A Comprehensive Review of State Vision Screening Mandates for Schoolchildren in the United States

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SIGNIFICANCE: Methods and frequency of vision screenings for school-aged children vary widely by state, and there has been no recent comparative analysis of state requirements. This analysis underscores the need for developing evidence-based criteria for vision screening in school-aged children across the United States.

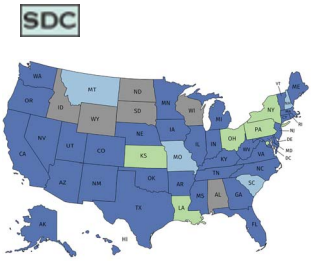
PURPOSE: The purpose of this study was to conduct an updated comprehensive analysis of vision screening requirements for school-aged children in the United States.

METHODS: State laws pertaining to school-aged vision screening were obtained for each state. Additional information was obtained from each state's Department of Health and Education, through their websites or departmental representatives. A descriptive analysis was performed for states with data available.

RESULTS: Forty-one states require vision screening for school-aged children to be conducted directly in schools or in the community. Screening is more commonly required in elementary school (n = 41) than in middle (n = 30) or high school (n = 19). Distance acuity is the most commonly required test (n = 41), followed by color vision (n = 11) and near vision (n = 10). Six states require a vision screening annually or every 2 years.

CONCLUSIONS: Although most states require vision screening for some school-aged children, there is marked variation in screening methods and criteria, where the screening occurs, and grade levels that are screened. This lack of standardization and wide variation in state regulations point to a need for the development of evidence-based criteria for vision screening programs for school-aged children.

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It is estimated that more than 200 million children worldwide are without needed vision correction, limiting their ability to learn and perform in school.[1] Students from disadvantaged backgrounds are disproportionally impacted. In the United States, the National Survey of Children's Health found that approximately one-quarter of children had not had their vision checked in the past 2 years, and children from low-income families and racial minority backgrounds are less likely to receive needed vision care.[2] Vision screenings are an effective way to detect children at risk for vision problems.[3–6] They are recommended to be done at set intervals in childhood because vision can change over time and children may not be routinely accessing care.[7]

Twenty-six states have specified vision screening guidelines for preschool-aged children.[8] There is limited information about state requirements for vision screening in school-aged children. A 2018 report by Gracy et al.[9] found that 42 states mandate a vision screening for school-aged students at some point between kindergarten and 12th grade, with only four states mandating annual screening. Prevent Blindness has an online resource updated every 2 years, which lists each state's vision screening mandates by grade[8]; Kindle and Spencer[10] published a review of childhood vision screening laws and programs across the United States. Both of these resources highlight marked variation in vision screening methodology and timing by state but do not assess how state requirements compare with one another. One comparative analysis conducted in 2008 found that 32 states require a minimum of screening for distance visual acuity for prekindergarten or school-aged students but did not provide a breakdown of what screening components were required at each grade (Naser NT, et al. IOVS 2008;49:ARVO E-Abstract 3131).

Recognizing that state vision screening requirements periodically change, the goal of this analysis was to provide a comprehensive state-by-state review of vision screening requirements for school-aged children by analyzing variations in frequency, timing, and components of the vision screening, current as of the time this analysis was conducted in September to October 2020.

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TABLE 1. U.S. vision screening components by state and grade

