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Title registration for a systematic review:

The impact of school-based vision care programs on the academic performance and well-being of school-aged children: a systematic review

Huan Wang, Matthew Boswell, Scott Rozelle, Nathan Congdon, Hongyu Guan, Jin Zhao

Submitted to the Coordinating Group of:

☐	Crime and Justice
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☐	Methods
☐	Knowledge Translation and Implementation
☐	Business and Management
☐	Other:

Plans to co-register:

☐	No
☐	Yes ☐ Cochrane ☐ Other
X	Maybe

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Title of the review

The impact of school-based vision care programs on the academic performance and well-being of school-aged children: a systematic review

Background

Worldwide, an unmet need for corrective spectacles is the leading cause of reduced vision in children. Myopia, or short-sightedness (the inability to see distant objects clearly), has become the most common eye condition. Reduced vision may affect academic performance and therefore choice of occupation and socio-economic status in adult life. Children's myopia problems can be easily detected by simple vision tests (such as visual acuity screenings) and corrected by timely and proper fitting of quality eyeglasses. School-based vision care programs are one of the most popular strategies used by governments and nongovernmental organizations attempting to solve myopia problems. They tend to offer a range of services that may include vision screening, eye examinations, information campaigns, and eyeglasses dispensing. Observed variation in the provision of vision care programs worldwide highlights the uncertainty around the efficacy and cost effectiveness of such programs. While many studies have focused on impacts of vision care programs on visual outcomes (Evans, Morjaria, & Powell, 2018; Ma et al., 2015; Smith, 2013; Wu et al., 2012), the effectiveness of vision care interventions as an educational input is unknown. A review of the evidence for the effectiveness of school-based vision care interventions on the academic performance and well-being of school-age children is important to resolve this uncertainty and identify future directions for research.

The current review seeks to systematically examine the available evidence for the effectiveness of different types of school-based vision care programs on student academic performance and well-being outcomes. Secondary goals relate to comparing different approaches (e.g. vision screening, eye examinations, information campaigns, and eyeglasses dispensing) and identify those that demonstrate the largest statistically significant effects when compared with comparison groups. Ultimately, this systematic review intends to provide school teams and policy makers with evidence that can be useful for decision-making and program implementation.

Policy relevance

A better understanding of the impacts of vision care interventions on academic outcomes can inform policies to expand access to services. Improving school outcomes can lead to increased productivities for a nation. There are over two billion people in Latin America, Africa and Asia in need of eyeglasses who do not have access to them (World Economic Forum, 2016). An estimated 4.8 billion people, or about half of the world's population, will have myopia by 2050 (Holden et al., 2016). International NGOs and inclusive businesses collectively address only 0.3% of the global need for vision care in developing countries. Without further intervention, this gap will only widen, as the prevalence rates of poor vision in children are expected to rise over the next three decades.

The lost productivity from not addressing this need has been calculated to cost the global economy at least $227 billion per year without accounting for loss associated with missed educational opportunities (Frick, Joy, Wilson, Naidoo, & Holden, 2015).

Governments in developing countries have been slow in focusing on this problem, especially as it relates to systematic screening in schools. In 2015, only $37 million, or 2 cents per person affected, was spent on providing eyeglasses to people in the developing world (World Economic Forum, 2016). Political will, investment and the engagement of private sectors need to work together to solve the vision care problem at scale.

The capacity for vision care intervention to boost human capital is not well understood among policy makers, especially among low- and middle-income countries. A review of this issue is overdue.

Objectives

The objectives of the review are to summarize and synthesize the available research evidence on the effects of school-based vision care provision for myopic students for improving academic performance and well-being among students.

The specific research questions guiding the review are:

1. What effect do school-based vision care interventions have on academic outcomes for myopic students? Specifically, what are the effects on measures of academic achievement, junior high completion, and high school completion?

2. What effect do school-based vision care interventions have on well-being and vision related intermediate outcomes for myopic students? Specifically, what are the effects on measures of learning anxiety, peer relationships, and self-efficacy and visual acuity, myopia progression, usage of eyeglasses?

