

# Programs to Increase High School Completion



## A Community Guide Systematic Health Equity Review

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**Context:** High school completion (HSC) is an established predictor of long-term morbidity and mortality. U.S. rates of HSC are substantially lower among students from low-income families and most racial/ethnic minority populations than students from high-income families and the non-Hispanic white population. This systematic review assesses the effectiveness of programs to increase HSC and the potential of these programs to improve lifelong health among at-risk students.

**Evidence acquisition:** A search located a meta-analysis (search period 1985–2010/2011) on the effects of programs to increase HSC or General Educational Development (GED) diploma receipt; the meta-analysis was concordant with Community Guide definitions and methodologic standards. Programs were assessed separately for the general student population (152 studies) and students who were parents or pregnant (15 studies). A search for studies published between 2010 and August 2012 located ten more recent studies, which were assessed for consistency with the meta-analysis. Analyses were conducted in 2013.

**Evidence synthesis:** The review focused on the meta-analysis. Program effectiveness was measured as the increased rate of HSC (or GED receipt) by the intervention group compared with controls. All assessed program types were effective in increasing HSC in the general student population: vocational training, alternative schooling, social–emotional skills training, college-oriented programming, mentoring and counseling, supplemental academic services, school and class restructuring, multiservice packages, attendance monitoring and contingencies, community service, and case management. For students who had children or were pregnant, attendance monitoring and multiservice packages were effective. Ten studies published after the search period for the meta-analysis were consistent with its findings.

**Conclusions:** There is strong evidence that a variety of HSC programs can improve high school or GED completion rates. Because many programs are targeted to high-risk students and communities, they are likely to advance health equity.

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## Context

High school completion (HSC) is an established predictor of long-term health.<sup>1</sup> In 2005, a 25-year-old man in the U.S. with a high school education could expect to live 6.7 years longer than a man who had not completed high school; a woman with a high school education could expect to live 7.0 years longer than a woman who had not.<sup>1</sup> In the 2009–2010 school year, the proportions of students who completed high school in 4 years varied markedly by race/ethnicity: 83.0% of whites, 66.1% of blacks, 71.4% of Hispanics, 93.5% of Asian/Pacific Islanders, and 69.1% of American Indian/Alaska Natives.<sup>2</sup> Similarly, in 2012, the proportions of people aged 16–24 years who were not enrolled or had not completed high school was 6.2 times higher in the lowest family income quartile, 4.6 times higher in the second quartile, and 2.25 times higher in the third quartile than in the highest income quartile (in which 1.9% were not enrolled and had not completed high school).<sup>3</sup> Child-bearing among high school students also reduces the likelihood of HSC.<sup>4</sup> Thus, if programs to increase HSC are effective and targeted to high-risk populations, such as certain racial/ethnic minorities, low-income communities, and students who are pregnant or parents, these programs are likely to improve long-term health and promote health equity.

A substantial body of evidence links educational attainment to lifelong health outcomes through three interrelated pathways: (1) development of psychological and interpersonal strengths, such as a sense of control and social support, which in turn contribute to healthy social interactions; (2) problem-solving abilities and the ability to pursue and maintain productive work and adequate income, and the health benefits they provide; and (3) adoption of healthy behaviors.<sup>5–8</sup>

HSC programs aim to increase the proportion of students who receive either a high school or General Educational Development (GED) diploma. Programs take many forms and may be delivered in schools or other community settings.<sup>9</sup> They may target at-risk students as individuals or as groups (e.g., students who are pregnant or have children [SPC]), or they may include all students in schools with high rates of high school non-completion. Programs may have a single focus, such as mentoring, or they may be multiservice programs that change several features of the school environment to promote HSC. The purpose of this review is to assess the effectiveness of diverse HSC interventions in increasing rates of HSC or GED receipt, which are associated with long-term health. Prior reviews have been non-systematic or limited in findings, are dated, or explicitly exclude low-income and minority populations.<sup>9–11</sup>

## Evidence Acquisition: Methods

### Community Guide Review Process

The Community Guide systematic review process<sup>12,13</sup> was used to assess the effectiveness of programs to increase HSC for the long-term improvement of health outcomes among low-income and racial/ethnic minority populations in the U.S. Evidence of effectiveness of programs in reducing subsequent pregnancies and births among SPC was also assessed.

The review process involved forming a systematic review team of methodology and subject matter experts (the team) in the Community Guide Branch at CDC and elsewhere to work with oversight from the nonfederal, independent, unpaid Community Preventive Services Task Force (Task Force) to develop evidence-based recommendations. The rules of evidence used by the Task Force address several aspects of the body of evidence, including the number of studies of different levels of design and execution, consistency of findings among studies, public health importance of the overall effect estimate, and balance of benefits and harms of the intervention.<sup>14,15</sup> A Community Guide economic review of HSC program costs, costs per additional high school graduate, and intervention benefits per additional high school graduate is summarized online.<sup>16</sup>