	Required						Recommended and/or optional	
State	**Distance acuity**	**Near acuity**	**Color vision**	**Stereoacuity**	**Ocular alignment**	**Plus lens**	**Instrument-based screening***	**Additional grades and/or tests**
Alaska†	K, T						"Valid photoscreener instrument administered at least once to children between the ages of 3 and 5 (preschool or kindergarten) and utilized for the special needs population."	Distance acuity: K, 1st, 3rd, 5th, 7th, 10th, 12th Near acuity: R Color vision: males K, T Stereoacuity: K, T Ocular alignment: K, T
Arizona†	K, 1st, 2nd, T, SE, R							
Arkansas	K, 1st, 2nd, 4th, 6th, 8th, T, R		K, 1st, 2nd, 4th, 6th, 8th, T, R	K, 1st, 2nd, 4th, 6th, 8th, T, R	K, 1st, 2nd, 4th, 6th, 8th, T, R	K, 1st, 2nd, 4th, 6th, 8th, T, R		
California	K, 2nd, 5th, 8th, T, SE	K, 2nd, 5th, 8th, T, SE	Males in 1st, SE				"Optional under guidance of optometrist or ophthalmologist. Evidenced-based, instrument-based screening is particularly useful as an alternative to optotype-based screening for: (1) Students with developmental disabilities, (2) Students who are younger (e.g., preschool or kindergarten) or pre-literate, (3) Students who are unable to be screened with traditional optotype-based screening."	Near point of convergence: 1st to 12th Stereopsis: K to 12th
Colorado	K, 1st, 2nd, 3rd, 5th, 7th, 9th, R	R	R	R			"These devices work well for young students and students with special needs that are difficult to screen."	Plus lens, near acuity, stereoacuity, near point of convergence, color vision
Connecticut	K, 1st, 3rd, 4th, 5th, 6th, 9th, T							
Delaware	K, 2nd, 4th, 7th, 9th, SE, T, R		K, T	K, T	K, 2nd, T, R			Near acuity: students with difficulty seeing at near range
District of Columbia	K, 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th							
Florida	K, 1st, 3rd, 6th, T (K–5th)					1st, 3rd, 6th, T (1st–5th)		
Georgia	K, T							1st, 3rd, 5th, 8th
Hawaii†	K, 7th, T							

(*Continued*)

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TABLE 1. *Continued*

State	Required						Recommended and/or optional	
	Distance acuity	Near acuity	Color vision	Stereoacuity	Ocular alignment	Plus lens	Instrument-based screening*	Additional grades and/or tests
Illinois‡	K, 2nd, 8th, SE, T, R		2nd		2nd, 8th, SE, T, R	K, 2nd, 8th, SE, T, R	"Photoscreening, using the MTI camera, may be conducted for children under three years of age and for older children who cannot be screened with stereoscopic or distance tests."	
Indiana	K, 3rd, 5th, 8th, T, R	K, 3rd, 5th, 8th, R		K				
Iowa	K, 3rd						"If a child over the age of 6 years cannot complete a vision chart, it is acceptable to use one of the automated screening tools for children under 6 in the list above. (iScreen, SPOT, Plusoptix, Sure Sight)."	
Kansas	K, 2nd, 4th, 6th, 8th, 10th, 12th			K			"Instrument-based screening is not recommended for children ages 6 years and older unless children cannot participate in optotype-based screening."	Near acuity, color vision
Kentucky‡	K, 6th, T							
Louisiana	K, 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th		1st				"Ages 1, 2, 3, 4, and 5 years. May also be used with students aged 6 years and older who cannot participate in optotype-based screening."	
Maine	K, 1st, 3rd, 5th, 7th, 9th	1st, 3rd					"Instrument-based screening may be used in place of visual acuity screenings with children ages 3, 4, and 5 years and children of any age when these children cannot participate in optotype-based vision screening."	
Maryland	K, 1st, 8th, T							
Massachusetts	K, 1st, 2nd, 3rd, 4th, 5th, 6th, 9th	1st, 2nd, 3rd, 4th, 5th, 6th, 9th		K, 1st, 2nd, 3rd			"Instrument-based vision screening is approved only for 3 to 5 year olds."	
Michigan	K, 1st, 3rd, 5th, 7th, 9th				K, 1st, 3rd, 5th, 7th, 9th			

