

RESEARCH ARTICLE

Development and Validity Testing of the School Health Score Card

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ABSTRACT

BACKGROUND: The objective of this study was to develop the School Health Score Card (SHSC) and validate its psychometric properties.

METHODS: The development of the SHSC questionnaire included 3 phases: item generation, construction of domains and items, and field testing with validation. To assess the instrument's reliability and validity, we recruited 15 middle schools and 15 high schools in the Republic of Korea.

RESULTS: We developed the SHSC questionnaire of 158 items categorized into 5 domains: (1) Governance and Infrastructure, (2) Need Assessment, (3) Planning, (4) Health Prevention and Promotion Program, and (5) Monitoring and Feedback. All SHSC domains and subdomains demonstrated acceptable reliability with good internal consistency. Each domain and subdomain except for "Planning" was associated significantly with students' health status. Most subdomains, including school health philosophy, school policy, communication, the evaluation system, and monitoring, were significantly and negatively associated with student absence.

CONCLUSIONS: The SHSC shows significant association with the overall student health and can be useful in assessing comprehensive school health programs.

Keywords: School Health Score Card; school health program assessment; adolescent health.

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Adolescence is a critical time for the development of not only the health and lifestyle of adolescents, but also the health and lifestyle that adolescents will have as adults.¹ As schools provide physical and social environments that affect the lifestyle and health-related behaviors of adolescents, comprehensive school-based initiatives target healthy lifestyles with changes to health-related behaviors as well as changes to the school environment.^{1,2} There are various emerging programs that comprehensively promote health in schools, such as the Health-Promoting Schools (HPS) concept from the World Health Organization (WHO),³ the Focusing Resources on Effective School Health

program from the United Nations Educational Scientific and Cultural Organization,³ and the Coordinated School Health Program (CSHP) from the US Centers for Disease Control and Prevention (CDC). The Whole School, Whole Community, Whole Child (WSCC) has introduced the Whole Child Approach to unify CSHP. This calls specifically for an ecological approach to improving students' learning and health.⁴

Comprehensive instruments to assess environmental conditions and health-promoting practices in schools have been recognized as beneficial.⁵ There are several measurements such as the School Health Index (SHI) developed by the CDC,⁶ the Hong Kong Healthy

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Schools Award,^{3,7} and the Pesquisa Nacional de Saúde do Escolar (PeNSE—National Survey of School Health) in Brazil.² The SHI is tool designed within the context of the CSHP to assess health in schools.¹ It consists of 8 components: health education, physical education, nutrition services, health services, psychological counseling and social services, family and community involvement, and health and safety policies and environment.

We developed a self-report School Health Score Card (SHSC) as part of Social Contribution for Health (SCH), which aims to help establish school and youth health programs. We based the SHSC upon a comprehensive approach that measures the same environmental conditions and policies as the SHI. Furthermore, to evaluate the process of school-health management as a whole, the SHSC examines whether policies and infrastructures exist in a school and, if they do exist, assesses their planning and actual implementation. The tool also assesses whether the process is properly monitored for post-program planning. We developed the SHSC based on existing literature, interviews with professionals, and national strategies for school health and safety programs. In addition, it is complemented by new factors and reflects existing content; therefore, it could be used as a comprehensive, generalized tool worldwide.

METHODS

Procedures and Participants

We developed and validated the SHSC according to the 3 phases of the self-reported assessment tool development module, which are as follows: (1) item generation, (2) construction of domains and items, and (3) validation with field testing. We conducted statistical analyses to test the reliability and validity of the tool. The tool was developed from August 2014 until March 2015, and the survey was conducted from August 2014 to January 2015.

Phase I: Item generation. For Phase I, we organized lists of indicators related to school health-promotion programs as well as worksite health management. We reviewed more than 20 published indexes, such as the SHI developed by the CDC,⁶ the GSHS based on the WHO guidelines,^{3,8,9} the Hong Kong Healthy Schools Award, the PeNSE—National Survey of School Health in Brazil,² the CDC Worksite Health Scorecard,^{10,11} the Worksite Health Index,¹² the US Comprehensive Soldier Fitness Program, the Health Impact Assessment, and the 26 school health-related statutes of the Republic of Korea such as the Korean School Health Act, the School Meals Act, and the Act of the Prevention of and Countermeasures Against Violence in School. In this report, we only cite the key sources for each related topic.