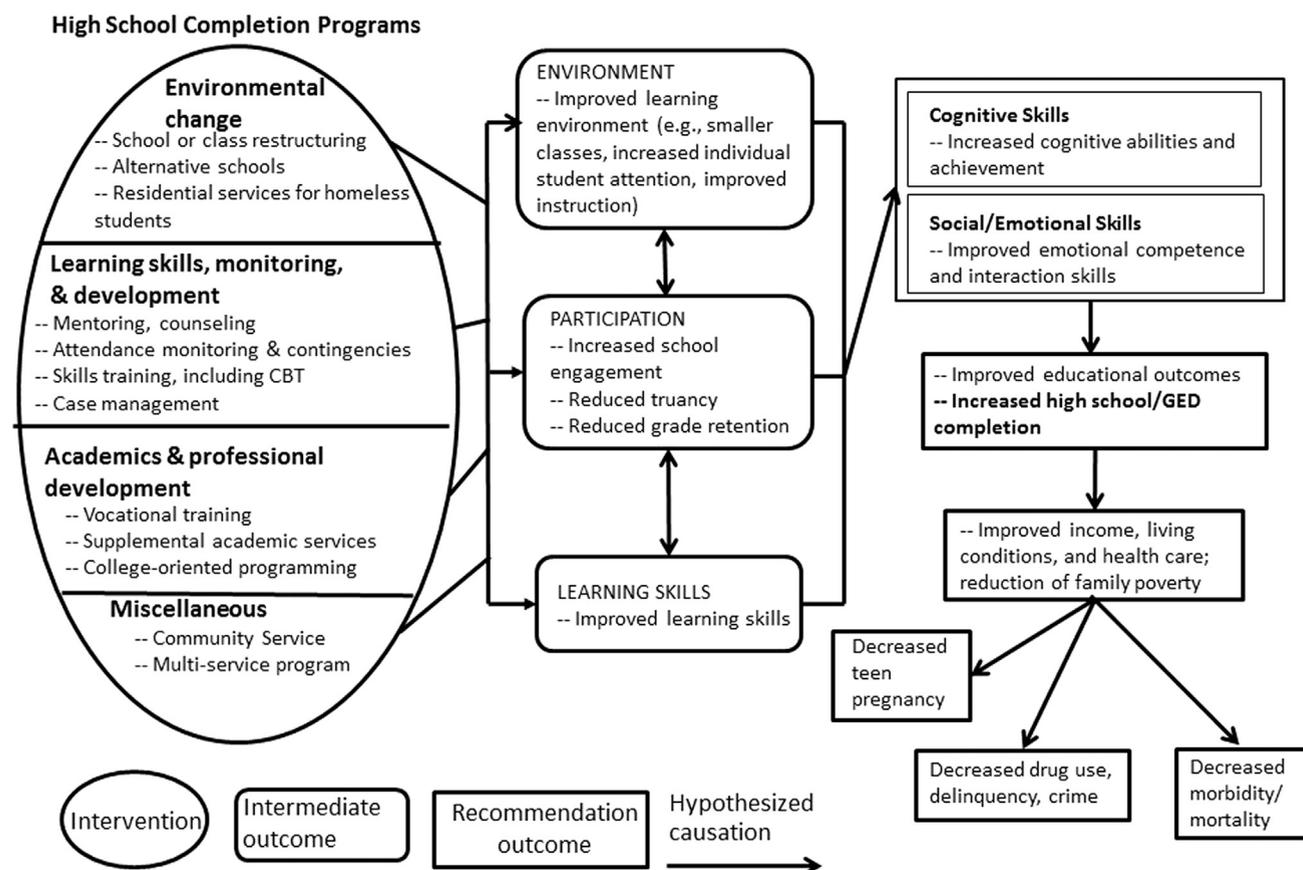
### Conceptual Approach and Analytic Framework

Diverse HSC programs are hypothesized to affect health outcomes through several intermediate pathways (Figure 1): they may alter the learning environment (e.g., by reducing class size and increasing attention to individuals); increase school participation (e.g., by reducing truancy); and improve learning skills. Each pathway leads to increased school engagement and improved learning, and, in turn, increased HSC or receipt of a GED, with indicated health improvements. In this review, several outcomes are “recommendation outcomes,” that is, public health and public health–related outcomes that serve as the basis for Task Force recommendations. Cognitive and social–emotional skills are important precursors of health outcomes, as are the completion of high school or a GED. These educational outcomes lead to improved living conditions and the reduction of family poverty; improved home environments are likely to lead to reductions in drug abuse and violence-related outcomes,<sup>17,18</sup> and decreased morbidity and mortality.<sup>19,20</sup> Improved cognitive and social–emotional skills and improved family conditions may lead to reduced teen pregnancy.

### Search for Evidence

Early in the Community Guide exploration of background literature on HSC, a recent meta-analysis was located (search period, 1985–2010/2011).<sup>21</sup> The study by Wilson et al. met Community Guide systematic review standards in terms of intervention definition, search procedures, outcome assessment, study design and execution evaluation, and synthesis of effect estimates. It was approved by the Task Force as the basis for a Community Guide health equity review.

An update search ([www.thecommunityguide.org/healthequity/education/supportingmaterials/SS-highschoolcompletion.html](http://www.thecommunityguide.org/healthequity/education/supportingmaterials/SS-highschoolcompletion.html)) was conducted to find studies published from January 2010 through August 2012 to assess studies published after the review by Wilson and colleagues,<sup>21</sup> using the following databases: ERIC;



**Figure 1.** Analytic framework: How high school completion programs affect educational and health-related outcomes and health equity.

National Education Association (NEA) website; NTIS database ([www.ntis.org](http://www.ntis.org)); PsycINFO; PubMed; Social Care Online Database ([www.scie-socialcareonline.org.uk/](http://www.scie-socialcareonline.org.uk/)); and Web of Science. Inclusion criteria in the review differed slightly from those used in this update, principally by including dissertations and studies conducted in non-high income nations (of which none of the latter were found). Each study was evaluated by two team members for inclusion in the update body of evidence. Because the review included 167 studies, it was highly unlikely that the ten studies published since the end of the review search period would alter the conclusions from the report of Wilson et al.; thus, more recent studies were reviewed only to assess consistency with meta-analysis findings.