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TABLE 1. *Continued*

State	Required						Recommended and/or optional	
	Distance acuity	Near acuity	Color vision	Stereoacuity	Ocular alignment	Plus lens	Instrument-based screening*	Additional grades and/or tests
Minnesota	K, SE						"Currently instrument-based vision screening is not recommended for children older than 6 years of age who can be screened with visual acuity charts."	1st, 3rd, 5th, 7th, 10th, R, SE, T Distance acuity: all Color vision: K males only Ocular alignment: all Stereoacuity: optional through 3rd Plus lens: all
Mississippi†	K							
Nebraska	K, 1st, 2nd, 3rd, 4th, 7th, 10th, T, R					K, 1st, 2nd, 3rd, 4th, 7th, 10th, T, R		
Nevada†	K, 1st, 6th, 9th, SE, R							
New Jersey†	K, 2nd, 4th, 6th, 8th, 10th, T							
New Mexico	K, 1st, 3rd, T, R, SE		K, T		K, T		"Photoscreening is for students in pre-kindergarten, kindergarten, and first grade."	Near acuity: student assessment team or special education referral
New York	K, 1st, 3rd, 5th, 7th, 9th, 11th, T, R	K, 1st, 3rd, 5th, 7th, 9th, 11th, T, R	K, 1st, 3rd, 5th, 7th, 9th, 11th, T, R					Hyperopia test
North Carolina†	K, T							
Ohio	K, 1st, 3rd, 5th, 7th, 9th, 11th, R, T		K, T	K, 1st, T			"Suresight Vision Screener and Retinomax Autorefractor are optional methods in K and 1."	Near acuity: K, 1st, 3rd, 5th, 7th, 9th, 11th
Oklahoma	K, 1st, 3rd			K, 1st, 3rd				
Oregon†	K, T							
Pennsylvania	K, 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th	K, 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th	1st, those not previously screened	1st, those not previously screened		1st, T who passed distance acuity		
Rhode Island	K, 1st, 2nd, 3rd, 4th, 5th, 7th, 9th, T, R	K, 4th, 7th, 9th, T	K, T		K, 1st, 2nd, T			

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TABLE 1. *Continued*

State	Required						Recommended and/or optional	
	Distance acuity	Near acuity	Color vision	Stereoacuity	Ocular alignment	Plus lens	Instrument-based screening*	Additional grades and/or tests
Tennessee	K, 2nd, 4th, 6th, 8th, R	K, 2nd, 4th, 6th, 8th, R	K, T					One year of high school. Plus lens (hyperopia): K, T for students who pass distance acuity testing. Functional tests (muscle balance and depth perception or ocular motor).
Texas	K, 1st, 3rd, 5th, 7th, T						"Photoscreening may be used for individuals through five years of age and those with disabilities who do not respond well to other allowable screening methods."	
Utah	K, 1st, 3rd, 5th, 7th, 9th, T, R						"Instruments should not be used for screening in students who are in first grade and older unless they cannot participate in optotype-based screening."	
Vermont	K, 1st, 3rd, 5th, 7th, 9th, 12th	K, 1st, 3rd, 5th, 7th, 9th, 12th					"Vision Screening with a spot vision machine; Perform visual screening per product instructions; Findings are pass or refer; there is not an acuity reading."	
Virginia	K, 2nd, 7th, 10th, T						"Any such screening may be conducted by a qualified nonprofit vision health organization that uses a digital photoscreening method pursuant to a comprehensive vision program or other methods that comply with Department of Education requirements."	Color vision: K
Washington	K, 1st, 2nd, 3rd, 5th, 7th, R	K, 1st, 2nd, 3rd, 5th, 7th, R					"Schools may use instrument-based vision screening devices (such as photo screening devices) in lieu of optotype charts."	
West Virginia†‡	K, T							Acuity: 11- to 13-year-olds

Vision screening components by state and grade collected from September to October 2020. The mandated screening components and grades in which they are required are listed. Optional or recommended tests are also included. States without screening requirements or states that only included recommendations were not included. Citations for these data can be found in Appendix 2 (available at http://links.lww.com/OPX/A483). Alabama, Idaho, Missouri, Montana, New Hampshire, North Dakota, South Carolina, South Dakota, Wisconsin, and Wyoming do not require a vision screening for school-aged children. *Language for instrument-based screening protocols is quoted from state sources cited in Appendix 2 (available at http://links.lww.com/OPX/A483). †No screening components were specified, and distance acuity was assumed to be the only required test. ‡Illinois, Kentucky, Nebraska, and West Virginia require comprehensive eye examinations upon school entry. K = kindergarten; R = referred; SE = special education; T = transfer.

