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Effect of school eye health promotion on children's eye health literacy in Vietnam

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Summary

Health promotion intervention in schools is a useful strategy to improve students' health awareness. The purpose of this study was to assess the effect of eye health promotion interventions on eye health literacy in school children in Vietnam. A piloted questionnaire was administered to 300 children from five secondary schools in Ba Ria–Vung Tau, Vietnam at baseline and re-administered after the eye health promotion interventions. McNemar chi-square and logistic regression were used for statistical analysis. A total of 300 children aged 12–15 years (mean, 13.3 ± 1.3 years; 60% female) participated in the baseline survey. The participation rate in the post-health promotion survey was 94.7%. After the health promotion interventions, number of children who had correct eye health knowledge increased by 10–20% (60–75% to 70–95%), more children reported having had an eye examination (63.3% to 84.7%; $p < 0.001$) and more reported wearing spectacles (36.1% to 43.4%; $p = 0.04$). Children in urban schools were twice as likely to have improved knowledge of vision loss compared with children in rural schools (odds ratio, 2.1–4.1; $p = 0.01$ to $p < 0.001$). Children from rural schools had significantly higher odds of visiting doctor after the eye problems worsened (odds ratio, 4.5; $p < 0.001$). These results imply that eye health promotion interventions significantly improve eye health knowledge, attitudes and practices of school children. Additionally, participation of parents and teachers as change agents may further improve children's health literacy.

Key words: eye health, knowledge, attitude, practice, health promotion

INTRODUCTION

The control of childhood blindness is one of the priorities of the World Health Organization (WHO) (Gogate *et al*, 2009). An estimated 18.9 million children aged 0–14 years have vision impairment, of whom 1.4 million are blind (Pascolini and Mariotti, 2012). It is estimated that in almost half of the children who are blind the underlying cause could have been prevented, or the eye condition treated to preserve vision or restore sight (Gilbert and Muhit, 2008). Unfortunately, eye health was not integrated into WHO's global school health initiative, which was launched in 1995 (World Health Organization, 2015). The health promoting schools initiative mainly focused on a wide range of health topics such as physical activity, nutrition, substance use, sexual health, hand washing, eating disorders and oral health,

but the effectiveness of this initiative has been documented in few areas of health (Langford *et al*, 2014). In recent years, child eye health or school eye health has been advocated (International Agency for the Prevention of Blindness, 2011a,b) and implemented worldwide. The school eye health activities mainly include school vision screening, refractive error correction, spectacle wearing compliance, and prevention of trachoma and vitamin A deficiency (Sharma *et al.*, 2012).

Poor eye health in children is detrimental to all aspects of their development (International Agency for the Prevention of Blindness, 2011b). Eye health education and promotion activities are essential for preventing blinding conditions and increasing uptake of services. For implementation of childhood blindness prevention programmes, schools are an effective setting. Vision screening for refractive error correction has been increasingly conducted in schools across the globe (Sharma *et al.*, 2012); however, eye health education and promotion activities in schools are rare. Few studies have documented children's eye health perceptions and awareness of use of spectacles and indicated the need for health promotion in schools (Ahmad *et al.*, 2006; Li *et al.*, 2010). There are very few studies reporting whether health promotion interventions in schools significantly improve awareness and health seeking behaviour. A study conducted in Timor-Leste found that the intervention in schools is useful to improve the eye health knowledge of students (Hobday *et al.*, 2015).

