Published in final edited form as:

Am J Prev Med. 2011 September ; 41(3): 309–316. doi:10.1016/j.amepre.2011.04.019.

Motivating Public School Districts to Adopt Sun Protection Policies:

A Randomized Controlled Trial

David B. Buller, PhD, Kim D. Reynolds, PhD, Jeff L. Ashley, MD, Mary K. Buller, MA, Ilima L. Kane, MA, Cheri L. Stabell, MPH, Kim L. Massie, BS, Xia Liu, MS, and Gary R. Cutter, PhD

Research Team, (DB Buller, MK Buller, Kane, Liu, Cutter) Klein Buendel, Inc., Golden, Colorado; the School of Community and Global Health (Reynolds, Massie), Claremont Graduate University, Claremont, Sun Safety for Kids (Ashley), Burbank; California Hispanic Commission on Alcohol and Drug Abuse, Inc. (Stabell), Glendale, California; the School of Public Health (Cutter), University of Alabama, Birmingham, Alabama

Abstract

Background—In 2002, CDC recommended that the nation's schools establish policies that reduce sun exposure to decrease students' risk of skin cancer.

Purpose—A program to convince public school districts to adopt such a policy was evaluated.

Design—RCT.

Setting/Participants—Public school districts in Colorado ($n=56$) and Southern California ($n=56$).

Intervention—Policy information, tools and technical assistance were provided through printed materials, a website, meetings with administrators, and presentations to school boards. An RCT enrolled public school districts from 2005 to 2010. Policy adoption was promoted over 2 years at districts randomized to the intervention.

Main Outcome Measures—School board–approved policies were obtained from 106 districts and coded at baseline and 2-year follow-up. Analyses were conducted in 2010.

Results—There was no difference in the percentage of districts adopting a policy (24% in intervention; 12% in control; $p=0.142$); however, intervention districts (adjusted $M=3.10$ of 21 total score) adopted stronger sun safety policies than control districts (adjusted $M=1.79$; $p=0.035$). Policy categories improved on sun safety education for students (intervention adjusted $M=0.76$; control adjusted $M=0.43$, $p=0.048$), provision of outdoor shade (intervention adjusted $M=0.79$; control adjusted $M=0.28$, $p=0.029$), and outreach to parents (intervention adjusted $M=0.59$; control adjusted $M=0.20$, $p=0.027$).

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Address correspondence to: David Buller, PhD, Klein Buendel, Inc., 1667 Cole Boulevard, Suite 225, Denver, Colorado 80401. dbuller@kleinbuendel.com.

No other authors reported financial disclosures.

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Conclusions—Multifaceted promotion can increase adoption of stronger policies for reducing sun exposure of students by public school districts. Future research should explore how policies are implemented by schools.

Introduction

Solar ultraviolet radiation is the most preventable cause of skin cancer.^{1–3} Americans receive at least a quarter of their lifetime sun exposure during childhood.⁴ Children spend nearly 3 hours per day outdoors,^{5,6} including at school,⁷ but they are not routinely protected from overexposure to solar radiation.^{8–11} A national survey and individual studies suggest that many American children are sunburned annually.^{11–13}

School policies that improve sun safety for children are essential to comprehensive skin cancer prevention.^{14–16} Policy development can improve health outcomes such as increasing physical activity and reducing obesity and tobacco use.^{17–22} Sun protection policies can protect all children, including those who do not choose or are unable to protect themselves.²³ Policies adopted by school districts may be more effective than by individual schools, for they have the force of legal authorities (i.e., elected school boards) and apply to all schools within the districts.

Interventions that promote sun safety policy have rarely been evaluated. Policy and educational materials with staff training achieved policy adoption by more Australian primary schools (10.7% increase) than materials alone (6.0% increase).²⁴ Materials emphasizing policy adoption in the EPA Sunwise tool kit appeared to stimulate policy adoption by individual schools.²⁵ A program for recreation centers in Hawaii increased staff awareness of policies.^{26,27} None of these programs focused on entire school districts.

Efforts are needed to convince the nation's schools to adopt sun protection policies to protect children. National surveys of school principals found that very few U.S. schools have such policies (3% of primary schools;⁷ 10% of secondary schools²⁸). While many principals in both surveys were willing to develop a policy, most were unaware skin cancer is a problem and indicated that policies are set by district administrators and school boards.