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METHODS

Data Collection

Each state's current vision screening requirements for screening school-aged children were reviewed (September to October 2020). For the purposes of this analysis, the District of Columbia was categorized as a state. In addition, the term *law* reflects references to any legal mandate, specifically those listed as a law or statute. The term *code* refers to the compilation of such laws for a state. Sometimes, a law delegates the specific requirements of screenings to be regulations from the Department of Health or Department of Education.

Sources of information include current state legislation, as listed in the education and public health sections of available vision screening laws. Data collected on school-age vision screening were initially obtained from the state legal code, either in the state laws or administrative code. In most cases, the laws specified details about the periodicity of the vision screening. When the legal code specified that the Department of Health or Department of Education was to establish regulations about vision screening requirements, this information was obtained from the state's Department of Education or Department of Health website resources. If the websites were incomplete, Departments were contacted via phone or e-mail for additional details.

For this analysis, *school age* is defined as kindergarten through grade 12. *Elementary school* is defined as kindergarten to 5th grade, *middle school* as 6th to 8th grade, and *high school* as 9th to 12th grade. Preschool screening requirements and mandates for comprehensive eye examinations before school entry were not included in this analysis. Screenings were categorized as those provided by the school system, *school screening*, or *community screening*, when the requirement stated the family was responsible for ensuring their child received a vision screening at the child's medical home or another local provider, often requiring the family to submit documentation of screening to the child's school. In cases where states recommended rather than required vision screening, this was also noted and analyzed separately from the compulsory requirements.

Data Analysis

For each state, the following information was collected: whether vision screening was mandated for school-aged children (yes/no), where screenings occurred (school or community), and which screening methods were required or recommended/optional (distance visual acuity, near visual acuity, color vision, stereoacuity, ocular alignment, plus lens, or instrument-based screening) (Table 1). States with requirements for screenings *upon first entry* were classified as kindergarten and grade of transfer. States with requirements before advancing to a higher grade level were categorized as a requirement for that grade (i.e., "Before enrolling in grade 8" is listed as required for grade 8). Screenings for referred students include students who are referred by parents or teachers, students not reading at grade level, students repeating a grade, students who failed a screening the previous year, or students being evaluated for special education.

Because there was variation in how screening methods were described in each state's laws, an ophthalmologist (MEC) reviewed each state's screening methods and assigned them to the following categories:

- *Distance visual acuity, which includes descriptors such as "use of a Snellen chart," "optotype-based screening," "myopia screening," "hyperopia screening," or "screening for farsightedness";*
- *Near vision, which also includes descriptors such as "near visual acuity" or "near vision screening";*
- *Color vision, which includes descriptors such as "color deficiency test";*
- *Stereoacuity, which includes descriptors such as "depth perception," "binocularity," "binocular coordination," "random dot E," or "PASS stereotest";*
- *Ocular alignment, which includes descriptors such as "muscle balance," "eye muscle function," or "strabismus test";*
- *Plus lens, which includes descriptors such as "plus lens test";*
- *Instrument-based screening, which includes descriptors such as "refractive error test," "scientifically validated screening tool," "automated screening device," "photo vision tester," and "photoscreening" or "autorefractor."*

States that do not mandate specific screening methods were assumed to require distance visual acuity testing only, as this was the most commonly required test among states that did specify screening methods. Distance visual acuity was also found to be the most commonly required test in a previous analysis of state vision screening mandates (Naser NT, et al. IOVS 2008;49:ARVO E-Abstract 3131). An aggregate analysis was performed for all states with school-age screening mandates to compare frequency of grades screened and screening methods included (Fig. 1).

RESULTS

How Many States Mandate or Recommend Vision Screening?

Forty states and the District of Columbia (41/51, 80%) mandate vision screening for school-aged children at least once, either in the school or community setting (Table 1). In addition to these mandates, 13 of these states also include language for recommended or optional screenings for additional grades. Four additional states (Montana, Missouri, South Carolina, and New Hampshire) recommend a vision screening but do not mandate one. Alabama, Idaho, North Dakota, South Dakota, Wisconsin, and Wyoming (6/51, 12%), had no vision screening requirement or recommendations based on our review of laws and regulations. Of the six states that require vision screening annually or every 2 years, four are clustered in the northeast United States (Fig. 2). Similarly, five states with no vision screening requirements border one another in the northcentral and northwest regions of the country.