### Inclusion Criteria

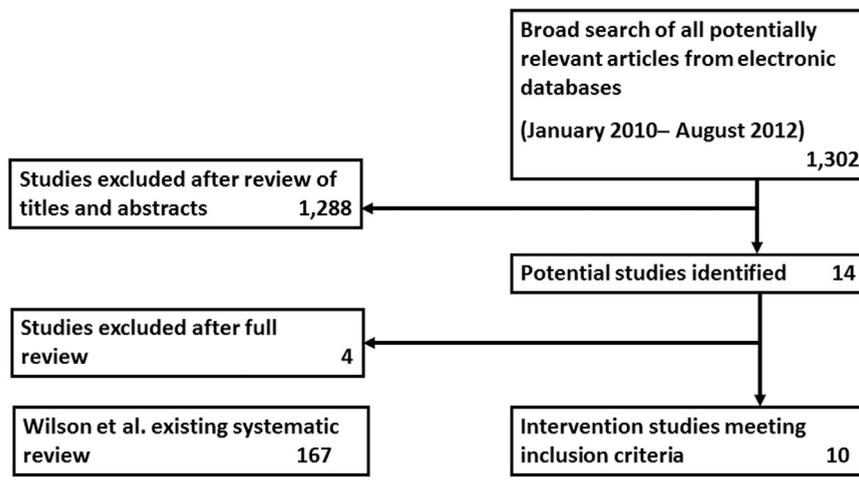
To qualify for inclusion in this review, a study had to

- evaluate the relative effectiveness of programs intended to increase HSC among a group of students, compared with a student sample not receiving the intervention;
- include students at any school level, from kindergarten through 12th grade (K–12), representing students aged approximately 5 or 6 years through 17 or 18 years;
- not study a population exclusively with mental or physical disabilities;
- measure and report HSC outcomes, including receipt of GED;

- be published in English in a peer-reviewed journal or a government report; and
- be conducted in a country with a high-income economy.<sup>22</sup>

### Synthesis Methods

Wilson and colleagues<sup>21</sup> categorized programs into 11 mutually exclusive types and a residual “other” category: vocational training, alternative schooling, social-emotional skills training, college-oriented programming, mentoring and counseling, supplemental academic services, school and class restructuring, multiservice packages, attendance monitoring and contingencies, community service, and case management. Estimates are not reported here for the “other” category (e.g., recreational, residential services for the homeless), because programs in this category were too heterogeneous to allow meaningful interpretation. The typology of Wilson et al. necessarily ignores overlap among categories, as many of them share elements; for example, college-oriented programs may use both mentoring and counseling. Each included study identified from the Community Guide update search was assigned to one of these types.



**Figure 2.** Results from Community Guide update search and the 2011 meta-analysis by Wilson et al.<sup>21</sup>

In addition to assessing the effects of interventions on HSC or receipt of a GED diploma, Wilson and colleagues<sup>21</sup> also assessed effects on truancy, school absence, and enrollment. In the present review, the focus was on HSC and GED. Because Wilson et al. did not assess intervention effects on rates of subsequent pregnancies for SPC, the review team abstracted data from all included studies to assess these outcomes. Studies reporting reproductive outcomes were stratified based on whether the HSC intervention focused on preventing subsequent pregnancies. Because included studies focused on HSC, they may not be representative of programs solely intended to prevent pregnancy.

Wilson and colleagues<sup>21</sup> reported ORs, such that ORs >1 indicated that, in general, students in a particular program type had higher rates of HSC than did the comparison population. For this review, rates of HSC estimated from ORs were also reported, because they are more readily understandable. Wilson et al. conducted meta-regressions to assess effect moderation by study design features, population characteristics, and program features, with results reported here (see Applicability section).

## Evidence Synthesis

The 167 studies included in the review by Wilson and colleagues<sup>21</sup> represented 368 independent study arms, of which 317 assessed programs for students at risk for non-completion (approximately 160,000 students) and 51 assessed programs for SPC (approximately 19,000 students). Although the search strategy for programs for SPC did not exclude student participants who were fathers, no programs for fathers were identified. The update search identified ten additional studies (Figure 2), none of which examined SPC.<sup>23–32</sup> Of the six update

studies that explicitly described demographics, all indicated high proportions of low-income or racial/ethnic minority populations. The analysis was conducted in 2013. Update findings were consistent with the results of the meta-analysis, and the analysis in this review focuses on findings from Wilson et al.

Studies included in Wilson et al.<sup>21</sup> were conducted in the U.S., Canada, and United Kingdom. In 75% of study samples, most stu-

dents were from racial or ethnic minorities; similarly, most samples predominantly included students from low-income families. In non-SPC studies, male and female students were represented equally.

Evidence of overall program effects combined, for each population, is summarized in Table 1. Table 2 and Figure 3 show effects by program type, followed by descriptions of program contents and examples. CIs for summary ORs among program types indicated substantial overlap in effects; the only exception was attendance monitoring with contingencies, where effects were significantly lower than effects of case management, school restructuring, social-emotional skills training, and college-oriented programs (Table 2, Figure 3). For all program types, HSC rates in the program population exceed HSC rates in the comparison population.

## Summaries of Program Types With Examples<sup>a</sup> and Findings

Effectiveness of all program types is shown in Table 2.

**Vocational training.** Vocational training prepares students for specific occupations. In addition to participating in the vocational curriculum, students commonly take a portion of the regular academic curriculum, participate in academic remediation, and learn life skills. Training may include occupational internships outside of school settings. Programs also may include training-related support services (such as transportation assistance and child care) and assistance with job placement.

<sup>a</sup>Examples of programs are provided to illustrate the type; they are chosen because good descriptions are available and do not suggest either effectiveness or endorsement.