This paper reports the outcomes of an RCT testing a program to convince public school districts in Colorado and Southern California to adopt sun protection policies for students. Two hypotheses were tested: (H1) More public school districts receiving the intervention will adopt a school-board approved sun protection policy than districts in the no-treatment control condition, and (H2) school districts in the intervention condition will increase the strength of their sun protection policies compared to control districts.

Methods

Setting and Participants

Sun Safe Schools was evaluated in an RCT in 2005–2010. Public school districts were recruited in 2005–2006 in Southern California and 2006–2007 in Colorado through letters and telephone calls. A total of 159 eligible districts in Southern California and 113 in Colorado were identified. Inclusion criteria were being a public school district within approximately 100 miles of downtown Los Angeles or 200 miles of downtown Denver to control travel costs. Initially, 61 districts in Southern California (38%) and 68 in Colorado (60%) were recruited. One Southern California district and one Colorado district dropped out before pretesting. Pretest surveys were completed by district administrators and school principals from 56 districts in Southern California and 56 in Colorado and these 112 public school districts were randomized to condition (41% of eligible districts).

Design

At baseline, research assistants obtained copies of sections in the school board–approved written policy document that were expected to contain policies on sun protection (primary study outcome). Participating districts were randomized following baseline policy collection. Districts assigned to the intervention received the policy program over 2 years. Two years postrandomization, research assistants re-contacted the districts and obtained copies of the same sections of the board-approved written policy document. Six months later, they re-contacted the districts and determined whether there had been any further policy changes pertaining to sun protection. Board approval of policy took several months so this second follow-up was performed to detect whether any districts adopted policy shortly after the intervention ceased. District administrators who might participate in policy creation and implementation and all school principals at participating districts were invited to complete pre-test and post-test surveys on attitudes and knowledge regarding sun safety policy. The secondary outcomes assessed in these surveys will be reported separately.

Intervention

The policy program, named Sun Safe Schools, was delivered to all districts in the intervention condition. It was guided by the diffusion of innovations theory (DIT),^{29,30} applied to organizational diffusion which distinguishes adoption and implementation processes.^{30,31} The intervention focused primarily on adoption consisting of agenda-setting (problem creates a perceived need and search for innovation), matching (fit between problem and innovation is evaluated), and adoption decision, although information was provided to help districts implement policy. It stressed positive attributes of sun protection policy (e.g., relative advantage, complexity, fit with district values).^{30,32,33} In DIT terms, Sun Safe Schools was an effort by outside change agents to promote policy adoption; such efforts have been successful with schools on other health topics.^{33–35} Past research suggested that senior school administrators are instrumental in adoption decisions, while mid-level administrators facilitate implementation.^{36,37} Hence, district administrators were the primary target of Sun Safe Schools but program staff tried to identify and work with internal champions at any level.^{38–41}

In-person Meeting—Superintendents and elected school board members were sent a program description and brochure on sun safety policies and the program website. Administrators were contacted by program staff via e-mail to introduce the project and identify a key contact person in the district. Program staff attempted to meet with the key contact to discuss sun protection policies. If this meeting did not occur, program staff visited the district unannounced. During the in-person meeting, program staff provided key contact people with a binder of printed materials promoting sun protection policies, reviewed the district's current policies (or lack thereof), and discussed where policies would fit best. Key contacts were encouraged to share the binder and website with other administrators (such sharing was not assessed). Potential internal champions and stakeholders were identified, along with the district's policy-making processes. A written meeting summary with next steps was sent to key contacts. All administrators were alerted that the key contacts had the binder and encouraged to visit the program website.

Program Binder and Website—The program binder included six sections: (1) descriptions of the program and letters from state health departments supporting school sun safety policies; (2) information on skin cancer in the state, skin cancer prevention, and school participation in prevention; (3) state skin cancer prevention regulations; (4) model policy and ways to assess the district's sun safety; (5) National Association of State Boards of Education's (NASBE) *Fit, Healthy and Ready to Learn, Part II: Sun Safety* booklet; and (6) CDC *Guidelines for School Programs to Prevent Skin Cancer*.

The website contained seven sections: (1) *The Burning Issue* on UV radiation, skin cancer, and role of school districts in sun safety; (2) *Assess Your District* interactive tool to measure district sun safety and determine steps to create sun safe environments; (3) *Policy Writing Assistant* with template policy and tool to customize it; (4) *In the News* articles and stories about skin cancer prevention and school health policy; (5) *Toolbox* of fact sheets, a slide presentation, sample newsletter articles, and media releases on sun safety; (6) *Become a Sun Safe School* with ideas for putting sun safety policy into practice; and (7) *Success Stories* from other districts, schools and communities who became sun safe. Administrators were able to use the binder materials and navigate the website content at their own pace and in any order that best fit their policy needs.

