### **Contextual Information and Subgroup Data**

Aggregated information may not uncover disparate policy implementation even within one community or significant variability across the state in its experience with policy implementation. To more fully understand patterns and trends at the state level, it is valuable to conduct analyses for demographic, social, and economic subgroups. For example, the rate of births among teens varies substantially by race and ethnicity. Accordingly, a state with a higher proportion of Hispanic teens is likely to have a higher teen birth rate because this group has the highest rate of childbearing across the major ethnic and racial groups (36).

Subgroup analyses across states are needed for assessing how subgroup differences may interact with state policies, e.g., the level of funding for comprehensive family life and contraceptive practices may vary across the states, as well as across different racial/ethnic groups within specific states, resulting in different outcomes. The quality of implementation and fidelity to the originally tested intervention may also vary, even if the study evidence is the result of a randomized control study.

### **Uses of State-Level Data**

Causal attributions between policy and outcomes are only appropriate for random-assignment, experimental studies (60). As it is not possible to randomly assign state policies, analyses of the implications of varied policies can only be quasi-experimental. With necessary caveats, though, analyses can compare health outcomes across states, given variations and timelines in implementation, creating naturally occurring learning laboratories, and the data can be used in a variety of ways. Descriptive analyses are of considerable interest to state policy makers, who are interested in their own state’s numbers, rates, and rankings, as well as how and what other nearby or “parallel” states are doing. Descriptive information can identify target population areas, help shape new and innovative approaches, and point to significant gaps in relevant policies.



A variant on the cross-state comparisons approach would involve estimating difference-of-difference models. These models compare the change in one state with a change in another state, as a function of policy variables, and control for social and economic factors. For example, analyses could examine whether changes over time in teen pregnancy and birth rates at the state level are associated with particular policies or services provided by some states. Similarly, growth curve models could examine trajectories over time as a function of varied policy and contextual factors, and cluster analyses can assess the implications of several policies implemented jointly.

Another use of state-level data involves microdatabases that have geographic identifiers for respondents. With state identifiers, state-level information on policy and contextual factors could be attached to an individual's data file and used in multivariate analyses, including individual characteristics, family backgrounds, community contexts, and state-level policies (with confidentiality procedures in place) (44).

## SUMMARY AND CONCLUSIONS

The federal government relies upon states to operationalize many federal policies, while providing funds for many of the programs and services that affect adolescent development and well-being. In the past, assessments of the effects of state policies have been in short supply relative to their importance for informing policy. More recently, policy analyses on state policies and teen birth rates (46), as well as policies pertaining to HIV and obesity prevention, have been used to examine the association between policies and state-level outcomes. Policy makers need to better understand which policies appear to have the intended effects, which have no effects and thus may represent a waste of money and resources, and which policies are counterproductive or even harmful. To improve the overall health of adolescents, research-based policies are needed that assess distal and proximal policies that result in positive outcomes for youth. New analyses on the effects of public policies would give policy makers and stakeholders valuable insights to improve health among adolescents.

## DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

## ACKNOWLEDGMENTS

We gratefully acknowledge the helpful comments and review by Dr. Trina Anglin, chief of the Adolescent Health Branch, Maternal and Child Health Bureau, Health Resources and Services Administration; our colleagues, Dr. Charles E. Irwin, Jr., and M. Jane Park at the National Adolescent Health Information and Innovation Center, University of California, San Francisco; and Alison Noji, at Child Trends. Funding support for this review was from the Maternal and Child Health Bureau (primary grant number U45 MC000023-14-00).