For Which Grades Is Vision Screening Mandated?

All states with a vision screening mandate (41/51, 80%) include required screenings for kindergarten students either during or upon entry to that grade. Thirty (30/51, 59%) states require a screening for at least 1 grade in middle school, and 19 states (19/51, 37%) require a vision screening for at least 1 grade in high school. Three states (3/51, 6%) require a vision screening annually for kindergarten to grade 12, three (3/51, 6%) require a vision

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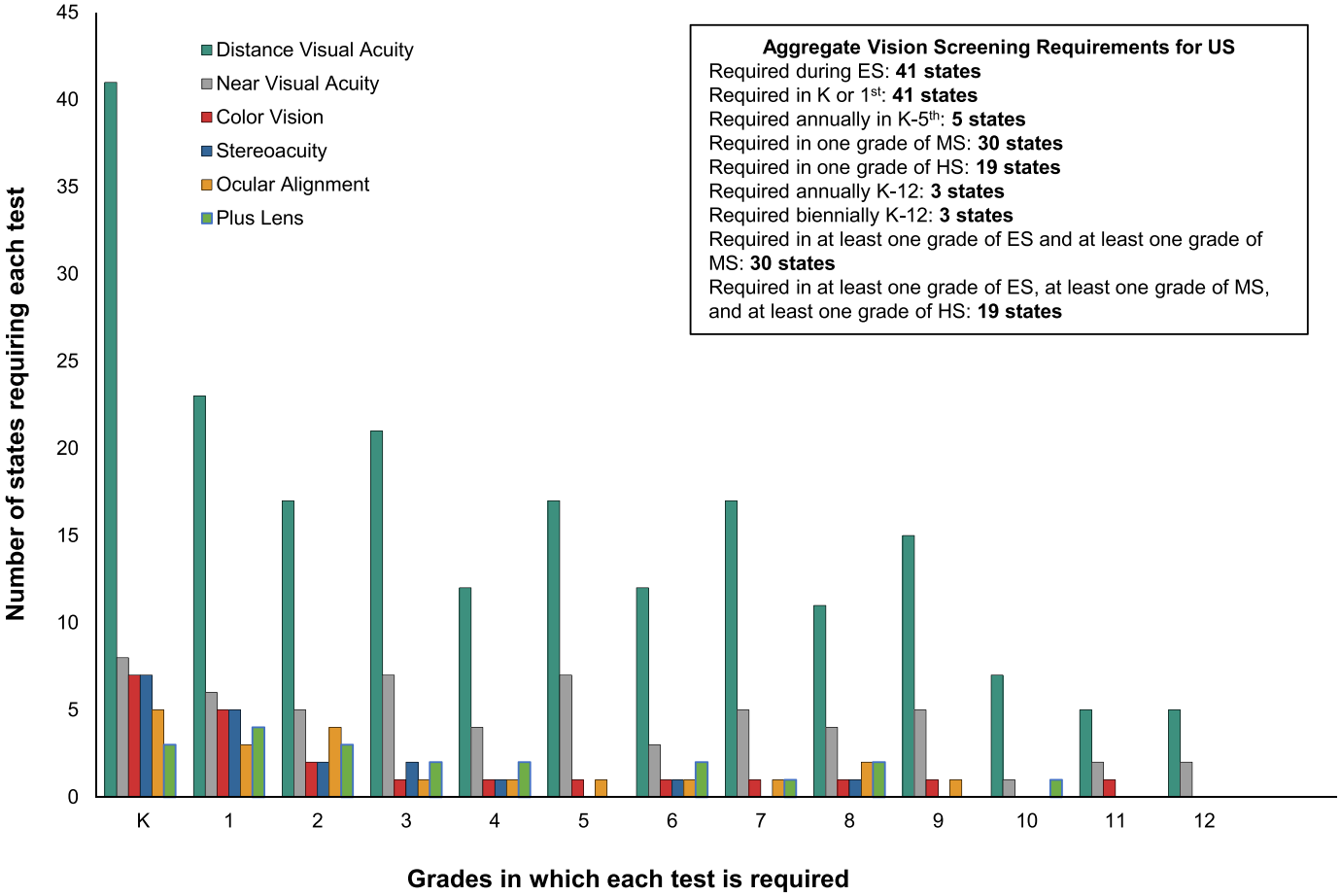