Follow-up Communication—Program staff maintained ongoing communication with key contacts and administrators interested in sun safety by telephone, e-mail and in-person to support policy adoption. Project staff checked on progress, referred them to useful resources and tools in the binder and website, and suggested ways to obtain support for and overcome barriers to policy adoption. Also, e-Newsletters were sent to all administrators every other month, containing four to six articles on need for sun safety, fit and feasibility of policies, tips on creating policies, strategies for surmounting barriers to policy adoption, tips for implementing policies, school sun safety information, and current sun safety news. Two follow-up visits to the districts occurred, one in the summer and a second in the winter where staff delivered a sun protection policy brochure, a program website flyer, the most current e-Newsletter, and sunscreen lip balm. If follow-up communications were not answered, program staff identified new key contacts for continued communication. In the second year, short presentations were made to school boards at districts that had not progressed with policy adoption. Presentations were made by a dermatologist or pediatrician (who was expected to be more credible to elected board members than project staff), highlighting the need for, and fit of, sun safety policy and encouraging boards to consider policy adoption.

Project staff recorded 2057 contacts with intervention districts (M=39 per district; range = 16–81). Nineteen percent of contacts included two-way communication with district staff but 81% were one-way (e.g., leaving voicemail messages, sending e-mail), without response from district personnel. Most contacts were by e-mail (62%; 8% in-person and 10% by phone), with district administrators (60%; 22% nurses and health workers and 18% school board members), and addressed policy development (1438 contacts; 175 addressed policy implementation).

Attention Control Information

Districts assigned to the control condition received a mailing directing them to national and state resources on school sun protection. It included an introductory letter from the state health department, NASBE's *Fit Healthy and Ready to Learn Part II: Sun Safety Guidebook*, CDC's *Guidelines for School Programs to Prevent Skin Cancer*, information about state sun safety regulations (e.g., California law requiring policy allowing sun protective hats; Colorado requirements on shade in outdoor child care settings); and in California, two informational sheets from the state's skin cancer prevention program.

Sun Protection Policy Assessment

School board-approved policy documents were coded to measure sun protection policies for students. According to the CDC,⁴² a model policy should include a statement of purpose and goals and rules on scheduling outdoor activities, physical environment related to shade, personal protective behavior by students (i.e., sunscreen, protective clothing, hats, and sunglasses) at school and school-sponsored outdoor activities, planned and sequential

education about sun protection, routine communication with families, and guidelines on resource allocation, accountability and ongoing evaluation of sun safety efforts. Project investigators developed procedures for identifying sections of the policy documents expected to contain sun protection policies and a protocol for coding the content. Research assistants were trained to identify and extract the relevant portions of policy documents, consistently, using a list of standard section titles (e.g., student dress code).

Research assistants were trained to code the content of the policy documents. Each district's policy document was coded by one coder. Inter-coder reliability was established before coding (Gwet's AC1 statistic^{43,44} at pretest=0.77 to 1.00 and at posttest= 1.00 for all categories). Research assistants initially coded whether 10 policy content categories were addressed in the policy document (0=not address; 1=addressed): provision of outdoor shade, scheduling of outdoor activities, education of students, education of teachers, accountability, resource allocation, communication with parents, and use of sunscreen (including sunscreen lip balm), hats, protective clothing (i.e., long-sleeved shirt and long pants/skirts). For each category addressed, strength of the policy was coded (i.e., 0=not allowed, 1=allowed, or 2=required; for sunscreen: 0=not allowed, 1=allowed with physician prescription, 2=allowed, 3=required). Scores for content and strength were created summing across all components. Research assistants coded whether the policy on shade, outdoor schedules, hat use, and protective clothing directly stated that it was intended for sun safety (0=indirect; 1=direct) because they could be included for other reasons (e.g., hats prohibited to reduce transmission of head lice). Content and strength were coded as zero if there was no direct intent for sun protection (i.e., intent=0).