Next, we conducted semistructured interviews with 25 professionals in the fields of health and school health, including 2 family medicine doctors, 2 psychiatrists, 3 counseling teachers, 1 economist, 2 nutritionists, 2 physical education teachers, 1 school health nurse, 1 ethics teacher, 1 school health expert, 2 education experts, 3 counseling teachers, 2 school principals, 2 Office of Education officials, and 1 expert on health education.

We generated 5 domains comprising a total of 267 items in Phase I. The domains and subdomains were as follows: (1) Governance and Infrastructure, which included School Health Philosophy, School Policy, and Health Infrastructure; (2) Need Assessment, which included Need Assessment and Actual Condition Investigation; (3) Planning, which included Planning and Communication; (4) Health Prevention and Promotion Programs, which included Physical Health, Mental Health, and Social and Spiritual Health; and (5) Monitoring and Feedback, which included Evaluation System, Monitoring, and Reflection on Post-plan. Similar to the SHI developed by the CDC, the Health Prevention and Promotion Programs covered various health topics as follows: healthy school environment, health education, physical education, nutrition services, school health services, school counseling, psychological and social services, and family and community involvement.¹³

Phase II: Original item construction. We converted the items collected from the literature review and interviews with experts into a questionnaire that referred to the experts' specific field experience. Each question was designed to be answered either "yes" or "no." In constructing the provisional questionnaire for the SHSC, we used the Delphi survey method, originally introduced by the RAND Corporation in 1967, to refine the items further. A group of 51 experts rated the feasibility and validity of each item with a 5-point Likert scale and provided feedback. The Delphi process was cycled twice to let the experts make the final decision on their responses. We retained the items that met all the following criteria in the SHSC: (1) validity mean score ≥ 3.0 points and feasibility mean score ≥ 2.5 points and (2) both validity and feasibility mean scores > 3 points from $\geq 75\%$ of the experts. We discarded items that did not meet both criteria. In the end, we excluded 61 items, leaving the SHSC with 206 questions.

Phase III: Validation with field testing. The field test aimed to further examine whether items should be excluded or added after the reliability and feasibility test in Phase II. We carried out pilot testing in 30 schools, which is the smallest acceptable sample size to achieve adequate statistical power. With the cooperation of the Korean Association of Secondary Education Principals, we first contacted 45 Korean public and private middle and high

schools. Then, 15 middle schools and 15 high schools, regardless of region, agreed to participate. From those schools, school nurses, physical education teachers, and counseling teachers completed the SHSC questionnaire.

Additional evaluation. In addition to the school evaluation in Phase III, we administered a study dealing with students for: (1) evaluating the policy and infrastructure, implementation, and student participation level of each health program (21 items) and (2) assessing students' health status and absent days in the month prior to the study. All 30 schools that participated in Phase III consented to take part in the survey of students. About 2800 students who were informed of the purpose and methods of the study agreed to participate in the additional evaluation.

To measure the students' health outcomes, we asked about their physical, mental, social, spiritual, and general health status. We determined internal consistency using a Cronbach's α coefficient of .849 for all variables. We grouped the students who reported their health status as either "Good" or "Better" in the "Good Health" category and those who reported their health status otherwise in the "Poor Health" category. We also investigated the sociodemographic variables of each student. All surveys were conducted using a printed questionnaire.

Data Analysis

Item reduction. After constructing the final SHSC questionnaire, we conducted univariate logistic regression analysis for each subdomain to select the items that most explained the students' health. We scaled each item on a yes or no scale, and we converted the raw data into discrete binary variables.

