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Original Article

Analyzing the Importance and Performance of Safety Education for Sports Participants with Disabilities in Korea

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Abstract

Background: We conducted an importance–performance analysis (IPA) to examine how sports instructors with disabilities perceive the effectiveness and relevance to improve safety education for sports participants with disabilities.

Methods: This study was conducted from April to July 2024 in Seoul and Gyeonggi Province, South Korea. We surveyed 395 sport instructors with disabilities and analyzed the perceived importance and performance of safety education across seven domains: life safety, traffic safety, violence and personal safety, drug and cyber addiction, disaster safety, occupational safety, and first aid. The survey included 52 sub-items, and data were analyzed using descriptive statistics, paired samples *t*-tests, and IPA.

Results: A significant difference in importance and performance was observed across all 7 safety education areas and 52 sub-items, with their importance exceeding their performance ($P<0.05$). The IPA matrix showed that the traffic and disaster safety domains required urgent improvement, while the life and occupational safety domains required long-term improvement.

Conclusion: Considering that accidents are difficult to predict and can occur in various forms, is it necessary to cultivate long-term improvement among sports participants with disabilities by incorporating safety education into their daily lives.

Keywords: Disability; Importance–performance analysis; Safety awareness; Safety education; Sports instructor

Introduction

The pervasive lack of sensitivity to safety in Korean society has often resulted in minor accidents escalating into major disasters. A representative example is the Sewol Ferry Disaster (1), which highlighted the critical need for effective disaster safety measures and crisis management (1,2). However, Korean society continues to suffer from safety insensitivity, resulting in minor and major accidents (3). Accidents are unpredictable and can occur in various forms, yet they are often addressed reactively rather than prevented proactively, highlighting the importance of safety education.

Safety education refers to education on how to prevent accidents and minimize damage when they occur (4,5). Its primary goal is to develop individuals' awareness, skills, and motivation to protect themselves and others from environmental hazards (6). Following the Sewol Ferry Accident (1-4), the Korean Ministry of Education introduced the "2014 Comprehensive Safety Measures for the Education Sector." According to this directive, safety education is provided in schools, enabling students to progressively develop an understanding of safety and learn how to take actions to protect themselves. Specifically, safety education addresses seven main domains—life safety, traffic safety, violence and personal safety, drug and cyber addiction, disaster safety, occupational safety, and first aid (7)—which focus on preventing and tackling accidents that occur in different areas of life.

However, the educational content designed for these seven topics does not consider sports participants with disabilities, who face difficulties in preventing and responding to safety accidents due to cognitive, emotional, and physical challenges. Compared with individuals without disabilities, sports participants with disabilities often have significantly less knowledge and ability to independently assess accident risks and respond to accidents in addition to facing challenges with physical mobility (8).

Sports participants with disabilities who do not receive safety education tailored to their characteristics often lack the skills to protect themselves against accident risks. This makes it crucial to provide safety education specifically tailored to individuals with disabilities. Notably, according to the safety education policies, safety education is provided by relevant instructors. Therefore, to plan effectively safety education content for sports participants with disabilities, it is vital to consult sports instructors with disabilities and assess their views on safety education for sports participants with disabilities. However, existing studies have rarely explored these views.

We explored the perception of sports instructors with disabilities on the importance and performance of the seven safety education areas for sports participants with disabilities. Specifically, it conducted an importance–performance analysis (IPA) and examined differences between the relevance and effectiveness of the seven safety education domains for sports participants with disabilities. By exploring the perspective of sports instructors with disabilities who deliver safety education to sports participants with disabilities, the study may broaden the scope and applicability of Korea's safety education policies and contribute to improving safety education for sports participants with disabilities.

Materials and Methods

Participants and data collection

This study, conducted from April to July 2024, targeted sports instructors with disabilities in Seoul and Gyeonggi Province, Korea who held national qualifications and had over one year of experience in special sports. We explained the study's objectives and procedures and distributed self-administered questionnaires to 400 sports instructors with disabilities. Subsequently, the completed questionnaires were collected. After excluding five questionnaires with no or unusable responses, 395 responses were used in data analysis.

All participants were informed about the study procedure and its purpose. They voluntarily signed an informed consent form, with the study's procedure approved by Yongin University, Yongin, Korea. Table 1 presents the general characteristics of the participants.

Table 1: General characteristics of the participants (n=395)

Characteristic	Categories	Frequency (n)	Percentage (%)
Sex	Male	259	65.6
	Female	136	34.4
Age	<30	253	64.1
	>31	142	35.9
Educational experience	Less than 1 year	295	74.7
	1–3 years	67	17.0
	3–5 years	27	6.8
	>5 years	6	1.5
Type of work place	Public	120	30.4
	Private	275	69.6

Measurements

Data were collected on participants' general characteristics, particularly sex, age, educational experience, and type of workplace. The questionnaire measured the importance and performance of the 7 safety education areas and 52 sub-items suggested in the "Seven Major Standards of Korean Safety Education" (7). The respondents rated the importance and performance of each sub-item on 5-point Likert scales ranging from 1 ("not at all") to 5 ("very much").