FIGURE 1. Distribution of screening requirements. The number of states that require the specific screening components for each grade level based on a review of current state laws.

screening biennially in these grades, and one state (1/51, 2%) requires screening every other year in kindergarten to grade 10. Nineteen states (19/51, 37%) require a vision screening for at least one grade in elementary, middle, and high school (Fig. 1). The average number of grades screened across all states with a school-age mandate is 5 (range, 1 to 13). Screening frequency decreases in higher grades (Fig. 1). Among all states, the grades where screenings most commonly occur are kindergarten, 1st, 3rd, 5th, 7th, and 9th with an overall trend toward decreased frequency as grade-level increases (Fig. 1).

What Vision Screening Methods Are Mandated?

Among all states, distance visual acuity (n = 41, 80%) is the most commonly required screening test (Appendix 1, available at http://links.lww.com/OPX/A482), followed by color vision testing (n = 11, 22%) and near visual acuity (n = 10, 20%). Among the states that mandate these screening tests, distance acuity is most often required in more than one grade (34/41), followed by near acuity (10/10); color vision testing is usually required once (9/11). Eight states (8/51, 16%) require stereoacuity testing for at least one grade, six states (6/51, 12%) require testing for ocular alignment, and five states (5/51, 10%) require plus lens testing. Stereoacuity testing is primarily required for younger grades, with only one state requiring stereoacuity testing beyond third grade. The same is also true for ocular alignment and plus lens testing, with a higher frequency in kindergarten to grade 3 compared with older grades. Three states (3/51, 6%) include ocular alignment testing in middle or high school; only one state (1/51, 2%) requires stereoacuity testing in middle or high school. Four states (4/51, 8%) require plus lens testing in middle or high school.

Are States Using Instrument-based Screening?

Seventeen states (17/51, 33%) permit the optional use of instrument-based screening. Specifications about use vary widely by state. Of the 17 states that permit use, 8 do not specify the instrument to be used, 8 specify a photoscreener, and 1 specifies an autorefractor or photoscreener. In addition, many specify age cutoffs for its use. Six of these 17 states (6/17, 35%) allow instrument-based screening for kindergarteners or children 6 years or younger; 11 states (11/17, 65%) permit instrument-based screening in lieu of distance acuity when a student is unable to participate in traditional optotype testing. One of the states specifies that guidance of an optometrist or ophthalmologist is required for instrument-based screening use.

Where Do Vision Screenings Occur?

Nine states (9/41, 22%) require vision screenings in the community setting, and 24 states (24/41, 59%) require vision screening in school. Eight states (8/41, 20%) require screenings in both