3. Which school-based vision care intervention is more cost efficient?

4. Do the effects of school-based vision care interventions on students' outcomes vary among different students and school environment? Specifically, do the effects vary according to the gender or socioeconomic status of the students? Do the effects vary according to the school or teacher quality?

Existing reviews

The Campbell and Cochrane systematic review libraries were searched in October 2018 for completed and ongoing reviews relevant to this area. This search found a number of relevant completed reviews:

- A Cochrane review of the effectiveness of vision screening programs carried out in schools to for correctable visual acuity deficits in school-age children (Evans et al., 2018). This review focused mainly on the uptake and wear of spectacles of vision screening as opposed to academic performance and broader well-beings of students.
- A Cochrane review of the effectiveness of strategies to control progression of myopia in children (Walline et al., 2011). This review assesses the effects of several types of interventions, including eye drops, under correction of nearsightedness, multifocal spectacles and contact lenses, on the progression of nearsightedness in myopic children younger than 18 years and thus does not include the impact of vision care on student academic performance and well-being measures.
- A Cochrane review of acupuncture for slowing the progression of myopia in children and adolescents (Wei, Liu, Li, & Liu, 2011). This review only focuses on the effectiveness and safety of acupuncture in slowing the progression of myopia in children and adolescents, and does not have a specific focus on vision care interventions aimed at the broader range of performance and well-being measures of students.

Intervention

Eligible interventions are any form of vision care delivered to a whole-class or school basis to students in a pre-school/kindergarten, primary/elementary and secondary school setting.

The intervention may be delivered by the class teacher or other school or non-school personnel. The period of study will need to run for at least three months to be included. For example, school-based vision visual acuity screenings; vision care information campaigns; traditional vision care methods like eye exercises and acupuncture; programs to provide free or subsidized eyeglasses, and programs that provide incentives for teachers to improve eyeglasses usage.

For the present review, we will only include studies evaluating the effectiveness of school-based vision care interventions that involve a control condition. The control condition in this review may involve, for instance, a control group with no intervention (i.e. studies where the intervention group is compared with a group not receiving intervention at all), a control group with intervention as usual (i.e. studies where the intervention group is compared with those receiving the standard practice), a wait-list control group (i.e. studies where the intervention group is compared with a group of selected individuals who wait a period of time to receive the same intervention) or a placebo group (i.e. studies where the intervention group is compared with an intervention that is not expected to produce any change). The control groups could be selected by using random or non-random methods.

Population

Included reports will sample students from pre-school to secondary school or equivalent levels.

Although we will include primary and secondary schools, we will not apply any restrictions related to nationality, language or cultural background.

Outcomes

The primary outcome to be measured is academic performance, including:

- Academic achievement
- Junior high completion
- High school completion

Secondary outcomes to be measured are student wellbeing, including:

- Social emotional well-being, such as learning anxiety, peer relationships, and self-efficacy.
- Other unintended effects, such as being teased for wearing eyeglasses and spillover effects.

We will also look at the vision related intermediate outcomes along the causal chain, including:

- Compliance with spectacles prescribed as a result of vision care interventions (i.e. spectacle uptake and wear)
- Uncorrected and corrected visual acuity deficits more than three months after an intervention.
- The development of the prevalence and degree of refractive error.

Study designs

The proposed review will include studies that use an experimental or quasi-experimental design. For the primary analysis, eligible studies must compare outcomes for students enrolled in schools that have vision care provision intervention with students enrolled in comparison condition that does not involve vision care intervention.

To be eligible, study designs must meet at least one of the following criteria:

i. Randomized controlled trial: Participants are randomly assigned to intervention and comparison conditions. Individual and cluster level randomization is acceptable.

ii. Quasi-randomized controlled trial: Participants are assigned to intervention and comparison conditions via a quasi-random procedure, such as birth date or student record number.

iii. Quasi-experimental controlled trial with individual level matching: Participants in the intervention and comparison conditions are allocated to conditions via a non-random process, but participants are individually matched on at least one measure of substance use and on student demographics (age, race/ethnicity, gender).

iv. Quasi-experimental controlled trial with pretest-adjusted outcomes: Participants in the intervention and comparison condition are formed via a non-random process, but the study authors adjusted for pretest differences between groups (e.g., as pretest-adjusted posttest means, regression coefficients from models that adjust for pretest). For those outcomes on

which pretest data are not applicable (e.g., test scores), adjustment must be done for a close proxy of a pretest.

v. Qualitative studies and retrospective studies will be excluded from this systematic review.