## LITERATURE CITED

1. Adams SH, Newacheck PW, Park MJ, Brindis CD, Irwin CE Jr. 2013. Medical home for adolescents: low attainment rates for those with mental health problems and other vulnerable groups. *Acad. Pediatr.* 13(2):113–21
2. Adams SH, Newacheck PW, Park MJ, Brindis CD, Irwin CE Jr. 2007. Health insurance across vulnerable ages: patterns and disparities from adolescence to the early 30s. *Pediatrics* 119(5):e1033–39

3. Austin G, Brindis CD. 2011. Student health is vital to academic results. *Being Well. Learning Well. California Health Students Research Project*. <http://www.childrennow.org/index.php/learn/beingwelllearningwell>
4. Bachman JG, Johnston LD, O'Malley PM. 1998. Explaining recent increases in students' marijuana use: impacts of perceived risks and disapproval, 1976 through 1996. *Am. J. Public Health* 88:887-92
5. Blum RW, Beuhring T, Shew MI, Bearinger LA, Sieving RE, Resnick MD. 2000. The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. *Am. J. Public Health* 90:1979-84
6. Brindis CD. 2006. Understanding policy changes related to teen sexual activity and pregnancy. *Annu. Rev. Public Health* 27:277-95
7. Brindis CD, Morreale M, English A. 2003. The unique health care needs of adolescents: assuring access to care. *Health Insur. Child.: Future Child.* 13(1):117-35
8. Brindis CD, Ott MA. 2002. Adolescents, health policy and the American political process. *J. Adolesc. Health* 30(9):9-16
9. Brindis CD, Hair EC, Cochran S, Cleveland K, Valderrama LT, Park MJ. 2007. Increasing access to program information: a strategy for improving adolescent health. *J. Matern. Child Health* 11(1):27-35
10. Brindis CD, Geierstanger SP, Faxio A. 2009. The role of policy advocacy in assuring comprehensive family life education in California. *Health Educ. Behav.* 36(6):1095-108
11. Brindis CD, Ralph LJ. 2011. Critical junctures: assuring healthy outcomes for adolescents in the new millennium. *Adolesc. Med. State Art. Rev.* 22:335-60
12. Brofenbrenner U. 1979. *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard Univ. Press
13. Brownson RC, Fielding JE, Maylahn CM. 2009. Evidence-based public health: a fundamental concept for public health practice. *Annu. Rev. Public Health* 30:175-201
14. Buckelew S, Yu J, English A, Brindis CD. 2009. Innovations in preventive mental health care services for adolescents. *J. Adolesc. Health* 42(5):519-24
15. Catalano RF, Fagan AA, Gavin LE, Greenberg MT, Irwin CE Jr, et al. 2012. Worldwide application of prevention science in adolescent health. *Lancet* 379:1653-64
16. Cent. Disease Control Prev. 2007. *State-level school health policies and practices: a state-by-state summary from the School Health Policies and Programs Study 2006*. Cent. Disease Control Prev., Atlanta, GA. [http://www.cdc.gov/HealthyYouth/SHPPS/2006/summaries/pdf/State\\_Level\\_Summaries\\_SHPPS2006.pdf](http://www.cdc.gov/HealthyYouth/SHPPS/2006/summaries/pdf/State_Level_Summaries_SHPPS2006.pdf)
17. Child Trends. 2009. *Assessing Development and Well-Being: A "Whole Child" Perspective*. Washington, DC: Child Trends.
18. Cubbin C, Santelli J, Brindis CD, Braveman P. 2005. Neighborhood context and sexual behaviors among adolescents: findings from the National Longitudinal Study of Adolescent Health. *Perspect. Sex. Reprod. Health* 37:125-34
19. Cooper JL, Aratani Y, Knitzer J, Douglas-Hall A, Masi R, et al. 2008. *Unclaimed Children Revisited: The Status of Children's Mental Health Policy in the United States*. New York: Natl. Cent. Child. Poverty
20. Costello C, Henry J, eds. 2003. *Across America: Preventing Teen Pregnancy in California, Georgia and Michigan*. Washington, DC: Natl. Campaign Prev. Teen Pregnancy
21. Donovan P. 1997. The Colorado parental rights amendment: How and why it failed. *Fam. Plan. Perspect.* 29:187-10
22. Eddy M. 2010. *Medical Marijuana: Review and Analysis of Federal and State Policies*. Washington, DC: Congr. Res. Serv.
23. English A, Bass L, Boyle A, Eshragh F. 2010. *State Minor Consent Laws: A Summary*. Chapel Hill, NC: Cent. Adolesc. Law. 3rd ed.
24. English A, Park MJ. 2012. *Access to Health Care for Young Adults: The Affordable Care Act Is Making a Difference*. Chapel Hill, NC/San Francisco: Cent. Adolesc. Health Law/Natl. Adolesc. Young Adult Health Inf. Cent.
25. English A, Park MJ. 2012. *The Supreme Court ACA Decision: What Happens Now for Adolescents and Young Adults?* Chapel Hill, NC/San Francisco: Cent. Adolesc. Health Law/Natl. Adolesc. Young Adult Health Inf. Cent.
26. Fielding JE, Briss PA. 2006. Promoting evidence-based public health policy: Can we have better evidence and more action? *Health Aff.* 25:969-78