**Table 1.** Effectiveness of Programs to Increase High School Completion, from Existing Review<sup>21</sup> and Community Guide Update

Outcome	Measure	Wilson et al. review <sup>21</sup> (1985–2010/2011)	Community Guide update (2010–August 2012)
High school completion rates	Percentage point difference in high school completion in intervention compared with control populations	High-risk student populations (152 studies; 317 samples)	High-risk student populations (10 studies; 11 samples)
		Median difference=8.5% (Range: 3.6%–15.9%)	8/10 favorable
		Mean adjusted <sup>a</sup> OR=1.72 (95% CI: 1.56, 1.90)	Median difference=6.5% (Range: –11.4% to 9.5%)
		Pregnant or parent students (15 studies; 51 samples)	Pregnant or parent students (0 studies)
		Median difference=11.7% (Range: 11.0%–12.4%)	

<sup>a</sup>Adjusted for study methods, participant characteristics, and implementation quality.

**Alternative schooling.** Alternative schools are designed to provide educational and other services to students whose needs are not adequately addressed in traditional high schools. Alternative schools often include students who have been expelled from traditional schools and students who have quit school or seem likely to do so, including SPC. Alternative schools are commonly situated away from traditional schools and offer small classes and intense remediation for problems that students encountered in regular schooling. Schools are often

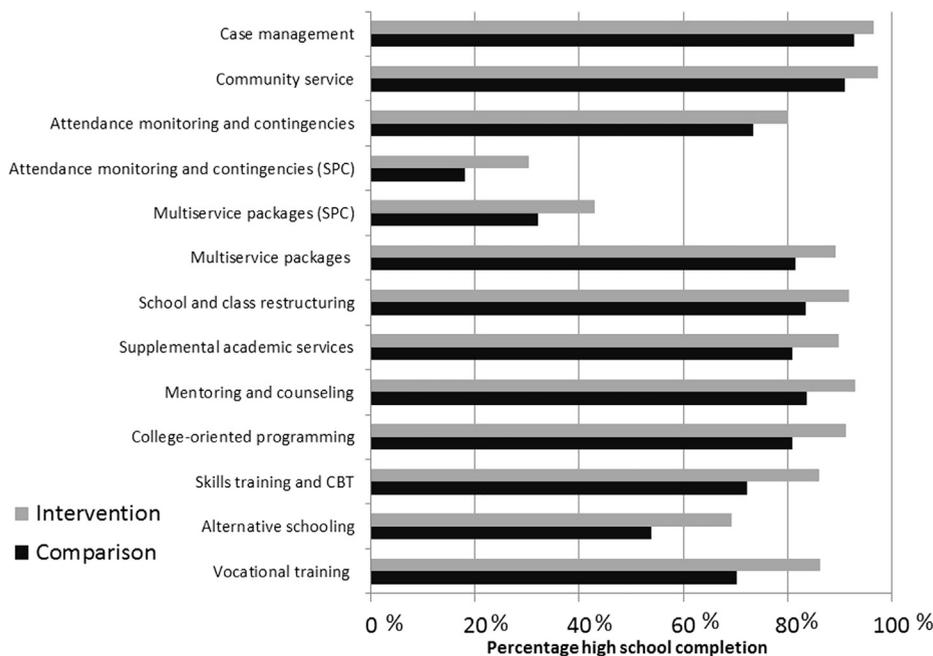
**Table 2.** Effectiveness of Programs to Increase High School Completion,<sup>a</sup> for High-Risk, Pregnant, or Parent Students

Intervention type	Adjusted <sup>b</sup> ORs (95% CI)	Comparison (control) high school completion rate (%)	Additional high school completion percentage points attributable to intervention (number of study arms)
Vocational training	2.64 (2.12, 3.28)	70.3	15.9 (51)
Alternative schooling	1.94 (1.34, 2.82)	53.8	15.5 (30)
Social-emotional skills training	2.35 (1.69, 3.28)	72.3	13.7 (12)
College-oriented programming	2.46 (1.70, 3.57)	80.9	10.4 (25)
Mentoring and counseling	2.62 (1.97, 3.47)	83.7	9.4 (27)
Supplemental academic services	2.06 (1.50, 2.81)	81.0	8.8 (28)
School and class restructuring	2.23 (1.89, 2.64)	83.6	8.3 (105)
Multiservice packages	1.87 (1.49, 2.36)	81.6	7.7 (23)
	1.61 (1.41, 1.83) <sup>c</sup>	32.0	11.0 (47)
Attendance monitoring and contingencies	1.46 (1.30, 1.63)	73.4	6.7 (26)
	1.99 (1.65, 2.40) <sup>c</sup>	18.0	12.4 (39)
Community service	3.53 (1.90, 6.54)	91.0	6.3 (24)
Case management	2.14 (1.75, 2.62)	92.9	3.6 (17)

<sup>a</sup>As shown in review by Wilson et al.<sup>21</sup>

<sup>b</sup>Adjusted for study methods, participant characteristics, and implementation quality.

<sup>c</sup>Target population was pregnant and parent students.



**Figure 3.** Proportions completing high school or receiving a GED among intervention and comparison populations in Wilson et al.<sup>21</sup> meta-analysis. CBT, cognitive behavioral therapy; SPC, programs for students who are pregnant or have children.

established in low-income communities, and may offer social services, such as child care and support groups, to address challenging issues. Teachers in alternative schools may act as formal mentors as well as instructors.

**Social-emotional skills training.** The skills training used to increase HSC most commonly aims to increase emotional self-awareness and regulation, improve self-esteem and attitudes about school, and prevent drug use. One example, the Social Problem Solving curriculum,<sup>33</sup> “focuses on the following major steps: stopping and calming down before acting, stating the problem and emotional reaction to it, setting a goal, generating possible actions to reach that goal, thinking about the consequences of each course of action, choosing the best plan of action, and acting out the plan.”