School District Characteristics

Information on school districts was obtained from the department of education websites in Colorado and California: district size in number of students; organizational size in terms of number of credentialed faculty, number of full-time equivalent (FTE) administrators, pupil services, and teachers; proportion of female students and staff and Caucasian students and staff; and percentage of students receiving free/reduce lunch (proxy for community income). Policy adoption has been affected by district size, availability of resources for prevention, and organizational structure.^{30–32,45}

Statistical Analysis

The number of districts that made any change to their sun protection policy (dichotomous measure 1=adopt/strengthen versus 0=did not adopt/strengthen policy) was first compared between experimental conditions (intervention vs control) using a chi-square statistic to test H1. ANCOVA tested whether policy content and strength scores at follow-up differed between conditions, when controlling for baseline score, to test H2, using PROC GLM in SAS. Potential covariates demonstrating significant correlations with pre–post change in policy score were included as covariates. A two-tailed p-value of 0.05 was used for all tests of significance. Multiple tests were performed without adjusting the alpha criterion.

Results

Profile of School Districts

Nearly all participating districts provided copies of their written policies for assessment (see CONSORT diagram in Figure 1). At baseline, 103 of the 112 school districts provided written policies (52 in intervention and 51 in control; 51 in Colorado and 52 in Southern California). At follow-up, 103 of the 112 districts provided copies of their written policies (52 in intervention and 51 in control; 51 in Colorado and 52 in Southern California). Six school districts (4 in Southern California and 2 in Colorado) did not provide their policies at

both baseline and follow-up and therefore were excluded from the analysis; they had fewer Caucasian staff ($p=0.020$) and more students on free/reduced lunch ($p=0.042$) than districts providing policies at baseline and follow-up. Six other districts (all in Colorado) failed to provide policies at either baseline ($n=3$; 1 intervention, 2 control) or follow-up ($n=3$; 1 intervention, 2 control); they were smaller on all size measures ($p=0.005$ to 0.028), had fewer female staff ($p=0.008$), and higher per capita spending ($p=0.003$) than districts providing policies at both times.

Table 1 presents the characteristics of the 112 public school districts in the analysis. On average, districts had 8,121 students, 481 credentialed faculty, 30 administrators, 43 pupil services staff, and 397 teachers. Districts were larger in Southern California than Colorado. Students were equally divided on gender but the large majority of district staff were female (74%). Half of students overall were Caucasian but most district staff were Caucasian (83%). Colorado districts had more Caucasian students and staff than Southern California districts. Finally 41% of students were on free/reduced lunch.

Change in School District Sun Protection Policies for Students

Table 2 presents the mean policy score on each content category at follow-up by experimental group adjusted for covariates for districts assessed. A total of 12 school districts in the intervention group (4 in Colorado and 8 in Southern California) and 6 districts in the control group (1 in Colorado and 5 in Southern California) made a change that adopted or strengthened a sun protection policy between baseline and 2-year follow-up. The percentage of districts who made any change was not statistically different by treatment group (24% in intervention; 12% in control; $[df=1]=2.16$, $p=0.142$; percentage change was not modified by state $[df=1]=3.60$, $p=0.058$), failing to confirm H1. There was also no significant change in the total number of policy categories adopted although more districts in the intervention condition adopted policies on outdoor shade and communication with parents on sun safety than in the control condition (see Table 2 for adjusted means and statistical tests).

However, school districts receiving Sun Safe Schools intervention had higher sun protection policy strength scores than control districts in the completer analysis of 100 school districts with policy scores at baseline and follow-up, confirming H2 (see Table 2 for adjusted means and statistical tests). Comparisons on the individual policy categories revealed that policies regarding sun safety education for students, provision of outdoor shade on school grounds, and communication with parents about sun protection improved in the intervention school districts relative to the control districts. Mean scores on all the remaining content categories were higher in the intervention than control group, although these differences were not statistically different. Treatment condition did not interact with state on any of the policy scores (all p values > 0.05 ; test statistics and means available from first author). The sensitivity of the results on the total strength score was examined by repeating the analysis using various methods to impute missing values. The mean difference remained unchanged, although the p -value did change slightly (total strength score range= 0.013 to 0.069 ; total content score range: $p=0.020$ to 0.084) so the completer analysis was interpreted.

Discussion

An intervention consisting of personal contact, printed materials, and online resources can lead public school districts to adopt sun protection policies. The intervention group showed gains on several policy components. If Sun Safe Schools was scaled up to all districts in Colorado ($n=178$) and California ($n=1050$), approximately 280 school district are likely to adopt sun safety policies, protecting tens of thousands of children.