Data analysis

Data were analyzed using a two-tailed test, with statistical significance set at P=0.05. All statistical analyses were performed using SPSS software (version 25.0; IBM Co., Armonk, NY, USA). First, descriptive statistics were determined using frequencies, percentages, means, and standard deviations. Second, internal consistency reliability tests were conducted to verify the reliability of the items. The reliability of the 52 items was found to be very high at 0.972. Third, we calculated mean scores and standard deviation and performed paired samples *t*-tests to investigate differences in the importance and performance of each safety education area and sub-item. A statistically significant difference was observed between the importance (mean=4.03, standard deviation=0.12) and performance (mean=3.07, standard deviation=0.07) (t=52.390; P<0.001) of each sub-item. Fourth, we created an IPA matrix based on the results of the paired samples *t*-test to determine the items requiring urgent improvement and those needing long-term improvement.

The IPA matrix demonstrates the performance of an attribute relative to its importance. The x-axis represents performance, while the y-axis represents importance. These axes yield four quadrants: the first quadrant, "keep up the good work," represents areas requiring sustained efforts; the second quadrant, "concentrate here," represents areas requiring urgent improvement; the third quadrant, "low priority," represents areas requiring long-term improvement; and the fourth quadrant, "possible overkill," represents areas where more than necessary efforts are being employed.

Results

Differences in the importance and performance of safety education areas

Table 2 presents the results of examining differences in the importance and performance of the seven safety education areas. A statistically significant difference in the importance and performance was observed across all seven domains (P<0.001). Notably, the mean importance score was higher than the mean performance score

across all domains, indicating a significant difference between the importance and performance of each area of safety education. It also confirmed that sports instructors with disabilities perceive the performance of all areas of safety education to be inadequate compared with their importance. Particularly, the instructors highlighted "traffic safety" and "disaster safety" as the most important safety education areas for sports participants with disabilities. These areas also showed the largest average difference between importance and performance.

Table 2: Results of examining differences in the importance and performance of safety education areas (n=395)

Area	Importance		Performance		Average difference	*t*	*P*
	Mean	SD	Mean	SD			
Life safety	3.95	0.84	3.03	0.87	0.92	18.007	<0.001***
Traffic safety	4.19	0.73	3.04	0.81	1.15	24.131	<0.001***
Violence and personal safety	4.08	0.73	3.10	0.88	0.98	20.413	<0.001***
Drug and cyber addiction	3.94	0.81	3.09	0.94	0.85	15.565	<0.001***
Disaster safety	4.12	0.62	3.07	0.91	1.05	21.828	<0.001***
Occupational safety	3.88	0.69	3.01	0.82	0.87	18.527	<0.001***
First aid	3.99	0.78	3.18	0.87	0.81	16.531	<0.001***

SD: standard deviation
***P<0.001; tested by paired samples t-tests

Differences in the importance and performance of safety education sub-items

Table 3 presents the results of examining differences in the importance and performance of the 52 safety education sub-items. Notably, a statistically significant difference in the importance and performance was observed across all 52 sub-items (P<0.001), with the mean importance score exceeding the mean performance score. This result suggests that sports instructors with disabilities perceive the performance of all 52-safety education sub-items as insufficient relative to their importance. Particularly, Item 14 (mean difference [MD]=1.25) and Item 15 (MD=1.25) showed the largest average difference, followed by Item 13 (MD=1.23), Item 11 (MD=1.22), Item 12 (MD=1.21), Item 10 (MD=1.14), Item 9 (MD=1.13), and Item 36 (MD=1.13). All of these items fall under the "traffic safety" area of safety education. This finding suggests that safety education in the domain of traffic safety (the most important area of safety education for sports participants with disabilities) is the least well implemented in disability sports settings.

Table 3: Results of examining differences in the importance and performance of safety education sub-items (n=395)