Vietnam (with over 26 million children) has school enrolment levels above 90% (United Nations Children's Fund, 2015). School health education in Vietnam particularly includes a broad range of activities that promote physical activity, hand washing and healthy eating behaviours, and activities that prevent substance use and the spread of sexually transmitted disease (Pridmore and Vu, 2006). In addition, school vision screening is the only eye health-related activity undertaken within the school environment. The major cause of childhood blindness is uncorrected refractive error (Limburg *et al.*, 2012). A study in Ba Ria–Vung Tau (BRVT) province found 21.4% of secondary school children with vision impairment due to refractive error (Paudel *et al.*, 2014). Regrettably, two thirds of children (67%) with vision impairment in either eye have never received spectacles or do not wear them, suggesting the need for immediate school vision screening and eye health education in Vietnam. Accordingly, a teacher-based vision screening was implemented in the schools in BRVT province, which was based on the evidence that Vietnamese teachers can accurately (sensitivity, >85%) detect and refer children with vision impairment (Paudel *et al.*, 2016). However, school vision screening is not sufficient to increase eye care utilization and spectacle wear compliance. Health promotion intervention in schools might improve knowledge, attitudes and practices in relation to the eye health of children, parents and teachers. This study aimed to assess the effect of eye health promotion interventions on eye health literacy of school children in Vietnam.

METHODS

Study design

This was a school-based cross-sectional interventional study conducted to evaluate the impact of eye health interventions on eye health literacy of children between June 2012 and November 2013. This study was implemented in four stages: focus group discussion in June 2012, questionnaire pilot test in October/November 2012, pre-survey in March/April 2013 and post-health promotion survey in October/November 2013. The time frame for post survey was 6 months, similar to previous school-based studies (Ribeiro and Alves, 2014; Fernando *et al.*, 2013).

Development and validation of a questionnaire

Initially, relevant studies in Pakistan and China (Ahmad *et al.*, 2006; Li *et al.*, 2010) and eye health education materials (Francis and Wiafe, 2007) were reviewed and questions were prepared for focus group discussion at four schools. Each focus group included 10 children aged 12–15 years (two or three children from each six to nine grade) who wished to participate in the study. Focus groups were facilitated and recorded by one of the authors (P.T.Y.) in Vietnamese, who later transcribed and translated to English. The groups focused on three central areas including perceptions of eye health; beliefs around the causes of vision loss, and knowledge of common eye problems; and their prevention and treatment. The discussion transcripts were analysed qualitatively using NVivo based on the grounded theory approach (Corbin and Strauss, 1990). The relevant and meaningful statements were extracted and the common themes/issues of the participants were identified by the two authors (P.P. and V.K.) and an external consultant. Discrepancies were resolved by discussion before finalizing the questions for inclusion in the pilot questionnaire. The knowledge, attitude and practices to eye health (KAP-EH) questionnaire was translated from English to Vietnamese by the BRVT Provincial Eye Centre staff and re-translated back to English by the author (P.T.Y.) for verification of the translated version. Some of the

questions were negatively phrased to check the consistency in answering pattern.

The questionnaire was first reviewed by a group of health experts working in child eye health and then subjected to internal consistency check. In the pilot study, a test and re-test of the questionnaire was undertaken by administering it twice to 60 children in a secondary school.

After test-retest, the questionnaire was revised for clarity and comprehension. The final KAP-EH questionnaire was then administered to school children in five secondary schools. After the survey, health promotion interventions were implemented at the participating schools for a month. Three months after the health promotion, the questionnaire was re-administered by the same interviewers to same children in their respective schools.

Sample size and sample selection

A sample of 300 children was estimated for a baseline study to be sufficient to determine a prevalence of awareness of eye health and healthy eye care practices of 50% with an absolute precision of 15% and accounting for 15% non-response rate and a cluster design effect of 1.5. A multistage cluster random sampling was undertaken to select the schools, school grades and classes (Figure 1). The study subjects (children) were selected from five randomly selected secondary schools of BRVT province located in the southern coastal region of Vietnam: Chau Duc district (2 of 16 schools), Tan Thanh district (1 of 9 schools) and Long Dien district (2 of 10 schools). These three districts and five selected schools represent localities where school vision screening and health promotion measures have not been implemented previously. Two classes were randomly chosen from each school grade. Each class comprised ~30 children and the participants were randomly selected starting from the first child in a class register. None of the selected students refused to participate. In post-health promotion survey, the same children who were interviewed at the baseline were tracked and included.