Other eligibility criteria

Study Settings. Studies may be conducted in preschool to secondary school settings.
Language of Publication. No restrictions will be placed on language of publication.
Date of Publication. No limitations will be placed on year of publication.
Form of Publication. To be as comprehensive as possible, studies may be reported in any form or type of publication, including but not limited to journal articles, books, book chapters, theses and dissertations, technical reports, conference papers, and other unpublished but disseminated formats.

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Review authors

Lead review author:

Name:	Huan Wang
Title:	Research Scholar
Affiliation:	Rural Education Action Program, Stanford University
Address:	616 Serra Street, Encina Hall
City, State, Province or County:	Stanford, CA
Post code:	94305
Country:	USA
Phone:	650-722-6087
Email:	huanw@stanford.edu

Co-authors:

Name:	Matthew Boswell
Title:	Program Manager
Affiliation:	Rural Education Action Program, Stanford University
Address:	616 Serra Street, Encina Hall
City, State, Province or County:	Stanford, CA
Post code:	94305
Country:	USA
Phone:	650-868-7378
Email:	kefka@stanford.edu

Name:	Scott Rozelle
Title:	Professor
Affiliation:	Rural Education Action Program, Stanford University
Address:	616 Serra Street, Encina Hall
City, State, Province or County:	Stanford, CA
Post code:	94305
Country:	USA

Phone:	650-862-0466
Email:	rozelle@stanford.edu

Name:	Nathan Congdon
Title:	Professor
Affiliation:	Queen's University Belfast
Address:	69/71 University Street
City, State, Province or County:	Belfast
Post code:	BT71HL
Country:	UK
Email:	ncongdon1@gmail.com

Name:	Hongyu Guan
Title:	Postdoctoral Scholar
Affiliation:	Center for Experimental Economics in Education
Address:	620 Chang'an Rd West, Chang'an District
City, State, Province or County:	Xi'an City, Shaanxi Province
Post code:	710119
Country:	China
Phone:	+86 18691889621
Email:	hongyuguan0621@gmail.com

Name:	Jin Zhao
Title:	PhD Candidate
Affiliation:	Center for Experimental Economics in Education
Address:	620 Chang'an Rd West, Chang'an District
City, State, Province or County:	Xi'an City, Shaanxi Province
Post code:	710119
Country:	China
Phone:	+86 15191462752
Email:	zhaojinceee@163.com

Roles and responsibilities

Please note that this is the *recommended optimal* review team composition.

- Content: Boswell, Rozelle, Congdon.
- Systematic review methods: Wang, Guan, Boswell. All three attended Campbell Systematic Review Workshop.
- Statistical analysis: Wang, Guan
- Information retrieval: Boswell, Wang, Zhao

This review is part of the training/mentoring supported by Campbell Collaboration. All members attended Campbell Systematic Review Workshop given by Howard White in Xi'an, China. Follow-up training on search strategies for the protocols will be given by Ciara Kennan in X'ian, China in February, 2019.

Dr Nathan Congdon, MD, MPH, is Ulverscroft Chair of Global Eye Health at Queen's University Belfast. His career has focused on improving the quality of vision care in areas of limited resources, especially in rural Asia. His research has resulted in the publication of over 165 peer-reviewed publications on vision care.

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The review team has not received extra funding to conduct this review.

Potential conflicts of interest

None of the review authors has a financial interest in this review.
Matthew Boswell, Scott Rozelle, and Nathan Congdon have been authors of potentially included studies.

Preliminary timeframe

- Date you plan to submit a draft protocol: 1 April, 2019
- Date you plan to submit a draft review: 1 April, 2020