Cognitive behavioral therapy, often part of social-emotional skills training, addresses counterproductive emotions, behaviors, and cognitive processes. It commonly combines stress management or relaxation techniques; cognitive exploration (including correction of inaccurate cognitions); and the reframing of counterproductive cognitions and behaviors. Some programs train SPC to be able to teach cognitive behavioral management to their own children.

**College-oriented programming.** These programs help high school students prepare for college by providing remedial courses, college guidance counseling to help

with school selection and application, assistance with scholarship applications, and, in some cases, scholarships. For example, Talent Search<sup>34</sup> is a federal program that funds college-oriented programming in communities and schools serving disadvantaged students.

**Mentoring and counseling.**

These programs assign trained adult mentors or counselors to help students focus on their school work or career objectives and deal with personal issues. Mentors and counselors are expected to work within the context and framework of students’ home and community environments. They work closely with students, encouraging

respect and personal growth as students progress toward HSC and, in some cases, college. Mentors are most often volunteers who work with students throughout high school to help them graduate and get accepted to college. Some programs also provide financial support for college.

**Supplemental academic services.** In these programs, services such as remedial education, tutoring, or homework assistance are provided to students who have demonstrated academic difficulties in school or who may be at risk for academic difficulties. Several federal programs fund these types of services, including the 21st Century Community Learning Centers and Supplemental Educational Services.<sup>35</sup>

The Community Preventive Services Task Force has issued findings on the effectiveness of out-of-school-time academic programs.<sup>36</sup> Programs that focused on a subject, such as reading or math, were found to be more effective than more general programs, and programs offered during the summer were found to be more effective than those offered during the school year. There were too few studies of programs not focused on academics (e.g., homework-time or recreation programs) to draw conclusions about the effectiveness of those programs.

**School and class restructuring.** Schools may be reorganized with the objective of improving student engagement and learning. Reorganization may include the

creation of small learning communities; career academies designed to orient student learning to particular occupational fields; block schedules (i.e., longer class periods that increase concentrated learning and decrease between-class transition time); or class size reduction that allows more attention to students' individual needs.

High school career academies allow students to gain experience related to a particular career path (e.g., business, health care) while following a routine academic curriculum. The California Peninsula Academies<sup>37</sup> were an early effort by the State of California to retain high school students at risk for non-completion by offering them vocational classes to complement their core courses. In this program, academy mentors were closely linked with professionals working in the occupations students were learning about in school. The First Things First program,<sup>38</sup> used in several states, reduced student-teacher ratios, restructured schools so that students had the same teacher for several years, established high academic standards, and engaged students in learning-related decisions.

**Multiservice packages.** Multiservice packages combine more than one of the program types described here. Most often, multiservice packages are comprehensive programs that include an academic component, vocational training, and case management.

Some programs, like the federally coordinated Job Corps,<sup>39</sup> provide housing and health care for participants in addition to vocational training. Other programs, such as Communities in Schools,<sup>40</sup> provide diverse services to students at risk of academic failure, and also include guidance, counseling, and enrichment activities. Los Angeles' Better Educated Students for Tomorrow (BEST)<sup>41</sup> is an afterschool program for Los Angeles students enrolled in kindergarten through fifth grade. Students are provided with homework assistance, social-emotional development programs, recreational opportunities, and access to performing arts.

The New Chance Program,<sup>42</sup> a community intervention for SPC in Pittsburgh, contacts students around the time of their child's birth to inform them about educational opportunities. The first contact is followed by home visits and referrals for assistance with education, health care, social services, and day care.

**Attendance monitoring and contingencies.** In these programs, staff monitor students' attendance in school and provide mentoring services to increase attendance and school participation. Staff also review students' academic performance, provide feedback to students, and update parents on their children's progress. Staff may also model use of problem-solving skills, making themselves available for students to discuss personal

concerns, and working with students to increase their school engagement.

In the Check and Connect Program,<sup>43</sup> used in multiple U.S. states, Canada, and New Zealand, mentors are trained to monitor students' attendance, tardiness, behavioral referrals, and grades, and work with students and their families to solve problems and develop skills.

Students in attendance-monitoring programs may receive rewards or "contingencies" such as cash awards for their attendance and participation in school. In some cases, contingencies may be negative and involve withholding family support payments following specified levels of unexcused school absences.<sup>44</sup>

**Community service.** Students participating in these programs plan and carry out community service projects. These programs are commonly coupled with a life-skills curriculum. For example, in the Coca-Cola Valued Youth Program,<sup>45</sup> high school students at risk for dropping out tutor elementary school students at risk for academic failure. Teen Outreach,<sup>46</sup> a widely used community service program for SPC, aims to increase HSC and prevent subsequent pregnancies by engaging students in community activities coordinated by the Junior League (e.g., volunteer work in hospitals, nursing homes, or schools). Students work closely with Junior League volunteers and have classroom discussions about their volunteer experience. Similarly, the Wyman Teen Outreach Program<sup>47</sup> provides community volunteer opportunities for students between sixth and 12th grade who are at risk for dropping out. As part of the program, students discuss values, relationships, communication and assertiveness, influence, goal setting, decision making, human development, and sexuality.

**Case management.** Case management connects students and families with appropriate services, and monitors students' progress. For example, the Cluster Plan for Dropout Prevention<sup>48</sup> was conducted in a middle school with the objective of empowering students and promoting their success and retention by removing barriers and providing the necessary support, skills, and enabling partnerships. The project team consisted of the principal, the vice principal for discipline, a student services specialist, a drug and alcohol specialist, an attendance monitor, and a Department of Children's Services caseworker. Project staff often acted as student advocates, helping teachers understand why students might have difficulties in their classes and assisting with development of plans to resolve those difficulties. The Children's Services caseworker also served families whose children attended the school.