Informed consent and ethics approval

In-country authors (N.V.G. and T.Y.P.) contacted the principal of the selected schools by pre-scheduled meeting or phone and received consent prior to commencement of the study. None of the principals refused to participate. An invitation to participate in the study and an informed consent document for parents/guardians was sent home with the child from the selected classes. Children and their parents who gave their written informed consent participated in the study. Ethics approval was obtained from the Human Research Ethics Committee of the University of New South Wales, Sydney, Australia, and permission was also obtained from the Vietnam Institute of Ophthalmology and BRVT Provincial Eye Centre in Vietnam.

Development of health promotion interventions

A health promotion campaign was carried out at five secondary schools in which the baseline survey was conducted. The campaign was launched by the local research officer and the BRVT Provincial Eye Centre staff for 1 week in each school from mid-September to mid-October 2013 and targeted to 4600 students, their parents and over 240 teachers.

This study adopted the concept of disseminating health messages through different health promotion interventions and evaluating the effects of health promotion (Brilliant *et al.*, 1991; Baker and Murdoch, 2008). The health promotion interventions were finalized by the expert panel from the fields of optometry, public health, education and communication. The panel discussed and agreed with a preliminary list of eye care messages and strategies for dissemination. The health promotion interventions (i.e. health messages dissemination modalities) were based on the pre-survey results. Subsequently, drafts of brochures and posters were sent to a local team in Vietnam for feedback and to check cultural appropriateness. The local team, including an ophthalmologist, reviewed the health promotion materials and provided images, illustrations, and pictures for the posters that were tested on a small group of parents and children who were visiting hospital for clarity, comprehension and content validity. The key eye health messages were then translated into Vietnamese by in-country investigators and the BRVT provincial eye centre staff.

The finalized key eye health messages were integrated into a health education learning package which comprised four main interventions or activities, namely: (i) an ophthalmologist's oral presentation to students and teachers; (ii) posters displayed at school premises; (iii) distribution of brochures/leaflets and stickers/decals communicating eye health messages; (iv) primary eye care/first aids training to school principal and teachers, and school vision screening. Following school vision screening, all children who were identified to have vision impairment were provided with spectacles. The contents, location, team members, duration and frequency of activities undertaken during health intervention are presented in the Supplementary Appendix.

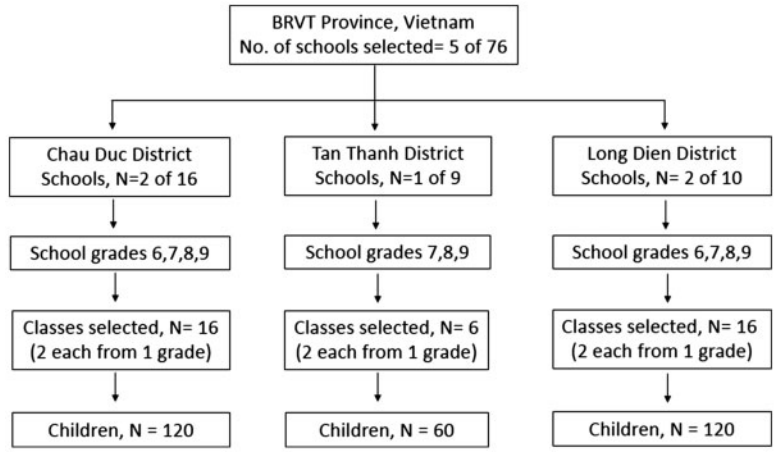

Fig. 1. Flow diagram of sample selection and sample size.

Statistical analysis

Data were entered into a Microsoft Access database, checked and corrected for data entry errors. Data were analysed using SPSS version 21.0 software (IBM Corp, Armonk, NY, USA) and summarized as frequencies and percentages. Agreement in the questionnaire responses following test and re-test was analysed using Kappa statistics. Kuder and the Richardson Formula 20 was used to estimate internal consistency of the questionnaire. Questionnaire items that had multiple choice options were not subject to agreement analysis.

The change in responses between pre- and post-survey was analysed using McNemar Chi-square tests. Variables that showed a significant change in response were then analysed using multiple logistic regression where the outcome variable was the post survey results being correct. Association of demographic factors to answering correctly in the post-survey was described using odds ratio (OR) and its 95% confidence limits. Level of significance was set at 5%.