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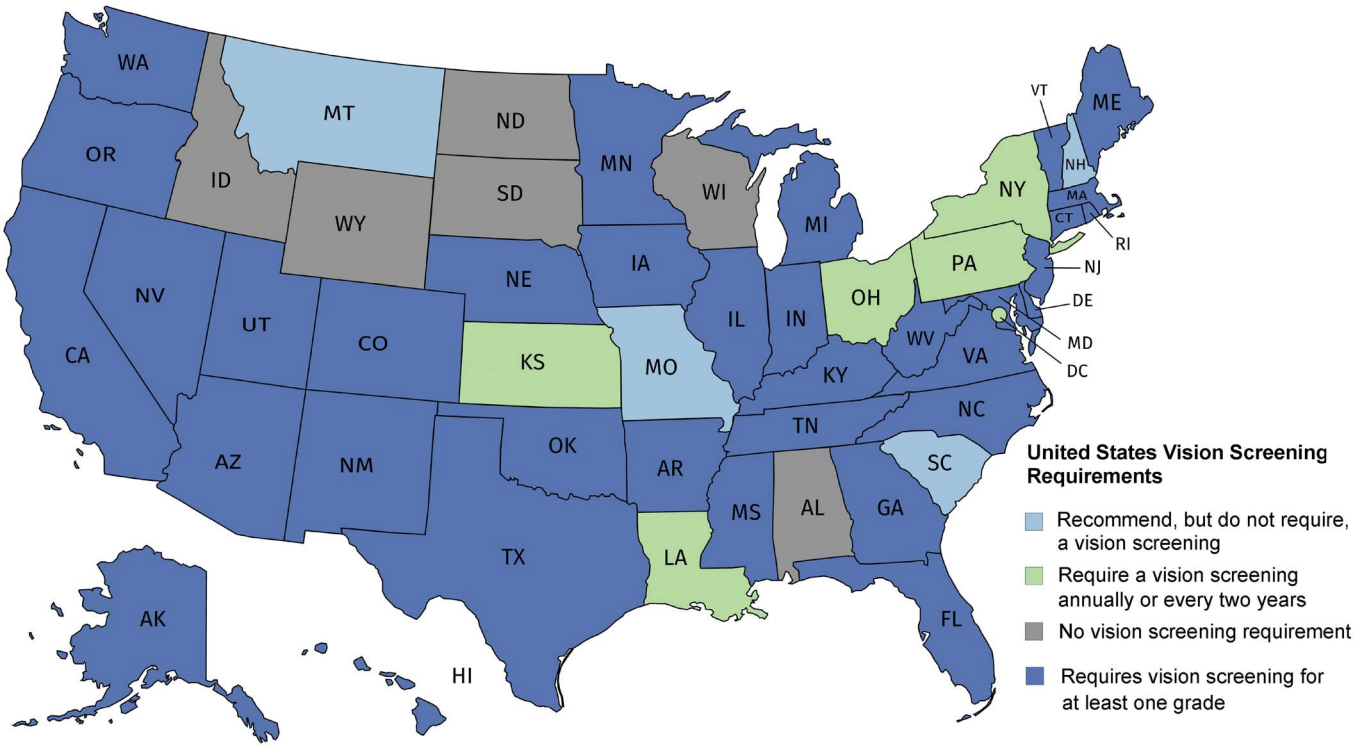


FIGURE 2. Map of vision screening requirements. A map depicting which states require a school or community vision screening in school-aged children based on a review of current state laws. Map generated using mapchart.net.

school and community settings, with the requirements differing at grade levels.

DISCUSSION

Vision screenings in community and school settings are effective public health interventions to detect children at risk for vision disorders and promote eye health education. Vision screenings are not a substitute for a comprehensive eye examination; for children who do not pass, vision screenings are a way to identify and connect children to needed eye care providers.[1,6] Refractive errors are present in nearly 30% of school-aged children,[11,12] and other vision problems, including amblyopia and strabismus, affect about 4% of children.[6] Impaired visual acuity may negatively impact school performance, and some eye conditions can lead to permanent loss of sight if left untreated.[1,6]

We found that vision screening requirements for school-aged children vary dramatically across the United States. Six states have no requirement for vision screening in school-aged children, whereas many states specify certain screening tests at designated grade levels, with more tests conducted in lower grades. Four states, Illinois, Kentucky, Nebraska, and West Virginia, mandate comprehensive eye examinations before kindergarten. Although there are no national evidence-based recommendations for vision screening in school-aged children, current consensus guidelines from the American Association for Pediatric Ophthalmology and Strabismus and the American Academy of Ophthalmology state that children older than 5 years should be screened at a minimum every 1 to 2 years for distance visual acuity, which would mean a vision screening in seven grades up to high school (kindergarten to grade 12).[13,14] The average number of grades for which states currently mandate vision screening is five; only 12% of states meet the recommendation to conduct vision screenings for distance visual acuity annually or every 2 years (Table 1).