27. Ford CA, Millstein S, Halpern-Felsher B, Irwin C. 1997. Influence of physician confidentiality assurances on adolescents' willingness to disclose information and seek future health care. *JAMA* 278:1029-34
28. Gans JE, Brindis CD. 1995. Choice of research setting in understanding adolescent health problems. *J. Adolesc. Health* 17(5):306-13
29. Gavin LE, Catalano RF, David-Ferdon C, Gloppen KM, Markham CM. 2010. A review of positive youth development programs that promote adolescent sexual and reproductive health. *J. Adolesc. Health* 46(Suppl.):S75-91
30. Gold R, Kawachi I, Kennedy BP, Lynch JW, Connell FA. 2001. Ecological analyses of teen birth rates: association with community income and income inequality. *Matern. Child Health J.* 5:161-67
31. Gold R, Kennedy B, Connell F, Kawachi I. 2002. Teen births, income inequality, and social capital: developing an understanding of the causal pathway. *Health Place* 8:73-92
32. Harper S, Strumpf EC, Kaufman JS. 2012. Do medical marijuana laws increase marijuana use? Replication study and extension. *Ann. Epidemiol.* 22:207-12
33. Haskins R, Baron J. 2011. *Building the Connection Between Policy and Evidence: The Obama Evidence-Based Initiatives*. Washington, DC: Brookings Inst.
34. Hoffman SD, Maynard RA, eds. 2008. *Kids Having Kids: Economic Costs and Social Consequences of Teen Pregnancy*. Washington, DC: Urban Inst. 2nd ed.
35. Irwin CE Jr, Adams SH, Park MJ, Newacheck P. 2009. Preventive care for adolescents: Few get visits and fewer get services. *Pediatrics* 123(4):e565-72
36. Jiang N, Kolbe LJ, Dong-Chul S, Noy SK, Brindis CD. 2011. Health of adolescents and young adults: trends in achieving the 21 Critical National Health Objectives by 2010. *J. Adolesc. Health* 49(2):124-32
37. Kappahhn C, Morreale M, Rickert VI, Walker L. 2006. Financing mental health services for adolescents: a background paper. *J. Adolesc. Health* 39(3):318-27
38. Kirby D. 2001. *Emerging answers: Research findings on Programs to reduce teen pregnancy*. Washington, DC: Natl. Campaign Prev. Teen Pregnancy
39. Kirby D, Lepore G, Ryan J. 2005. *Sexual risk and protective factors: factors affecting teen sexual behavior, pregnancy, childbearing and sexually transmitted disease: Which are important? Which can you change?* Washington, DC: Natl. Campaign Prev. Teen Pregnancy
40. Keeton V, Soleimanpour S, Brindis CD. 2012. School-based health centers in an era of health care reform: building on history. *Curr. Probl. Pediatr. Adolesc. Health Care* 42:132-56
41. Kreger M, Sargent K, Arons A, Standish M, Brindis CD. 2011. Creating an environmental justice framework for policy change in childhood asthma: a grassroots to treetops approach. *Am. J. Public Health* 101(Suppl.):S208-16
42. Knopf KD, Park MJ, Brindis CD, Mulye TP, Irwin CE Jr. 2007. What gets measured gets done: assessing data availability for adolescent populations. *Matern. Child Health J.* 11:335-45
43. Manlove J, Terry-Humen E, Papillo AR, Franzetta K, Williams S, Ryan S. 2001. *Background for community-level work on positive reproductive health in adolescence: reviewing the literature on contributing factors*. Rep. Child Trends, Washington, DC
44. Moore KA. 2008. *Quasi-experimental evaluations: part 6 in a series on practical evaluation methods*. Res. Brief. 2008-04. Child Trends, Washington, DC
45. Moore KA, Keyes CLM. 2003. A brief history of well-being in children and adults. In *Well-being: Positive development across the life course*, ed. MH Bornstein, L Davidson, CLM Keyes, KA Moore, pp. 1-11. Mahwah, NJ: Lawrence Erlbaum
46. Moore KA, Terzian MA, Dariotis J, Harbin VG. 2014. Teen birth rates from 1990 to 2008: the role of state policy and contextual factors. In *Perspectives on Sexual and Reproductive Health*. New York: Guttmacher Inst. Under review
47. Mosher WD, Deang LP, Bramlett MD. 2003. Community environment and women's health outcomes: Contextual data. *Vital Health Stat.* Apr. (23):1-72
48. Mulye TP, Park MJ, Nelson CD, Adams SH, Irwin CE Jr, Brindis CD. 2009. Trends in adolescent and young adult health in the United States. *J. Adolesc. Health* 45(1):8-24
49. Lawrence RS, Appleton Gootman J, Sim LJ, eds. 2009. *Adolescent health services: missing opportunities*. Washington, DC: Natl. Res. Council/Inst. Med./Natl. Acad.