The most common changes were in policies that encouraged sun safety education of students, increased the availability of shade, and communicating with parents about sun protection. These changes are very encouraging. Education could potentially improve students' sun safety both at school and when not in school and shade may protect children who are not motivated to be sun safe. Recently, secondary school students used school recreation areas with shade sails more than unshaded areas,⁴⁶ even though adolescents are one of the least sun safe subgroups. These policy changes are also notable because they require substantial changes to schools. Education may require altering the school curricula and can face barriers from standards-based education. Likewise, shade has construction and maintenance costs.

Parents play a role in children's sun protection, by taking protective actions (e.g., apply sunscreen), providing sun protection resources (e.g., purchasing protective clothing), reminding children to take precautions; serving as sun safe role models, and reinforcing sun safety education.⁴⁷ Policies requiring schools to communicate with parents about sun safety should improve sun safety at school and school-sponsored activities.⁴²

The data suggested that Sun Safe Schools made districts more willing to allow sunscreen use by students but the difference did not meet the 0.05 alpha criterion. Sunscreen may be acceptable because it is a common sun protection behavior by Americans.^{11,48} Districts may have hesitated to codify protective clothing and hats into policy because they are less commonly used than sunscreen,^{11,48} may interfere with dress code policies on display of gang colors,^{49,50} and may raise concerns about head lice transmission.⁵¹ Districts may have been reluctant to alter school schedules to avoid disrupting school day management, as implied by surveys with principals.^{7,28}

Several circumstances may have undermined the effectiveness of Sun Safe Schools. There was a stronger sense of local control among administrators in Colorado than California which may have bred resistance to new policies. California districts already had policies on sun protective hats at baseline because of an existing state law, so additional change was difficult (i.e., a basement effect). The California School Boards Association (CSBA) created and promoted a model sun protection policy to school boards. The authors had input on CSBA's model policy to ensure consistency with Sun Safe Schools but CSBA's actions may have caused the five control districts in California to adopt policies, reducing the treatment difference. Intermediary organizations such as professional associations can be influential conduits for new health and safety innovations;⁵² however, Sun Safe Schools increased the number of districts adopting policies beyond CSBA.

School policy changes have improved students' health and safety.^{53–57} Policy sets the standards that administrators, teachers, parents, and students must reach. Policy strength is a concern, as most districts only encouraged rather than required sun protection. Districts may avoid requirements because they could be responsible for paying for sun protection resources for children who cannot afford them. The improvement in the strength score without a significant increase in number of districts altering policies may have arisen because the Sun Safe Schools intervention convinced administrators to adopt stronger policies than they would have if left to their own devices.

Policy implementation and effects on actual student sun safety behaviors should be examined in future research. It was uncertain whether Sun Safe Schools would result in board-approved policy change. Communicating with senior administrators at 112 public school districts was a substantial undertaking. Thus, the research assessed organizational behavior, an important first step to improve school sun safety through policy. An examination of implementation should assess school administrators and staff awareness of

policies and whether and how they put them into practice to establish that board-approved policy translates into meaningful improvements in students' sun safety. Future research should also assess cost effectiveness of Sun Safe Schools with its reliance on personal contact with school district administrators.

There were a few limitations to this study. It was conducted in regions with dry climates and a large number of sunny days and where outdoor recreation is popular, which may have elevated the importance of sun safety for school district administrators than in cloudier climates with less- active populations. The results are limited to public school districts. A few districts did not provide their policy documents, but imputation methods suggested nonresponse bias was small. Policy measures were based on inspection of written documents, which was a strength, but some districts may have changed operating procedures rather than board-approved policies, a change not captured in the coding protocol.

The adoption of sun protection policies for students is an important facet of CDC's 2004 *Guidelines for School Programs to Prevent Skin Cancer*.⁴² Six years on, simply publishing guidelines has not achieved widespread policy adoption. The Sun Safe Schools program is a promising method for outside groups to convince schools that sun protection policies for students are necessary and achievable.

Acknowledgments

This project was supported by a grant from the National Cancer Institute (CA100285). The findings, views, and opinions expressed here are those of the authors. The authors thank the 112 public school districts in California and Colorado and their administrators and principals who participated in the project.

DBB receives a salary from Klein Buendel, Inc and his spouse is the owner of Klein Buendel, Inc; his work has been supported by the NIH. MKB is the owner of Klein Buendel, Inc; her work has been supported by the NIH.

ILK and XL receive a salary from Klein Buendel, Inc.