RESULTS

Pilot participants and validity of the questionnaire

A total of 60 secondary school children aged 12–15 years (mean, 13.3 ± 1.3 years; 50% female; 17% presenting with spectacles) participated. The test and re-test responses to the pilot questionnaire demonstrated overall good agreement (Kappa values ranged from 0.65 to 0.94). The Kuder and Richardson Formula 20 test showed the internal consistency of questionnaire items was 0.69, which is within the acceptable limit. The questions and responses that had low agreements were revised for the clarity and comprehension, and the technical terminology such as squint and refractive error was re-worded with the specific Vietnamese wordings commonly used in the communities.

Characteristics of the study participants

A total of 300 children aged 12–15 years (mean, 13.3 ± 1.3 years; 60% female; 17% presenting with spectacles) from five secondary schools were randomly selected. At baseline, participants comprised 61 (20.3%) children aged 12 years, 74 (24.7%) aged 13 years, 78 (26.0%) aged 14 years and 87 (29.0%) aged 15 years. A 60% of participants were from urban areas and 20% of participants had vision problem (presenting visual acuity of <6/9). The participation rate in the repeat survey was 94.7% (284/300). The remaining 16 children could not be followed because they moved to different schools. Participation rates by demographic characteristics showed no significant difference.

Knowledge of eye health

Table 1 illustrates children's knowledge of general eye health such as symptoms and causes of an eye problem, and prevention of red eye infection. The study showed that at baseline children's knowledge of symptoms of an eye problem ranged between 42 and 84%, which increased significantly to 75–95% after the health promotion. Before health promotion, <80% of children had knowledge of the activities that could cause an eye problem. After health promotion, a significant proportion of children became aware of such activities such as 'not eating Vitamin A rich food' (36–64%, $p < 0.001$), 'injury while playing' (76–81%, $p = 0.02$), and exposure to sunlight, dust and smoke (76–91%, $p < 0.001$).

Table 1: Children's perceptions and knowledge of eye health ($n = 284$ children)

Knowledge	Correct response, *n* (%)		Incorrect response, *n* (%)		*P* value
	Pre-survey	Post-survey	Pre-survey	Post-survey	
Knowledge of eye problem symptoms					
Red, itchy and watery eyes	170 (59.9)	269 (94.7)	114 (40.1)	15 (5.3)	<0.001
Painful eyes	205 (72.2)	258 (90.8)	79 (27.8)	26 (9.2)	<0.001
Do not see well	239 (84.2)	263 (92.6)	45 (15.8)	21 (7.4)	0.006
Turn/crossed eyes	120 (42.3)	214 (75.4)	164 (57.7)	70 (24.6)	<0.001
Activities perceived to cause an eye problem					
Holding book too close to eyes	28 (9.1)	9 (3.2)	256 (90.1)	275 (96.8)	0.003
Watching TV from close distance	9 (3.2)	6 (2.1)	274 (96.8)	277 (97.9)	0.74
Watching TV or computer for long hours	15 (4.6)	23 (8.1)	268 (94.7)	260 (91.9)	0.047
Not eating Vitamin A rich food[a]	103 (36.4)	181 (64.0)	180 (63.6)	102 (36.0)	<0.001
Injury with sharp objects, fireworks, toys etc.	215 (76.0)	227 (80.2)	68 (24.0)	56 (19.8)	0.02
Studying in dim light[a]	234 (82.7)	229 (80.9)	49 (17.3)	54 (19.1)	0.06
Exposure to sunlight dust and smoke	216 (76.3)	257 (90.8)	67 (23.7)	26 (9.2)	<0.001
Disease perceived to cause vision loss or cause discomfort					
Red eye infection	214 (75.4)	247 (87.0)	70 (24.7)	37 (13.0)	<0.001
Refractive errors	167 (58.8)	202 (71.1)	117 (41.2)	82 (28.9)	<0.001
Eye trauma (foreign object injury)[a]	73 (25.8)	226 (79.9)	210 (74.2)	57 (20.1)	<0.001
Squint eyes (crossed eyes)	127 (44.9)	151 (53.4)	156 (55.1)	132 (46.6)	0.03
Night blindness[a]	123 (43.3)	143 (50.4)	161 (56.7)	141 (49.7)	0.25
Cataract[a]	120 (42.3)	187 (65.8)	164 (57.7)	97 (34.1)	<0.001
Knowledge of activities that prevent red eye infection from spreading					
Washing hands regularly and face washing[a]	81 (28.5)	191 (67.3)	203 (71.6)	93 (32.7)	<0.001
Not sharing face cloths	185 (65.1)	240 (84.5)	99 (34.9)	44 (15.5)	<0.001
Using eye drops from medical shop	174 (61.3)	246 (86.6)	110 (38.7)	38 (13.4)	<0.001
Not going to crowded places	98 (34.5)	232 (81.7)	186 (65.5)	52 (18.3)	<0.001
Not rubbing eyes and touching friends[a]	132 (46.5)	203 (71.5)	152 (53.5)	81 (28.5)	<0.001
Wearing protective glasses or sunglasses	158 (55.6)	227 (79.9)	126 (44.4)	57 (20.0)	<0.001
Staying at home until full recovery	125 (44.0)	210 (73.9)	159 (56.0)	74 (26.1)	<0.001