50. O'Connell ME, Boat T, Warner KE, eds. 2009. Preventing mental, emotional, and behavioral disorders among young people: progress and possibilities. Washington, DC: Natl. Res. Council./Inst. Med./Natl. Acad.
51. Newacheck PW, Hung YY, Park JM, Brindis CD, Irwin CE Jr. 2003. Disparities in adolescent health and health care: Does socioeconomic status matter? *Health Serv. Res.* 38(5):1235–52
52. O'Brien CP, Anthony JC, Carroll K, Childress AR, Dackis C, et al. 2005. Defining substance use disorders. In *Treating and Preventing Adolescent Mental Health Disorders*, ed. DL Evans, EB Foa, RE Gur, H Hendin, CP O'Brien, et al., pp. 336–89. New York: Oxford Univ. Press
53. Off. Technol. Assess., US Congress. 1991. *Adolescent health. Vol. 1: summary and policy options*. Rep. OTA-H-468, US Gov. Print. Off. Washington, DC.
54. Park MJ, Brindis CD, Chang F, Irwin CE Jr. 2008. A midcourse review of the Healthy People 2010: 21 critical health objectives for adolescents and young adults. *J. Adolesc. Health* 42:329–34
55. Park MJ, Brindis CD, Mulye T. 2011. Health policy and financing for adolescent and young adult health services. In *APP Textbook of Adolescent Health Care*, ed. MM Fisher, EM Aldermanm, RE Kreipe, WD Rosenfeld, pp. 200–9. Los Angeles, CA: Donohue Group
56. Park MJ, Mulye TP, Adams SH, Brindis CD, Irwin CE Jr. 2006. The health status of young adults in the United States. *J. Adolesc. Health* 39:305–17
57. Deleted in proof
58. Perrin JM, Bloom SR, Gortmaker SL. 2007. The increase of childhood chronic conditions in the United States. *JAMA* 297:2755–59
59. Ralph LJ, Brindis CD. 2010. Access to reproductive healthcare for adolescents: establishing healthy behaviors at a critical juncture in the lifecourse. *Curr. Opin. Obstet. Gynecol.* 22(5):369–74
60. Rossi PH, Lipsey MW, Freeman HE. 2004. *Evaluation: A Systematic Approach*. Thousand Oaks, CA: SAGE. 7th ed.
61. Sandell A, Johnson K. 1998. The politics of EPSDT policy in the 1990s: policy entrepreneurs, political streams, and children's health benefits. *Milbank Q.* 76:175–205
62. Sawyer SM, Afifi RA, Bearinger LH, Blakemore SJ, Dick B, et al. 2012. Adolescence: a foundation for future health. *Lancet* 379(9826):1630–40
63. Soleimanpour S, Geierstanger SP, Kaller S, McCarter V, Brindis CD. 2010. The role of school health centers in health care access and client outcomes. *Am. J. Public Health* 100(9):1597–603
64. Taioli E, Wynder EL. 1991. Effect of the age at which smoking begins on frequency of smoking in adulthood. *N. Engl. J. Med.* 325(13):968–69
65. Terzian M, Moore KA. 2012. *Examining state-level patterns in teen childbearing: 1991 to 2009*. Res. Brief. 2012-07, Child Trends, Washington, DC
66. Univ. Calif., San Francisco. 2003. *Fact Sheet on Demographics: Adolescents*. San Francisco, CA: Natl. Adolesc. Health Inf. Cent. <http://nahic.ucsf.edu/downloads/Demographics08.pdf>
67. Vesely SK, Wyatt VH, Oman RF, Aspy CB, Kegler MC, et al. 2004. The potential protective effects of youth assets from adolescent sexual risk behaviors. *J. Adolesc. Health* 34:356–65
68. Viner RM, Haines MM, Head JA, Bhui K, Taylor S, et al. 2011. Variations in associations of health risk behaviors among ethnic minority early adolescents. *J. Adolesc. Health* 38:55–58
69. Viner RM, Ozer EM, Denny S, Marmot M, Resnick M, et al. 2012. Adolescence and the social determinants of health. *Lancet* 379:1641–52
70. Wall MM, Poh E, Cerda M, Keyes KM, Galea S, Hasin DS. 2011. Adolescent marijuana use from 2002 to 2008: higher in states with medical marijuana laws, cause still unclear. *Ann. Epidemiol.* 21:714–16