## Reproductive Outcomes of Programs to Increase High School Completion Among Students Who Are Pregnant or Have Children

Data from studies included in Wilson and colleagues<sup>21</sup> were used to calculate the effects of programs designed to increase HSC on rates of subsequent pregnancies and births for SPC. Effects were negligible, even among programs focused on preventing childbearing. Because studies were included in this review only if there was a clear HSC component, results may not be representative of interventions designed to prevent pregnancies among students.

## Conclusions

### Summary of Findings

Based on the meta-analysis by Wilson et al.,<sup>21</sup> the present review demonstrated effectiveness of a wide array of HSC programs in increasing rates of HSC or receipt of a GED diploma. Programs are available both for the general population of students at risk of not completing high school and for SPC who are at high risk of not completing high school. The wide variety of reviewed alternative programs provides communities with choices that allow adaptation to local needs and resources. Because these programs are commonly targeted to minority and low-income communities, they are likely to narrow academic achievement gaps and advance health equity. An accompanying economic assessment<sup>16</sup> demonstrates benefit-to-cost ratios (from a governmental perspective) mostly substantially greater than 1:1.

### Discussion

Public health researchers conducting systematic reviews of educational interventions face two major challenges. One is that educational research rarely assesses health outcomes, so that it is incumbent on the public health researchers interested in persuading public health audiences to demonstrate the link between educational outcomes and public health consequences. Although substantial evidence supports this link,<sup>6,7</sup> the effects are often long-term and difficult to prove. Nevertheless, completed schooling is one of the better-recognized predictors of long-term health.<sup>6,49</sup>

Second, public health practitioners may not accept the legitimacy of action in “other” fields, such as education, despite evidence supporting the effectiveness of interventions in these fields, and practitioners in those other fields may also be resistant to such cross-domain action. The health-in-all-policies movement and the increasing recognition of non-health social determinants of health provide rationale and opportunities for such cross-domain collaborations.

In addition, systematic evidence syntheses are commonly subject to challenges. The definitions of the intervention and intervention types are commonly arbitrary, as is the sorting of particular programs into one type or another. The choice of effect metrics can also influence judgments of relative effects. In this review, background rates of HSC in control populations varied widely, and differing effect metrics would have resulted in different conclusions. However, the metrics used in this review are standard ones, and, overall, CIs are sufficiently narrow to suggest robustness of findings.

### Applicability

Wilson and colleagues<sup>21</sup> evaluated studies’ applicability to different settings and populations, and assessed differences among program types. Of major importance for this review, most assessed programs were conducted in communities with high proportions of ethnic and racial minority students and students from low-income families. Although this focus limits the ability of Wilson et al. to compare effectiveness across SES strata, there is evidence from other studies that students from lower-SES strata have greater long-term health gains from educational attainment than students from higher-SES strata.<sup>50</sup>

Effectiveness was shown for a wide variety of programs. Assessment of effect modification indicates that, although programs in community settings (outside of school) can be effective, programs conducted within schools are more effective. And, as would be expected, programs that reported successful program implementation are more effective than those reporting problems in implementation. Among programs targeting SPC, programs were more effective for older as compared with younger participants. Program duration and the racial/ethnic composition of the students were not associated with differential effectiveness.

### Potential Harms, Additional Benefits, and Considerations for Implementation

Attendance and monitoring programs with negative contingencies that deny family benefits when students fail to attend school may raise ethical concerns and also reduce the capacity of families to produce the desired attendance by reducing available family resources (e.g., making it necessary for students to work rather than attend school, to make up for the loss of family assistance).<sup>51</sup>

Additional harms and benefits and considerations for implementation are addressed in an accompanying article.<sup>52</sup>

## Recommendations From Other Groups

The U.S. Department of Education's What Works Clearinghouse<sup>53</sup> makes several expert-assessed recommendations on the implementation of HSC programs. These recommendations, quoted here, are largely consistent with findings in the present review:

1. Use data systems that support the diagnosis of the number of students who drop out and identify individual students at high risk.
2. Assign adult advocates to students at risk of dropping out.
3. Provide academic support and enrichment to improve academic performance.
4. Implement programs to improve students' classroom behavior and social skills.
5. Personalize the learning environment and instructional process.
6. Provide rigorous and relevant instruction to better engage students in learning and provide the skills needed to graduate and to serve them after they leave school.

## Evidence Gaps

More information is needed about the effectiveness of these interventions on GED program completion. Wilson and colleagues<sup>21</sup> included GED diplomas as an outcome, but did not identify studies of programs delivered exclusively to GED candidates.

It would be useful to understand the contributions of different components to the effectiveness of multiservice package programs. For SPC, even the most successful examined program—multiservice programs—yielded HSC rates less than 50%; examination of program components might indicate paths to increased effectiveness. Clearly, implementation of effective programs to prevent teen pregnancy would reduce the need for such programs for SPC.<sup>10</sup> It also would be useful to assess the effectiveness of programs to increase HSC for students in institutions (e.g., prison or residential settings for various forms of treatment). Finally, optimal program duration (probably associated with each program type) should be assessed.