[a]Questions that were negatively phrased in the questionnaire.

Similarly, awareness of common childhood eye diseases that might cause vision impairment or discomfort was reported by 25.8–75.4% of children prior to health intervention. There was a significant increase in the number of children who became aware of these diseases after health promotion ($p < 0.03$–0.001), except for squint and night blindness (Table 1). The number of subjects who became aware of red eye infections, refractive error and cataract increased by 12–24% while children with eye injury awareness increased by three-fold after health promotion. . A substantial proportion of children showed no improvement in their knowledge of squint or night blindness. About half of the children (50.4 and 53.4%, respectively) perceived that squint and night blindness cannot cause vision loss or discomfort. Furthermore, 28.5–65.1% of the children were aware of the activities/strategies of preventing red eye infection from spreading in the pre-survey, which increased significantly to 63.3–86.6% after health promotion ($p < 0.001$) (Table 1).

Multivariate analysis indicated more children in rural schools had an awareness of painful eyes (OR, 4.1; $p < 0.04$) and squint (OR, 9.6; $p < 0.001$) as symptoms of eye problems than those in urban schools following the health promotion. In contrast, more children in urban schools and those who previously had an eye test showed increased awareness of eye injury and the importance of eating food containing Vitamin A.

Further, the multivariate analysis showed that children in urban schools were more likely to have improved knowledge of vision loss or discomfort caused by red eye, trauma, squint and cataract compared with children in rural schools (OR, 2.1–4.1; $p = 0.01$ to $p < 0.001$). Interestingly, males were about twice more likely to have a changed attitude regarding squint.

With regard to knowledge of preventing red eye infection and keeping eyes healthy, urban and older children were more likely to be aware of preventing red eye infection by wearing protective glasses, and avoiding eye injury after health promotions. Unfortunately, health promotions did not seem to impact younger children in rural areas. No other factors were associated for change in children's knowledge.

Attitudes to keeping eyes healthy and seeking health services

Overall, children demonstrated increased positive attitudes to keeping eyes healthy. More than 80% of children showed positive attitudes to the majority of eye-related activities, except for spectacles wear (Table 2). Just over one third of children (37.2%) understood that prescribed spectacles should be worn regularly. However, a few attitudes around the practices such as 'using medicines prescribed to other family members' and 'using traditional medicines' 'remained unchanged. Positive attitudes gained after health promotion include avoiding play with pencils or sharp objects (77.5–89.1%, $p < 0.001$) and making early visits to doctors (81.6–75.9%, $p = 0.03$). Multivariate analysis showed urban and older children were more likely (OR, 4.5; $p < 0.001$) to visit the doctor only after the problem worsens. No other factors were associated with change in children's attitudes to keeping eyes healthy.