First, based on each student's set of answers, we removed items from the SHSC that were insignificant or negatively associated with the student's self-reported health status. Then, we also got rid of items that showed 100% execution rate based on the responses from each school. Thus, we removed 48 items from the original SHSC. The final version of the SHSC questionnaire contained 158 items. After the item reduction was completed, we recoded the questionnaire and generated new scores for each subdomain and domain level. For ease of interpretation, we linearly summed and transformed all domain and subdomain scores into a 0-100 scale.

Reliability and validity test. We used Cronbach's α coefficients to estimate the reliability of all 5 domains of the SHSC. To ensure the validity of the SHSC, we applied a method that referred to a previous index development study.¹² The student data were initially aggregated in this test, and the scores for the subdomains and domains for each school were assigned to the students. We then

performed univariate logistic regression to examine the associations between each domain and subdomain, student health status, and absence rates. For the absence rates during the month prior to the survey, we classified the numbers of days absent into 2 categories: "Never absent" and "Absent at least 1 day."

We weighted the SHSC scores of the 30 schools in accordance with the results of an additional evaluation that examined the rates of students' awareness and participation in the school health-promotion program. We based the analyses for validating the tool on the weighted scores of each school. We performed the data analysis using Microsoft Excel 2013 and the SPSS 23.0 package. All of the collected information and data were kept confidential.

RESULTS

Sample Characteristics

The study sample included 30 middle and high schools. The respondents who completed the SHSC form were school health professionals. A total of 2569 students from the schools participated in the additional evaluation. The demographic characteristics of the study sample are summarized in Table 1.

Reliability

The Cronbach's α coefficient to determine the reliability of the SHSC ranged from .622 to .856 for all domains of the tool, indicating acceptable internal consistency (Table 2).

Validity

Overall, a cutoff value of 90 points on the SHSC domain scores for each school could be used to predict the students' health status in the physical, mental, social, spiritual, and general health categories. The students from the schools that scored more than 90 points in the SHSC domains had significantly better results in all 5 categories (Table 3).

Specifically, SHSC scores in Governance and Infrastructure (OR, 1.18; 95% CI, 1.01-1.38) and Need Assessment (OR, 1.23; 95% CI, 1.06-1.44) above the 90-point cutoff were associated with good physical health of the students. SHSC scores in Health Prevention and Promotion Program above the cutoff were associated with good student health in all of the categories: physical health (OR, 1.40; 95% CI, 1.18-1.65), mental health (OR, 1.42; 95% CI, 1.20-1.68), social health (OR, 1.20; 95% CI, 1.02-1.41), spiritual health (OR, 1.26; 95% CI, 1.03-1.44), and general health (OR, 1.43; 95% CI, 1.21-1.68). Within each domain, SHSC scores that exceeded the cutoff value in the Health Infrastructure subdomain, all 3 subdomains of Health Prevention and Promotion Program, and the

Table 1. Summary of the Demographics of the Study Participants

	N (%)
School type	
Middle school	15 (50)
High school	15 (50)
Participants (N = 2569)*	
Age	
≤12	71 (2.8)
13-15	1287 (50.1)
16-19	1209 (47.1)
≥20	2 (.1)
Sex	
Male	1196 (46.6)
Female	1373 (53.4)

*Outcome measurement for students of the 30 schools.

Table 2. Domains, Scale Organization, and Reliability of the School Health Score Card

Domain, Subdomain	Number of Questions	Cronbach's α
Governance and infrastructure	28	.789
School health philosophy	7	
School policy	5	
Health infrastructure	16	
Need assessment	4	.622
Need assessment	2	
Actual condition investigation	2	
Planning	16	.856
Planning	13	
Communication	3	
Health prevention and promotion program	104	.855
Physical health	79	
Mental health	13	
Social/Spiritual health	12	
Monitoring and feedback	6	.850
Evaluation system	4	
Monitoring	1	
Reflection on post-plan	1	

Evaluation System subdomain were related to good student health status.

In terms of absence rates, subdomains such as School Health Philosophy (OR, .68; 95% CI, .57-.81) and School Policy (OR, .81; 95% CI, .69-.96) from Governance and Infrastructure, Communication (OR, .686; 95% CI, .58-.82) from Planning, and Evaluation System (OR, .81, 95% CI, .68-.96) and Monitoring (OR, .77; 95% CI, .64-.91) from Monitoring and Feedback were negatively related to student absence (Table 4).