# Contents

## Symposium: Generating Rigorous Evidence for Public Health: Alternatives to Randomized Design

Commentary: Generating Rigorous Evidence for Public Health:  
The Need for New Thinking to Improve Research and Practice  
*Ross C. Brownson, Ana V. Diez Roux, and Katherine Swartz* ..... 1

Evaluation of Systems-Oriented Public Health Interventions:  
Alternative Research Designs  
*Robert W. Sanson-Fisher, Catherine A. D'Este, Mariko L. Carey,  
Natasha Noble, and Christine L. Paul* ..... 9

Combining the Power of Stories and the Power of Numbers:  
Mixed Methods Research and Mixed Studies Reviews  
*Pierre Pluye and Quan Nha Hong* ..... 29

Practice-Based Evidence in Public Health: Improving Reach,  
Relevance, and Results  
*Alice Ammerman, Tosha Woods Smith, and Larissa Calancie* ..... 47

## Epidemiology and Biostatistics

Microbial Origins of Chronic Diseases  
*Lisa M. Gargano and James M. Hughes* ..... 65

Can We Say What Diet Is Best for Health?  
*D.L. Katz and S. Meller* ..... 83

Epigenetics: Relevance and Implications for Public Health  
*Laura S. Rozek, Dana C. Dolinoy, Maureen A. Sartor,  
and Gilbert S. Omenn* ..... 105

Implementing Health Reform: Improved Data Collection and the  
Monitoring of Health Disparities  
*Rashida Dorsey, Garth Graham, Sherry Glied, David Meyers,  
Carolyn Clancy, and Howard Kob* ..... 123