Overall, more than 80% of children showed good attitudes to seeking health services when they suffer from an eye problem. Following health promotion, a significant proportion of children reported they would not use traditional medicine (78.5–93.3%, $p < 0.001$), they would report to parents about their eye problem (80.4–90.0%, $p < 0.001$) and would go to an eye doctor irrespective of any problem (84.8–90.4%, $p = 0.04$) (Table 2).

Eye care practices

In the baseline survey, a little more than 60% (173/284) of children reported to have had an eye problem in the past 5 years (Table 3). In the post-survey, an additional 8% of children reported to have had an eye problem in the past. Similarly, 63.3% (136/215) of children in the pre-survey reported to have had an eye check-up in past 5 years, which rose significantly to 84.7% after the health promotion. Importantly, a significant proportion of children reported wearing spectacles following health promotion (36.1–43.4%; $p < 0.04$). However, regular wearing of spectacles did not improve greatly (52.4–57.1%, $p = 0.56$).

DISCUSSION

Health promotion interventions in schools and students' knowledge and attitudes or behaviours have been reported previously for other health areas such as dental health, nutrition and physical activity, and general health and illness (Onyango-Ouma *et al.*, 2005; Fernando *et al.*, 2013; Leonhardt *et al.*, 2014; Ribeiro and Alves, 2014). This study reports the knowledge, attitudes and practices findings of school children in Vietnam and the effect of health promotion interventions on their eye health literacy.

This study revealed that a week-long health promotion intervention in each school had a positive effect on children's knowledge, attitudes and eye care practices. At baseline, 60–75% of secondary school children in Vietnam had correct knowledge about eye health, such as symptoms of an eye problem, common childhood eye diseases, and the prevention/treatment strategies. After the health promotion interventions, more children (additional 10–20%) demonstrated correct eye health knowledge and also showed a positive attitude to keeping eyes healthy. Importantly, eye care service utilization also increased significantly after health promotion. In the repeat survey, more children reported undergoing an eye examination (63.3–84.7%) and wearing spectacles (36.1–43.4%). These findings indicate that eye health promotion activities, if organized effectively and adequately in a conducive school environment, can improve eye health knowledge, attitudes and practices of children.

Following the health promotion interventions, >90% children correctly reported the common symptoms of eye problems. Similarly, their knowledge of the causes of eye problems or vision loss also improved significantly. More than 80% of children were aware that vision loss can be due to red eye infection or eye injuries. Moreover, awareness of conjunctivitis was reasonably high (75.4%) at baseline itself as this is a common ocular morbidity among school children and is often the cause of absence from school (Pi *et al.*, 2012; Adhikari *et al.*, 2014; Mehari, 2014). However, some other knowledge and attitudes to eye health did not show improvement, suggesting the health promotion information failed to change some traditional community beliefs and myths. For instance, about 25% of children did not consider turn/crossed eyes (squint) as a sign of an eye problem and 47% felt that this condition does not lead to vision loss. This unchanged knowledge or belief may be associated with traditional beliefs that squint is a good luck sign (Senthilkumar *et al.*, 2013). Similarly, 50% of children believed that night-blindness does not

Table 2: Children's attitudes to keeping eyes healthy and seeking health services ($n = 284$ children)