Area	Sub-item	Importance		Performance		Average difference	t	*p*
		Mean	SD	Mean	SD			
Life safety	1. Facility safety	3.92	0.89	2.93	1.02	0.99	18.466	<0.001***
	2. Product safety	3.93	0.88	3.02	0.92	0.91	17.325	<0.001***
	3. Laboratory practice safety	3.95	0.87	3.05	0.92	0.90	16.184	<0.001***
	4. Sports and leisure activity safety	3.94	0.89	3.08	0.96	0.86	14.702	<0.001***
	5. Prevention of kidnapping and missing child accidents	3.95	0.90	3.07	0.95	0.88	15.309	<0.001***
Traffic safety	6. Distinguishing traffic signs	4.09	0.91	3.10	0.96	0.99	16.767	<0.001***
	7. How to cross the road	4.12	0.90	3.10	0.98	1.02	17.103	<0.001***
	8. Pedestrian safety	4.15	0.88	3.09	0.97	1.06	17.703	<0.001***
	9. Safe bicycle riding	4.18	0.84	3.05	0.98	1.13	18.457	<0.001***
	10. Bicycle maintenance	4.17	0.88	3.03	0.98	1.14	18.710	<0.001***
	11. Causes and prevention of motorcycle accidents	4.24	0.81	3.02	0.97	1.22	20.953	<0.001***
	12. Precautions while driving a motor-	4.18	0.91	2.97	1.01	1.21	19.871	<0.001***

Table 3: Continued …

	cycle							
	13. Causes of car accidents	4.23	0.84	3.00	1.01	1.23	19.749	<0.001***
	14. How to prevent car accidents	4.25	0.85	3.00	1.02	1.25	20.038	<0.001***
	15. Safety rules for using public transportation	4.25	0.85	3.00	1.03	1.25	19.779	<0.001***
Violence and personal safety	16. School violence	4.10	0.83	3.11	1.03	0.99	16.733	<0.001***
	17. Verbal/cyber violence	4.08	0.82	3.09	1.05	0.99	16.359	<0.001***
	18. Physical violence	4.12	0.83	3.05	1.06	1.07	18.180	<0.001***
	19. Group bullying	4.08	0.82	3.07	1.02	1.01	17.145	<0.001***
	20. Sexual violence prevention and coping methods, prostitution prevention	4.09	0.86	3.10	1.05	0.99	16.540	<0.001***
	21. Child abuse prevention and coping methods	4.09	0.86	3.09	1.05	1.00	16.383	<0.001***
	22. Suicide prevention and coping methods	4.06	0.88	3.15	1.05	0.91	15.088	<0.001***
	23. Domestic violence prevention and coping methods	4.04	0.88	3.15	1.06	0.89	14.721	<0.001***
Drug and cyber addiction	24. Drug addiction and prevention	3.99	0.84	3.11	1.01	0.89	14.722	<0.001***
	25. Smoking addiction and prevention	4.01	0.87	3.19	1.82	0.82	8.223	<0.001***
	26. Drinking addiction and prevention	3.98	0.89	3.08	0.99	0.90	15.232	<0.001***
	27. High-caffeine food addiction and prevention	3.93	0.91	3.06	1.00	0.87	14.748	<0.001***
	28. Internet gaming addiction	3.87	0.95	3.06	1.02	0.81	13.380	<0.001***
	29. Smartphone addiction	3.87	0.96	3.05	1.04	0.82	13.553	<0.001***
Disaster safety	30. Fire	4.15	0.71	3.03	1.11	1.12	19.437	<0.001***
	31. Safety rules in case of fire	4.14	0.68	3.12	1.03	1.02	18.223	<0.001***
	32. Fire extinguisher use and response methods	4.14	0.67	3.17	1.01	0.97	17.251	<0.001***
	33. Causes of explosion and collapse and response methods	4.13	0.68	3.10	1.00	1.03	18.445	<0.001***
	34. Response methods in case of terrorist incidents	4.12	0.70	3.11	1.40	1.01	13.531	<0.001***
	35. Response methods in case of floods and typhoons	4.09	0.77	3.02	1.02	1.07	19.074	<0.001***
	36. Response methods in case of earthquakes, heavy snow, cold waves, and lightning	4.09	0.80	2.96	1.01	1.13	20.197	<0.001***
Occupational safety	37. Importance of occupational safety awareness	3.93	0.82	2.99	0.99	0.94	16.437	<0.001***
	38. Occupational safety culture	3.87	0.82	3.02	1.02	0.85	14.516	<0.001***
	39. Meaning and occurrence of industrial accidents	3.89	0.82	2.98	1.01	0.91	15.008	<0.001***
	40. Prevention and countermeasures for industrial accidents	3.88	0.83	3.02	1.01	0.86	14.307	<0.001***
	41. Meaning and occurrence of occupational diseases	3.86	0.83	2.98	0.97	0.88	15.425	<0.001***
	42. Prevention and countermeasures for occupational diseases	3.87	0.85	3.03	1.03	0.84	13.643	<0.001***
	43. Management of industrial accidents	3.87	0.91	3.00	1.01	0.87	13.565	<0.001***
	44. Organization and order	3.86	0.88	3.02	1.03	0.84	13.363	<0.001***
	45. Wearing protective gear	3.87	0.89	3.03	1.03	0.84	12.999	<0.001***
First aid	46. Purpose and general principles of first aid	4.00	0.86	3.18	1.00	0.82	13.669	<0.001***
	47. Actions in emergency situations	4.02	0.86	3.17	1.02	0.85	14.255	<0.001***
	48. Precautions and preparations before first aid	3.97	0.85	3.17	1.00	0.80	13.643	<0.001***
	49. Cardiopulmonary resuscitation	3.99	0.87	3.21	1.01	0.78	13.289	<0.001***
	50. Use of an automated external defibrillator	4.02	0.88	3.15	0.99	0.87	15.003	<0.001***
	51. Airway obstruction	3.96	0.90	3.17	0.98	0.79	13.266	<0.001***
	52. Hemostasis and wound care, sprains, fractures, burns, etc.	3.99	0.88	3.18	1.03	0.81	13.744	<0.001***