Hearing Loss in an Aging American Population: Extent, Impact, and Management <i>Kathleen E. Bainbridge and Margaret I. Wallhagen</i> .....	139
Commentary: Generating Rigorous Evidence for Public Health: The Need for New Thinking to Improve Research and Practice <i>Ross C. Brownson, Ana V. Diez Roux, and Katherine Swartz</i> .....	1
Evaluation of Systems-Oriented Public Health Interventions: Alternative Research Designs <i>Robert W. Sanson-Fisher, Catherine A. D’Este, Mariko L. Carey, Natascha Noble, and Christine L. Paul</i> .....	9
Combining the Power of Stories and the Power of Numbers: Mixed Methods Research and Mixed Studies Reviews <i>Pierre Pluye and Quan Nba Hong</i> .....	29
<b>Environmental and Occupational Health</b>	
Biological Diversity and Public Health <i>Aaron S. Bernstein</i> .....	153
Mental Health Consequences of Disasters <i>Emily Goldmann and Sandro Galea</i> .....	169
Millions Dead: How Do We Know and What Does It Mean? Methods Used in the Comparative Risk Assessment of Household Air Pollution <i>Kirk R. Smith, Nigel Bruce, Kalpana Balakrishnan, Heather Adair-Rohani, John Balmes, Zoë Chafe, Mukesh Dherani, H. Dean Hosgood, Sumi Mehta, Daniel Pope, Eva Rebfuess, and others in the HAP CRA Risk Expert Group</i> .....	185
Nature and Health <i>Terry Hartig, Richard Mitchell, Sjerp de Vries, and Howard Frumkin</i> .....	207
Precarious Employment: Understanding an Emerging Social Determinant of Health <i>J. Benach, A. Vives, M. Amable, C. Vanroelen, G. Tarafa, and C. Muntaner</i> .....	229
<b>Public Health Practice</b>	
Aligning Leadership Across Systems and Organizations to Develop a Strategic Climate for Evidence-Based Practice Implementation <i>Gregory A. Aarons, Mark G. Ehrhart, Lauren R. Farabnak, and Marisa Sklar</i> .....	255
Personal Belief Exemptions From School Vaccination Requirements <i>Douglas S. Diekema</i> .....	275



Public Health and Media Advocacy <i>Lori Dorfman and Ingrid Daffner Krasnow</i> .....	293
Practice-Based Evidence in Public Health: Improving Reach, Relevance, and Results <i>Alice Ammerman, Tosha Woods Smith, and Larissa Calancie</i> .....	47
<b>Social Environment and Behavior</b>	
Why Do Americans Have Shorter Life Expectancy and Worse Health Than Do People in Other High-Income Countries? <i>Mauricio Avendano and Ichiro Kawachi</i> .....	307
Health Promotion in Smaller Workplaces in the United States <i>Jeffrey R. Harris, Peggy A. Hannon, Shirley A.A. Beresford, Laura A. Linnan, and Deborah L. McLellan</i> .....	327
Improving Adolescent Health Policy: Incorporating a Framework for Assessing State-Level Policies <i>Claire D. Brindis and Kristin Moore</i> .....	343
Peer Support in Health Care and Prevention: Cultural, Organizational, and Dissemination Issues <i>Edwin B. Fisher, Muchieb Maggy Coufal, Humberto Parada, Jennifer B. Robinette, Patrick Y. Tang, Diana M. Urlaub, Claudia Castillo, Laura M. Guzman-Corrales, Sayaka Hino, Jaimie Hunter, Ariana W. Katz, Yael R. Symes, Heidi P. Worley, and Cuirong Xu</i> .....	363
Social Movements in Health <i>Theodore M. Brown and Elizabeth Fee</i> .....	385
<b>Health Services</b>	
Community Health Workers in Low-, Middle-, and High-Income Countries: An Overview of Their History, Recent Evolution, and Current Effectiveness <i>Henry B. Perry, Rose Zulliger, and Michael M. Rogers</i> .....	399
Metrics for Assessing Improvements in Primary Health Care <i>Kurt C. Stange, Rebecca S. Etz, Heidi Gullett, Sarah A. Sweeney, William L. Miller, Carlos Roberto Jaén, Benjamin F. Crabtree, Paul A. Nutting, and Russell E. Glasgow</i> .....	423
Scale, Causes, and Implications of the Primary Care Nursing Shortage <i>Logan MacLean, Susan Hassmiller, Franklin Shaffer, Kathleen Robrbaugh, Tiffany Collier, and Julie Fairman</i> .....	443

The Growth of Palliative Care in the United States <i>Mark T. Hughes and Thomas J. Smith</i> .....	459
Top-Down and Bottom-Up Approaches to Health Care Quality: The Impacts of Regulation and Report Cards <i>Dana B. Mukamel, Simon F. Haeder, and David L. Weimer</i> .....	477
Hearing Loss in an Aging American Population: Extent, Impact, and Management <i>Kathleen E. Bainbridge and Margaret I. Wallbagen</i> .....	139

## Indexes

Cumulative Index of Contributing Authors, Volumes 26–35 .....	499
Cumulative Index of Article Titles, Volumes 26–35 .....	505

## Errata

An online log of corrections to *Annual Review of Public Health* articles may be found at <http://www.annualreviews.org/errata/publhealth>





# ANNUAL REVIEWS

It's about time. Your time. It's time well spent.