Attitudes	Strongly agree or agree, *n* (%)		Strongly disagree or disagree, *n* (%)		*P* value
	Pre-survey	Post-survey	Pre-survey	Post-survey	
Attitudes to keeping eyes healthy					
Clean face and eyes regularly	260 (92.2)	270 (95.7)	22 (7.8)	12 (4.3)	–
Take breaks during long reading or computer viewing	236 (83.1)	253 (89.1)	48 (16.9)	31 (10.9)	0.14
Share face-cloths with family and friends	264 (93.3)	259 (91.5)	19 (6.7)	24 (8.5)	0.08
Avoid playing with pencils or sharp objects	220 (77.5)	253 (89.1)	64 (22.5)	31 (10.9)	<0.001
Use home-made or traditional medicines	35 (12.3)	24 (8.5)	249 (87.7)	260 (91.5)	0.17
Use sunglasses to avoid sunlight and dust	268 (95.0)	263 (93.3)	14 (5.0)	19 (6.7)	0.17
Wear prescribed spectacles regularly	130 (46.1)	105 (37.2)	152 (53.9)	177 (62.8)	0.14
Eat green/leafy vegetables and fruits	266 (94.0)	267 (94.3)	17 (6.0)	16 (5.7)	0.32
Go to doctor only after problem gets worse	52 (18.4)	68 (24.1)	230 (81.6)	214 (75.9)	0.03
Use eye drops prescribed to family and friends	54 (19.5)	65 (23.5)	223 (80.5)	212 (76.5)	0.22
Attitudes to seeking health services					
Buy eye drops/medicine from local pharmacy without consulting a doctor	166 (58.5)	136 (47.9)	118 (41.5)	148 (52.1)	0.007
Use traditional medicine (e.g. Diep flower)	61 (21.5)	19 (6.7)	223 (78.5)	265 (93.3)	<0.001
Do nothing and stay at home until self-recovery	10 (3.5)	15 (5.3)	274 (96.5)	269 (94.7)	0.36
Talk/report to parents	226 (80.4)	253 (90.0)	55 (19.6)	28 (10.0)	<0.001
Go to eye doctor for any eye problem	239 (84.8)	255 (90.4)	43 (15.2)	27 (9.6)	0.04

Table 3: Eye care practices of children in past 5 years

Practices	Yes, *n* (%)		No, *n* (%)		*P* value
	Pre-survey	Post-survey	Pre-survey	Post-survey	
Had an eye problem past 5 years ($n = 284$)	173 (60.9)	194 (68.3)	111 (39.1)	90 (31.7)	0.04
Had an eye check-up in past 5 years ($n = 215$)	136 (63.3)	182 (84.7)	79 (36.7)	33 (15.3)	<0.001
Wear spectacles for vision correction ($n = 244$)	88 (36.1)	106 (43.4)	156 (63.9)	138 (56.6)	0.04
If yes, wear spectacles regularly ($n = 63$)	33 (52.4)	36 (57.1)	30 (47.6)	27 (42.9)	0.56

cause vision loss or discomfort. Awareness of night-blindness among children is crucial as this condition is linked to insufficient dietary intake such as Vitamin A rich food (Akhtar *et al.*, 2013). Additionally, parents place a bigger role in providing appropriate dietary intake. The health promotion intervention included information about the healthy diet that is important to prevent Vitamin A deficiency and night blindness. However, the results suggest that detailed information about the night blindness and severe visual consequences of the condition should also be communicated to school children.

Furthermore, knowledge about some eye health related myths such as holding books too close and watching TV too close causes eye problems, also surprisingly remained unchanged. Myths are people's beliefs without theoretical abstractions and rational concepts (Trompoukis and Kourkoutas, 2007), and are difficult to change. Different approaches are required to tackle with the unchanged knowledge and attitudes of children observed in this study such as parents' involvement in school based health promotion. In addition, involvement of trained teachers is valuable as children often see teachers as role models.

Similar to knowledge of general eye health, children's overall attitudes to keeping eyes healthy and seeking an eye examination was high (80–90%). However, attitudes to treatment and compliance such as wearing spectacles on a regular basis and using prescribed eye drops were relatively poor. Only a small proportion of children with positive attitudes to spectacle wear increased after health promotion. A significant proportion of children did not wear spectacles because they were not comfortable wearing spectacles, dislike spectacles, and/or parents did not purchase new spectacles when others

were lost or broken. Interviews with teachers and parents would have also been useful to understand the reasons for children not wearing spectacles. As non-compliance to spectacle wear is multifactorial, this issue could be addressed through specific strategies involving teachers and parents. For instance, non-compliance to spectacles wear due to peer pressure and appearance (Sharma *et al.*, 2012) could be addressed by teacher-based school health education. However, factors such as cost and parents' misconception about spectacles wear (Sharma *et al.*, 2012) would need parents' engagement in health promotion.