DISCUSSION

The final SHSC questionnaire had 158 items by which health managers and officers assessed the school environment and key evidence-based and best health-promotion practices. The items were presented in

the form of questions with yes or no answers that were easily applicable, which eliminated ambiguities regarding whether or not the environments and practices exist.²

Tests for internal consistency and predictive validity, ie, the degree to which the SHSC score was predictive of student health-related outcomes and absence rates, showed that the SHSC had acceptable levels of validity and reliability. Our study demonstrated that the schools with higher SHSC scores were more likely to strongly exhibit school health-management programs and have more students with good health status. Most notably, we found significant associations between schools' SHSC scores and students' self-reported physical, psychological, social, spiritual, and general health status. These preliminary findings are noteworthy, because they demonstrate the effectiveness of the SHSC in assessing each school's level of commitment to student health promotion.

The SHI assessment has 8 different modules, each of which corresponds to a component of the CSHP: (1) school health and safety policies and environment; (2) health education; (3) physical education and other physical activity programs; (4) nutrition services; (5) health services; (6) school counseling, psychological, and social services; (7) health promotion for staff; and (8) family and community involvement.¹⁴ The SHSC in the current study combined the components of SHI with 6 essential components of the HPS: (1) healthy school policies, (2) the school's physical environment, (3) the school's social environment, (4) community links, (5) individual health skills and action competencies, and (6) health services.^{3,15} The final composition of the SHSC had satisfactory reliability and validity and included dimensions composed of items that are compatible with the themes indicated as priorities for health-promoting activities and structures in the school environment.²

Similar to the SHI, and based on the CSHP model, the SHSC can evaluate school programs for promoting health and can identify the strengths and weaknesses of each school's policies.¹ In line with the CDC's 8 components and the WHO's 6 components, the SHSC consists of components that constitute Governance and Infrastructure, Need Assessment, Planning, Health Prevention and Promotion Programs, and Monitoring and Feedback in an effort to impact the overall school environment as well as school health policies.^{1,16} The Health Prevention and Promotion Programs domain of the SHSC also covers healthy school environment, health education, physical education, nutrition services, health services, counseling, psychological and social services, and family and community involvement.¹³

Our intent was that the completion of the modules could provide a framework for utilizing a "whole school approach" to produce healthier

Table 3. Differences by Student's Self-Reported Health Status by School Health Score Card (SHSC) Scores