GRC has served on data and safety-monitoring committees for Sanofi-Aventis, Cleveland Clinic, Daichi-Sankyo, Glaxo Smith Klein Pharmaceuticals, Genmab Biopharmaceuticals, Eli Lilly, Medivation, Modigenetech, Ono Pharmaceuticals, PTC Therapeutics, Teva Pharmaceuticals, and Vivus; he has consulted, advised and been a speaker for Alexion, Bayhill, Bayer, Novartis, Genzyme, Klein-Buendel, Inc., Nuron Biotech, Peptimmune, Somnus Pharmaceuticals, Sandoz, Teva Pharmaceuticals, and Visioneering Technologies, Inc.; his work has been supported by the NIH.

KDR and JLA's work has been supported by the NIH.

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Figure 1.
CONSORT diagram

Table 1

Descriptive characteristics of the 112 public districts randomized in the trial

District Characteristic	Southern California	Colorado	Total
N	56	56	112
Students in grades–K 12 (<i>n</i>)	12,090.1 (10,851.9)	4,152.2 (7,661.0)	8,121.1 (10,165.0)
Credentialed faculty (<i>n</i>)	628.0 (560.1)	334.9 (587.8)	481.4 (590.2)
Full-time equivalent (FTE) administrators (<i>n</i>)	38.2 (32.9)	21.6 (34.6)	29.9 (34.6)
FTE pupil services staff (<i>n</i>)	43.3 (41.6)	42.4 (84.6)	42.9 (66.4)
FTE teachers (<i>n</i>)	535.6 (475.5)	258.3 (453.0)	397.0 (482.8)
Female staff (%)	75.9 (9.9)	72.4 (5.6)	74.2 (8.2)
Caucasian staff (%)	72.4 (19.6)	92.9 (13.7)	82.6 (19.7)
Female students (%)	48.9 (1.2)	48.7 (2.5)	48.8 (2.0)
Caucasian students (%)	30.6 (24.4)	72.6 (21.1)	51.6 (31.0)
Students on free/reduced lunch (%)	41.9 (28.5)	40.0 (16.9)	41.0 (23.4)
Per capita spending (\$)	\$8724.00 (923.8)	\$9552.40 (2661.9)	\$9138.20 (2026.6)

Table 2

ANCOVA models^a comparing mean follow-up sun protection policy score by condition ($n=100$ school districts^b)

Policies	Content ^c			Strength ^d		
	Adjusted M (SE) ^e		p	Adjusted M (SE) ^e		p
	Control	Intervention		Control	Intervention	
Sunscreen Use	0.23 (0.05)	0.37 (0.05)	0.050	0.44 (0.10)	0.71 (0.10)	3.66
UV Protective Clothing	0.35 (0.05)	0.43 (0.05)	0.226	0.35 (0.05)	0.43 (0.05)	1.48
Hats	0.36 (0.04)	0.42 (0.04)	0.79	0.36 (0.04)	0.42 (0.04)	0.79
Education of Students	0.20 (0.05)	0.32 (0.05)	0.076	0.23 (0.07)	0.44 (0.07)	4.38
Education of Teachers	0.05 (0.03)	0.11 (0.03)	0.201	0.06 (0.04)	0.14 (0.04)	1.79
Outdoor Shade	0.08 (0.05)	0.22 (0.04)	4.34	0.11 (0.08)	0.36 (0.07)	5.38
Scheduling	0.06 (0.04)	0.14 (0.04)	2.57	0.06 (0.04)	0.15 (0.04)	2.62
Parent Outreach	0.08 (0.05)	0.24 (0.05)	5.54	0.12 (0.08)	0.35 (0.07)	4.56
Resource Allocation	0.00 (0.01)	0.02 (0.01)	0.83	0.00 (0.01)	0.02 (0.01)	0.83
Accountability	0.03 (0.03)	0.09 (0.03)	1.69	0.03 (0.03)	0.09 (0.03)	1.69
Total Score	1.44 (0.33)	2.34 (0.32)	3.88	1.79 (0.44)	3.10 (0.43)	4.58

^a Analysis was adjusted for baseline policy score and percentage of female staff and percentage of Caucasian students.

^b Districts providing completed policy data at baseline and follow-up were analyzed.

^c Not address=0, Addressed=1.

^d Not allowed=0, Recommended/ encouraged=1, Required=2.

^e For policy components that had intent assessed, content and strength scores were included only if intent was assessed as "direct."