This study showed that children's attitude to preventing injury from pencils and sharp objects improved noticeably after health promotion. However, attitudinal change were not significantly noted among children for some activities such as eating Vitamin A rich food and keeping well with personal hygiene such as washing hands and face. Infectious eye disease such as conjunctivitis and trachoma can result due to habits of not washing hands properly (Montessori *et al.*, 1998; Nicholson *et al.*, 2014; Strunz *et al.*, 2014). Education on hand washing needs to be prioritized in school because 97% of school children in Vietnam do not wash their hands properly (Xuan le and Hoat, 2013). In school health promotion, inclusion of role play for personal hygiene activities and/or audio-visual demonstration could considerably improve children's attitude to washing hand and cleaning faces.

Evidence shows that people in the developing world often rely on traditional healers and traditional medicines to treat common eye conditions and consequently they become vision impaired or blind (Prajna *et al.*, 1999; Shenoy *et al.*, 2009; Nwosu and Obidiozor, 2011). Traditional medicine is widely popular in Vietnam though the medicines are not evidence-based from clinical perspective (Woerdenbag *et al.*, 2012). However, a majority (78.5%) of school children at baseline reported they would never use traditional medicines for prevention or treatment of eye conditions. After health promotion interventions, there was a significant increase in the proportion of children (78.5–93.3%) who professed they would not use traditional medicines. Importantly, majority of children (>90%) expressed a positive attitude to seeking eye care as they would report their parents and visit eye doctors for their eye problems.

Although preschool children's perceptions of eye health by using 'draw and write method' (Ahmad *et al.*, 2006) and use of spectacles conducting a questionnaire survey (Li *et al.*, 2010) have been published, a questionnaire to assess children's knowledge, attitude and practices to eye health was not available until the time of this study. The strength of this study is that the questionnaire was developed through focus groups and pilot test. As the responses to the questionnaire showed high reliability (>80%) when administered for test and re-test, the study results probably reflect the real and substantial effect of health promotion interventions.

The study has a few potential limitations. First, health promotion materials were not tested for content validity. However, caution has been exercised to ensure the quality and comprehension of materials. A team of experienced staff from social sciences and ophthalmology, as well as representative from schools in Vietnam were involved in development of the materials. Second, the work of teachers and field workers in disseminating health materials was not monitored. Moreover, due to short period of interventions, we were unable to collect specific details about the time spent by each participating child in health promotion intervention activity and whether they missed any of the interventions or materials distributed in the school. Hence, it would be useful to investigate health promotion effectiveness by using different methods such as a case control and a randomized controlled trail (Lee *et al.*, 2005). Although the use of an ophthalmologist for dissemination of health messages in a school setting was useful, the routine use of highly qualified professionals for school health promotion programmes might not be always feasible. Inclusion of eye health education in the school curriculum and teachers' role in health promotion should be investigated. In Vietnam, school vision screening is the only eye health-related activity in the whole school environment in which teachers are involved. Third, there is uncertainty as to whether improvement in knowledge of children could be linked to self-experience and family influence. This information and other potential individual factors need to be investigated in future studies by conducting in-depth interviews. Fourth, there were ceiling effects i.e. high scores for several of the pre-intervention results, which mean that a large number of children were already aware of some conditions and thus change in awareness (upwards) could not be demonstrated. Last, as the repeat survey was administered after just 3 months of health intervention, the results might have been influenced positively because of children's good short memory or negatively due to less time available to implement learnt things into practice. Furthermore, self-reported positive attitude do not reflect actual practices.

In conclusion, health promotion interventions organized for a week in each school had a positive effect on children's knowledge, attitudes and practices to eye care. A significant increase in number of children who

reported to have eye care visits and spectacles wear in 6 months indicates that the effort and expense of health promotion is reasonable. School health education or health promotion intervention in schools therefore is an effective strategy for improving children's knowledge, attitude to health care practices and improving utilization of health services.

Supplementary material

Supplementary material is available at *Health Promotion International* online.

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