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## References

1. Rostron B, Boies J, Arias E. Education reporting and classification on death certificates in the United States. *National Center for Health Statistics. May 2010 Series 2*(Number 151).
2. U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Percentage of high school dropouts among persons 16 through 24 years old (status dropout rate), by sex and race/ethnicity: selected years, 1960 through 2012. *Digest of Education Statistics*. 2013. [nces.ed.gov/programs/digest/d13/tables/dt13\\_219.70.asp](http://nces.ed.gov/programs/digest/d13/tables/dt13_219.70.asp).
3. U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. Percentage of high school dropouts among persons 16 through 24 years old (status dropout rate), by income level, and percentage distribution of status dropouts, by labor force status and years of schools completed: 1970 through 2012. *Digest of Education Statistics*. 2013. [nces.ed.gov/programs/digest/d13/tables/dt13\\_219.75.asp](http://nces.ed.gov/programs/digest/d13/tables/dt13_219.75.asp).
4. Ahn N. Teenage childbearing and high school completion: accounting for individual heterogeneity. *Fam Plan Perspect*. 1994;26(1):17–21.
5. Egarter S, Braveman P, Sadegh-Nobari T, Grossman-Kahn R, Dekker M. Education matters for health. Issue Brief 6: Education and health. *Robert Wood Johnson Foundation*. 2009.
6. Ross CE, Wu CL. The links between education and health. *Am Sociol Rev*. 1995;60(5):719–745.
7. Feinstein L, Sabates R, Anderson TM, Sorhaindo A, Hammond C. What are the effects of education on health? Measuring the effects of education on health and civic engagement. *Proceedings of the Copenhagen Symposium*. 2006:171–354.
8. Braveman P, Egarter S, Williams DR. The social determinants of health: coming of age. *Annu Rev Public Health*. 2011;32:381–398.
9. Lehr CA, Hansen A, Sinclair MF, Christenson SL. Moving beyond dropout toward school completion: an integrative review of data based interventions. *Sch Psychol Rev*. 2003;32:342–364.
10. Dynarski M, Clarke L, Cobb B, Finn J, Rumberger R, Smink J. *Dropout prevention: a practice guide*. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education, 2008. [ies.ed.gov/ncee/wwc/pdf/practice\\_guides/dp\\_pg\\_090308.pdf](http://ies.ed.gov/ncee/wwc/pdf/practice_guides/dp_pg_090308.pdf).