Domain, Subdomain	SHSC Score	%	Good Physical Health Status		Good Mental Health Status		Good Social Health Status		Good Spiritual Health Status		Good General Health Status	
			OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Governance and infrastructure	< 90	40.0	1.18	1.01-1.38	1.12	.95-1.31	1.04	.89-1.21	1.04	.88-1.22	1.02	.87-1.19
	≥ 90	60.0										
School health philosophy	< 90	30.0	1.18	1.00-1.39	1.11	.94-1.32	1.16	.99-1.37	1.16	.98-1.38	1.18	1.00-1.39
	≥ 90	70.0										
School policy	< 90	53.3	1.15	.99-1.34	1.03	.88-1.20	1.06	.91-1.23	1.07	.91-1.25	1.04	.89-1.21
	≥ 90	46.7										
Health infrastructure	< 90	36.7	1.38	1.18-1.61	1.32	1.12-1.55	1.10	.95-1.29	1.24	1.06-1.46	1.25	1.07-1.46
	≥ 90	63.3										
Need assessment	< 90	50.0	1.23	1.06-1.44	1.13	.96-1.32	.96	.83-1.12	1.02	.87-1.20	1.04	.89-1.21
	≥ 90	50.0										
Need assessment	< 90	50.0	1.23	1.06-1.44	1.13	.96-1.32	.96	.83-1.12	1.02	.87-1.20	1.04	.89-1.21
	≥ 90	50.0										
Actual condition investigation	< 90	30.0	1.25	1.06-1.48	1.20	1.01-1.42	1.02	.87-1.20	1.05	.89-1.24	1.17	.99-1.38
	≥ 90	70.0										
Planning	< 90	66.7	1.02	.86-1.20	1.00	.84-1.19	.95	.80-1.11	.96	.81-1.14	1.03	.87-1.22
	≥ 90	33.3										
Planning	< 90	63.3	1.10	.93-1.29	1.04	.88-1.23	1.00	.86-1.18	1.00	.85-1.19	1.08	.91-1.27
	≥ 90	36.7										
Communication	< 90	33.3	1.04	.88-1.22	.98	.84-1.16	.99	.85-1.17	.89	.76-1.06	.97	.85-1.14
	≥ 90	66.7										
Health prevention and promotion program	< 90	66.7	1.40	1.18-1.65	1.42	1.20-1.68	1.20	1.02-1.41	1.22	1.03-1.44	1.43	1.21-1.68
	≥ 90	33.3										
Physical health	< 90	93.3	1.22	.90-1.65	1.41	1.04-1.91	1.28	.94-1.73	1.66	1.23-2.24	1.72	1.27-2.33
	≥ 90	6.7										
Mental health	< 90	43.3	1.28	.09-1.49	1.12	.96-1.32	.99	.85-1.16	.89	.76-1.04	1.00	.85-1.16
	≥ 90	56.7										
Social/Spiritual health	< 90	86.7	1.49	1.17-1.89	1.47	1.15-1.87	1.35	1.06-1.73	1.56	1.22-1.99	1.59	1.25-2.03
	≥ 90	13.3										
Monitoring and feedback	< 90	60.0	.90	.76-1.05	1.13	.96-1.33	1.1	.94-1.29	1.01	.86-1.19	1.02	.87-1.19
	≥ 90	40.0										
Evaluation system	< 90	33.3	.98	.84-1.15	1.20	1.02-1.42	1.09	.93-1.28	1.28	1.08-1.52	1.21	1.03-1.42
	≥ 90	66.7										
Monitoring	< 90	33.3	.97	.83-1.14	1.16	.99-1.37	1.14	.97-1.33	1.05	.89-1.24	1.10	.94-1.30
	≥ 90	66.7										
Reflection on post-plan	< 90	16.7	1.00	.82-1.23	1.08	.88-1.34	.90	.74-1.10	1.02	.83-1.26	1.00	.82-1.23
	≥ 90	83.3										

CI, confidence interval; OR, odds ratio.

school environments in a sustainable manner.¹ The instrument's final composition can be considered appropriate, because the dimensions are satisfactorily in line with the promotion of school health, prioritizing actions for health promotion in the school environment.²

Limitations

The SHSC has some limitations. First, we assessed the tool's reliability only by a single round of data collection from each school. To improve the reliability and validity of the tool, we chose respondents within each school who could provide the most relevant answer to each question¹⁷; however, more objective data about "real-world" practices within schools might be generated by responsible managers other than those that we selected for the current study. Second, we

applied the tool only in a small number of schools. The Need Assessment component presented a Cronbach's α slightly below what is deemed acceptable, because we only included 30 schools. In tests of validity, 5 subjects per item are suggested.² An instrument of 158 items should therefore be tested in approximately 790 schools. That has an impact on reliability analyses, because scales with few items tend to provide lower Cronbach's α results. The Need Assessment was made up of 2 essential items,^{18,19} however, and we retained it in the final SHSC to reinforce the overall evaluation of the tool.^{1,2,7,20} Despite the limitation represented by the low number of schools, the SHSC showed acceptable reliability (>.6). Third, the Social/Spiritual subdomain of the Health Prevention and Promotion Program domain was positively associated with student absence (Table 4), which was unexpected. That finding needs to be confirmed by further studies. Finally,

Table 4. School Health Score Card (SHSC) Difference by the Number of Student Absent Days