There is an urgent need to align state vision screening practices, especially in impoverished communities. A 2019 analysis by Milante et al.[15] demonstrated that one-third of students in Baltimore failed a vision screening across all grades, with higher failure rates in grades that were not mandated by the state (grades 2 to 7). Similar rates of vision screening failures (28 to 32%) have been found among other low-income student populations.[16–20] The high failure rates among low-income students, coupled with the fact that low-income families and families without insurance are less likely to receive needed vision care,[2,21] underscore a greater unmet need for vision screening among the most disadvantaged students.

Recently, there has been interest in instrument-based screening as a cost-effective tool to detect amblyopia, strabismus, and refractive error in school-aged children unable to participate in optotype-based testing.[13,14,22–25] In contrast to the use of instrument-based screening for children unable to participate in optotype-based testing, there is limited literature on its use in school-aged children able to participate in optotype-based testing, either as an adjunct or a replacement for distance acuity testing. Although instrument-based screening has not been established as a standard of care in this age group, 17 states permit its optional use. There is a need for research on the effectiveness of these approaches in school-aged children. This is especially important because there is marked variation in how states describe instrument-based screening, and prior work by the Vision in Preschoolers studies has

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demonstrated that photoscreeners and autorefractors differ in their effectiveness for screening in preschool-age children, with autrorefraction being significantly more effective in identifying those with vision problems.[26]

Of all states that require vision screenings, 78% require the screenings to be conducted in the school setting. Offering screenings uniformly in the school setting would likely increase the early detection of eye diseases without the added obstacles that obtaining community eye examinations pose for families.[4] Adopting a universal strategy for vision screening in school-aged children at least every other year, which at present only a minority of states require, along with post-screening evaluation in schools, would be reasonable given the high rates of uncorrected vision problems in school-aged children.

Limitations

There are limitations to our analysis. We relied on publicly available documents. Although every effort was made to ensure accuracy of data, it is possible that details of some state vision screening requirements are not publicly available. All states with vision screening requirements (n = 41) included language specifying this mandate in the law. Thirteen states (13/41, 32%) delegated the determination of grades and tests mandated to state Departments of Health or Education. In addition, some states or counties within states may be performing vision screening at a greater frequency than the minimum mandated by state laws. This analysis looked only at legal requirements, not current state vision screening practices.

Furthermore, given the high frequency with which state laws are changed,[27] it is possible that some state requirements have changed since the collection of our data in fall 2020 or will change in the future. We also had to interpret at times ambiguous language about required grades and screening methods in some states. This may have skewed our analysis with an overrepresentation or underrepresentation of certain vision screening practices. For example, the grades where screening most frequently occurs (Fig. 1) were influenced in part by our decision to choose the lowest grade if the state provided an option.

This analysis does not include information related to which states require follow-up care after a vision screening and how compliance with community screenings is organized, enforced, and tracked. These important topics are beyond the scope of this article. Finally, this analysis is focused on vision screening requirements for school-aged children; it does not examine any state or school requirements for specific populations of students (e.g., students with individual education plans) to obtain a comprehensive eye examination or vision screening requirements for preschool-aged children. Future studies exploring this area would add much needed information to the field of children's eye health.

CONCLUSIONS

Vision screenings can successfully identify school-aged children at risk for many vision problems, most commonly uncorrected refractive error. Although vision screening in school-aged children is required in the majority of states, there is marked variation in the laws and regulations around these screenings. The lack of consistency across states on screening practices is consistent with the limited existing data regarding best practices in this area. Uniform guidance on screening methods and grade levels screened, data collection, and surveillance of vision problems in schoolchildren, as well as use of existing data, can help to establish best-practice guidelines for vision screenings. Such guidelines could be used to establish consistency in vision screening across states at set intervals, ensuring children who need care are properly identified and referred to an eye care provider.

ARTICLE INFORMATION

Supplemental Digital Content: Appendix 1. Distance visual acuity screening requirements by state and grade level are available at http://links.lww.com/OPX/A482.

Appendix 2. List of sources used to determine state screening requirements and recommendations is available at http://links.lww.com/OPX/A483.

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