11. Klima T, Miller M, Nunlist C. *What Works? Targeted Truancy and Dropout Programs in Middle and High School*. Olympia: Washington State Institute for Public Policy, 2009.
12. Briss P, Zaza S, Pappaioanou M, et al. Developing an evidence-based Guide to Community Preventive Services—methods. *Am J Prev Med*. 2000;18(1S):35–43.
13. Zaza S, Wright-De Agüero LK, Briss PA, et al. Data collection instrument and procedure for systematic reviews in the Guide to Community Preventive Services. *Am J Prev Med*. 2000;18(1S):44–74.
14. Fischer K. States and individual differences in cognitive development. *Annu Rev Psychol*. 1985;36:613–648.
15. Lipsey MW, Wilson D. The efficacy of psychological, educational, and behavioral treatment. *Am Psychol*. 1993;48:1181–1209.
16. Guide to Community Preventive Services. Promoting health equity through education programs and policies: high school completion programs. [www.thecommunityguide.org/healthequity/education/highschoolcompletion.html](http://www.thecommunityguide.org/healthequity/education/highschoolcompletion.html). Last updated: July 16, 2014.
17. Hiscock R, Bauld L, Amos A, Fidler JA, Munafo M. Socioeconomic status and smoking: a review. *Ann NY Acad Sci*. 2012;1248:107–123.
18. Eron LD, Guerra NL, Huesmann R. Poverty and violence. In: Feshbach S, Zagrodzka J, eds. *Aggression: Biological, Developmental and Social Perspectives*. New York: Plenum, 1997:139–154.
19. Hahn RA, Eaker E, Barker ND, Teutsch SM, Sosniak W, Krieger N. Poverty and death in the United States. *Int J Health Serv*. 1996;26(4): 673–690.
20. Williams DR, Sternthal M. Understanding racial/ethnic disparities in health: sociological contributions. *J Health Soc Behav*. 2010;51(suppl): S15–S27.
21. Wilson SJ, Tanner-Smith EE, Lipsey MW, Steinka-Fry K, Morrison J. Dropout prevention and intervention programs: effects on school completion. *Campbell Systematic Reviews*. 2011;8. [campbellcollaboration.org/lib/project/158/](http://campbellcollaboration.org/lib/project/158/).
22. World Bank. World Development Indicators. 2014. [go.worldbank.org/I358WVLT0](http://go.worldbank.org/I358WVLT0).
23. Bloom HS, Thompson SL, Unterman R. Transforming the high school experience: how New York City's new small schools are boosting student achievement and graduation rates. [www.mdrc.org/sites/default/files/full\\_589.pdf](http://www.mdrc.org/sites/default/files/full_589.pdf).
24. Booker K, Sass TR, Gill B, Zimmer R. The effects of charter high schools on educational attainment. *J Labor Econ*. 2011;29(2):377–415.
25. Furgeson J, Gill B, Haimson J, et al. National study of charter management organization effectiveness. Charter-school management organizations: diverse strategies and diverse student impacts. Mathematica Policy Research. *Inc. and Center on Reinventing Public Education*. 2012.
26. Lee H-J, Özgün-Koca SA, Cristol D. An analysis of high school transformation effort from an outcome perspective. *Curr Iss Educ*. 2011;14(1):5–26.
27. Landis RN, Reschly AL. An examination of compulsory school attendance ages and high school dropout and completion. *Educ Policy*. 2011;25(5):719–761.
28. Porowski A, Passa A. The effect of Communities in Schools on high school dropout and graduation rates: results from a multiyear, school-level quasi-experimental study. *J Educ Stud Placed Risk*. 2011;16(1):24–37.
29. Schwerdt G, Weste MR. The impact of alternative grade configurations on student outcomes through middle and high school. *J Public Econ*. 2013;97:308–326.
30. Mac Iver MA. The challenge of improving urban high school graduation outcomes: findings from a randomized study of dropout prevention efforts. *J Educ Stud Placed at Risk (JESPAR)*. 2011;16(3):167–184.
31. Flores N, Chu H. How does size matter? The impact of the rise of small schools on Latinos and emergent bilinguals in New York City. *Int J Biling Educ Biling*. 2011;14(2):155–170.
32. Ford R, Frenette M, Nicholson C, et al. Future to discover: post-secondary impacts report. *Social Research and Demonstration Corporation*. 2012. [www.srdc.org/media/9216/FTD\\_PSI\\_Report\\_EN.pdf](http://www.srdc.org/media/9216/FTD_PSI_Report_EN.pdf).
33. Gottfredson G, Jones E, Gore T. Implementation and evaluation of a cognitive-behavioral intervention to prevent problem behavior in a disorganized school. *Prev Sci*. 2002;3(1):43–56.
34. U.S. Department of Education. Talent Search Program. 2012. [www2.ed.gov/programs/triotalent/index.html](http://www2.ed.gov/programs/triotalent/index.html).
35. U.S. Department of Education. Supplemental Educational Services, 21st Century Community Learning Centers. 2012. [www2.ed.gov/nclb/choice/help/ses/index.html](http://www2.ed.gov/nclb/choice/help/ses/index.html).
36. The Community Guide. Promoting health equity through education programs and policies: out-of-school-time academic programs. [www.thecommunityguide.org/healthequity/education/outofschooltime.html](http://www.thecommunityguide.org/healthequity/education/outofschooltime.html).
37. Stern D, Dayton C, Paik L, Weisberg A, Evans J. Combining academic and vocational courses in an integrated program to reduce high school dropout rates: second year results from replications of the California Peninsula Academies. *Educ Eval Policy Anal*. 1988;10: 161–170.
38. Quint JC, Byndloss DC, Melamud B. Scaling up First Things First: findings from the first implementation year. [www.mdrc.org/sites/default/files/Scaling%20Up%20First%20Things%20First%20ES.pdf](http://www.mdrc.org/sites/default/files/Scaling%20Up%20First%20Things%20First%20ES.pdf).
39. U.S. Department of Labor. Job Corps. 2013. [www.jobcorps.gov/AboutJobCorps/program\\_design.aspx](http://www.jobcorps.gov/AboutJobCorps/program_design.aspx).
40. Communities in Schools. [www.communitiesinschools.org/](http://www.communitiesinschools.org/).
41. Huang D, Kim KS, Marshall A, Perez P. *Keeping kids in school: an LA's BEST example—A study examining the long-term impact of LA's BEST on students' dropout rates*. Los Angeles, CA: National Center for Research on Evaluation, Standards, and Student Testing, 2005.
42. Solomon R, Liefeld C. Effectiveness of a family support center approach to adolescent mothers: repeat pregnancy and school dropout rates. *Fam Relat*. 1998;47(2):139–144.
43. U.S. Department of Education, Institute of Education Sciences. What Works Clearinghouse intervention report: Check & Connect. [www.ies.ed.gov/ncee/wwc/pdf/intervention\\_reports/WWC\\_Check\\_Connect\\_092106.pdf](http://www.ies.ed.gov/ncee/wwc/pdf/intervention_reports/WWC_Check_Connect_092106.pdf).
44. State of Wisconsin Legislative Audit Bureau. *An evaluation of third-semester effects of the Wisconsin Learnfare Program: interim report*. Madison, WI: Wisconsin Department of Workforce Development, 1996.
45. Cardenas J, Montecel M, Supik J, Harris R. The Coca-Cola Valued Youth program: dropout prevention strategies for at-risk students. In: Miller BC, Card JJ, Paikoff RL, Peterson JC, editors. *Texas Researcher*; 1992. p. 111–130.
46. Philliber S, Allen JP. Life options and community service: teen outreach program. In: Miller BC, Card JJ, Paikoff RL, Peterson JC, eds. *Preventing Adolescent Pregnancy: Model Programs and Evaluations*. Thousand Oaks, CA: Sage, 1992:139–155.
47. U.S. Department of Education, Institute of Education Sciences. What Works Clearinghouse. Wyman Teen Outreach Program (TOP). [www.ies.ed.gov/ncee/wwc/pdf/intervention\\_reports/wwc\\_teenoutreach\\_010609.pdf](http://www.ies.ed.gov/ncee/wwc/pdf/intervention_reports/wwc_teenoutreach_010609.pdf).
48. Rossi R, DuBois P, McLaughlin D, et al. *Evaluation of projects funded by the School Dropout Demonstration Assistance program: final evaluation report*. Palo Alto, CA: American Institute of Research, 1995.
49. Phelan JC, Link BG, Diez-Roux A, Kawachi I, Levin B. "Fundamental causes" of social inequalities in mortality: a test of the theory. *J Health Soc Behav*. 2004;45:265–285.
50. Ross C, Mirowsky J. The interaction of personal and parental education on health. *Soc Sci Med*. 2011;72:591–599.
51. Howard B. First, do not punish: individual incentives in health policy. *Virtual Mentor*. 2008;10(11):719–723.
52. Community Preventive Services Task Force. High school completion programs recommended to improve health equity. *Am J Prev Med*. 2015;48(5):609–612.
53. U.S. Department of Education, Institute of Education Sciences. What Works Clearinghouse. [ies.ed.gov/ncee/wwc/](http://ies.ed.gov/ncee/wwc/).