Domain, Subdomain	SHSC Score	%	At Least 1 Absent Day (Ref = No absence)	
			OR	95% CI
Governance and infrastructure	< 90	40.0		
	≥ 90	60.0	.87	.73-1.03
School health philosophy	< 90	30.0		
	≥ 90	70.0	.68	.57-.81
School policy	< 90	53.3		
	≥ 90	46.7	.81	.69-.96
Health infrastructure	< 90	36.7		
	≥ 90	63.3	1.06	.89-1.26
Need assessment	< 90	50.0		
	≥ 90	50.0	1.08	.91-1.28
Need assessment	< 90	50.0		
	≥ 90	50.0	1.08	.91-1.28
Actual condition investigation	< 90	30.0		
	≥ 90	70.0	1.20	1.00-1.43
Planning	< 90	66.7		
	≥ 90	33.3	.95	.79-1.14
Planning	< 90	63.3		
	≥ 90	36.7	.97	.81-1.15
Communication	< 90	33.3		
	≥ 90	66.7	.69	.58-.82
Health prevention and promotion program	< 90	66.7		
	≥ 90	33.3	.83	.69-1.00
Physical health	< 90	93.3		
	≥ 90	6.7	1.31	.95-1.80
Mental health	< 90	43.3		
	≥ 90	56.7	.99	.84-1.17
Social/Spiritual health	< 90	86.7		
	≥ 90	13.3	1.41	1.09-1.88
Monitoring and feedback	< 90	60.0		
	≥ 90	40.0	.95	.80-1.13
Evaluation system	< 90	33.3		
	≥ 90	66.7	.81	.68-.96
Monitoring	< 90	33.3		
	≥ 90	66.7	.77	.64-.91
Reflection on post-plan	< 90	16.7		
	≥ 90	83.3	1.05	.84-1.31

CI, confidence interval; OR, odds ratio.

student absence could be an equivocal measure via which to validate the SHSC, because in some cases, sick students are encouraged to be absent to prevent the spread of infection. Therefore, different types of absenteeism require further elaboration, eg, whether absence is inexcusable or chronic. Despite this, student absence indicates that they undergo changes in certain conditions, which should be considered.

Conclusions

In conclusion, the SHSC significant association with the overall student health and can comprehensively assess the needs of school health programs, evaluate current school programs for the promotion of student health, identify program gaps, and prioritize high-impact interventions for critical health topics. The SHSC scale will contribute to the expansion of

knowledge of school health promotion in both research and practice.

IMPLICATIONS FOR SCHOOL HEALTH

Our study showed that good school health policies and programs were associated with overall aspects of student health and reduced absenteeism.¹⁹ As we recognize the potential for schools to provide more healthy environments for young people, the SHSC enables schools to evaluate the health needs of students, identify the strengths and weaknesses of school-health management programs, and develop action plans, like the SHI, that improve student health and enable students to become healthy and productive adults.^{1,6,16}

The aim of the study was not only to demonstrate that school policies and practices for promoting health are associated with positive outcomes, but also to

assess how many schools are currently engaged in these school policies and practices. Analyses using the SHSC can therefore help to identify the strengths and weaknesses of school health policies and programs and to plan and monitor programs nationwide.^{1,14,18} We could benefit school personnel by providing the SHSC manual and guidelines based on the results of our data and suggesting solutions accordingly to improve weak domains.

In addition, such data are useful in supporting school health-related policies and legislation.¹⁴ The present study applied a comprehensive approach in order to measure school-health management process that includes governance and infrastructure, need assessment, planning, program implementation, and monitoring. Notably, each domain showed significant positive impacts on students' health and absence rate, representing that this program needs to be carried in a systematic and continuous manner. Furthermore, based on the examined positive outcomes on various aspects of student health, this study gives implications to decision-makers or stakeholders to pursue a holistic point of view when considering school health-related programs. By considering the development of WSCC, which compensates for the original CSHP, a collaborative and ecological approach should also be taken into account and reflected in further SHSC uptake.⁴

Human Subjects Approval Statement

This study was approved by the Institutional Review Boards of Seoul National University Hospitals as an IRB Review Exemption study.

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