## New From Annual Reviews:

### ***Annual Review of Statistics and Its Application***

Volume 1 • Online January 2014 • <http://statistics.annualreviews.org>

Editor: **Stephen E. Fienberg**, *Carnegie Mellon University*

Associate Editors: **Nancy Reid**, *University of Toronto*

**Stephen M. Stigler**, *University of Chicago*

The *Annual Review of Statistics and Its Application* aims to inform statisticians and quantitative methodologists, as well as all scientists and users of statistics about major methodological advances and the computational tools that allow for their implementation. It will include developments in the field of statistics, including theoretical statistical underpinnings of new methodology, as well as developments in specific application domains such as biostatistics and bioinformatics, economics, machine learning, psychology, sociology, and aspects of the physical sciences.

**Complimentary online access to the first volume will be available until January 2015.**

#### TABLE OF CONTENTS:

- *What Is Statistics?* Stephen E. Fienberg
- *A Systematic Statistical Approach to Evaluating Evidence from Observational Studies*, David Madigan, Paul E. Stang, Jesse A. Berlin, Martijn Schuemie, J. Marc Overhage, Marc A. Suchard, Bill Dumouchel, Abraham G. Hartzema, Patrick B. Ryan
- *The Role of Statistics in the Discovery of a Higgs Boson*, David A. van Dyk
- *Brain Imaging Analysis*, F. DuBois Bowman
- *Statistics and Climate*, Peter Guttorp
- *Climate Simulators and Climate Projections*, Jonathan Rougier, Michael Goldstein
- *Probabilistic Forecasting*, Tilmann Gneiting, Matthias Katzfuss
- *Bayesian Computational Tools*, Christian P. Robert
- *Bayesian Computation Via Markov Chain Monte Carlo*, Radu V. Craiu, Jeffrey S. Rosenthal
- *Build, Compute, Critique, Repeat: Data Analysis with Latent Variable Models*, David M. Blei
- *Structured Regularizers for High-Dimensional Problems: Statistical and Computational Issues*, Martin J. Wainwright
- *High-Dimensional Statistics with a View Toward Applications in Biology*, Peter Bühlmann, Markus Kalisch, Lukas Meier
- *Next-Generation Statistical Genetics: Modeling, Penalization, and Optimization in High-Dimensional Data*, Kenneth Lange, Jeanette C. Papp, Janet S. Sinsheimer, Eric M. Sobel
- *Breaking Bad: Two Decades of Life-Course Data Analysis in Criminology, Developmental Psychology, and Beyond*, Elena A. Erosheva, Ross L. Matsueda, Donatello Telesca
- *Event History Analysis*, Niels Keiding
- *Statistical Evaluation of Forensic DNA Profile Evidence*, Christopher D. Steele, David J. Balding
- *Using League Table Rankings in Public Policy Formation: Statistical Issues*, Harvey Goldstein
- *Statistical Ecology*, Ruth King
- *Estimating the Number of Species in Microbial Diversity Studies*, John Bunge, Amy Willis, Fiona Walsh
- *Dynamic Treatment Regimes*, Bibhas Chakraborty, Susan A. Murphy
- *Statistics and Related Topics in Single-Molecule Biophysics*, Hong Qian, S.C. Kou
- *Statistics and Quantitative Risk Management for Banking and Insurance*, Paul Embrechts, Marius Hofert

Access this and all other Annual Reviews journals via your institution at [www.annualreviews.org](http://www.annualreviews.org).

**ANNUAL REVIEWS | Connect With Our Experts**

Tel: 800.523.8635 (US/CAN) | Tel: 650.493.4400 | Fax: 650.424.0910 | Email: [service@annualreviews.org](mailto:service@annualreviews.org)