SD: standard deviation

****P*<0.001; tested by paired samples *t*-tests

IPA matrix

Table 4 presents the results derived from the IPA matrix. Being in the first quadrant ("keep up the good work"; high importance and high performance), 11 sub-items required sustained efforts: 3 items pertaining to the "traffic safety" area, 4 items pertaining to the "violence and personal safety" area, and 4 items pertaining to the "disaster safety" area. In the second quadrant ("concentrate here"; high importance but low performance), 12 items required urgent improvement: 7 items pertaining to the "traffic safety" area, 2 items pertaining to the "violence and personal safety" area, and 3 items pertaining to the "disaster safety" area. In the third quadrant ("low priority"; low importance and low performance), 15 sub-items required long-term improvement: 3 items pertaining to the "life safety" area, 3 items pertaining to the "drug and cyber addiction" area, and 9 items pertaining to the "occupational safety" area. Finally, 14 items were in the fourth quadrant ("possible overkill"), indicating low importance but high performance—suggesting that disproportionate efforts may be allocated to these areas. These areas included all seven items from the "first aid" domain, two items from the "life safety" area, two from the "violence and personal safety" domain, and three from the "drug and cyber addiction" area.

Table 4: Results derived from the IPA matrix

Quadrant	Areas	Sub-items	Number of items
First quadrant: Keep up the good work (items requiring sustained efforts)	Traffic safety	6. Distinguishing traffic signs	11
		7. How to cross the road	
		8. Pedestrian safety	
	Violence and personal safety	16. School violence	
		17. Verbal/cyber violence	
		20. Sexual violence prevention and coping methods, prostitution prevention	
		21. Child abuse prevention and coping methods	
	Disaster safety	31. Safety rules in case of fire	
		32. Fire extinguisher use and response methods	
		33. Causes of explosion and collapse and response methods	
		34. Response methods in case of terrorist incidents	
Second quadrant: Concentrate here (items requiring urgent improvement)	Traffic safety	9. Safe bicycle riding	12
		10. Bicycle maintenance	
		11. Causes and prevention of motorcycle accidents	
		12. Precautions while driving a motorcycle	
		13. Causes of car accidents	
		14. How to prevent car accidents	
		15. Safety rules for using public transportation	
	Violence and personal safety	18. Physical violence	
		19. Group bullying	
	Disaster safety	30. Fire	
		35. Response methods in case of floods and typhoons	
		36. Response methods in case of earthquakes, heavy snow, cold waves, and lightning	
Third quadrant: Low priority (items requiring	Life safety	1. Facility safety	15
		2. Product safety	
		3. Laboratory practice safety	

Table 4: Continued …

long-term improvement)	Drug and cyber addiction	27. High-caffeine food addiction and prevention	
		28. Internet gaming addiction	
		29. Smartphone addiction	
	Occupational safety	37. Importance of occupational safety awareness	
		38. Occupational safety culture	
		39. Meaning and occurrence of industrial accidents	
		40. Prevention and countermeasures for industrial accidents	
		41. Meaning and occurrence of occupational diseases	
		42. Prevention and countermeasures for occupational diseases	
		43. Management of industrial accidents	
		44. Organization and order	
		45. Wearing protective gear	
Fourth quadrant: Possible overkill (items where more than necessary efforts are being employed)	Life safety	4. Sports and leisure activity safety	14
		5. Prevention of kidnapping and missing child accidents	
	Violence and personal safety	22. Suicide prevention and coping methods	
		23. Domestic violence prevention and coping methods	
	Drug and cyber addiction	24. Drug addiction and prevention	
		25. Smoking addiction and prevention	
		26. Drinking addiction and prevention	
	First aid	46. Purpose and general principles of first aid	
		47. Actions in emergency situations	
		48. Precautions and preparations before first aid	
		49. Cardiopulmonary resuscitation	
		50. Use of an automated external defibrillator	
		51. Airway obstruction	
		52. Hemostasis and wound care, sprains, fractures, burns, etc.	

Discussion

We performed an IPA analysis and investigated differences in the importance and performance of safety education areas and sub-items, as perceived by sports instructors with disabilities, to derive a plan to improve safety education for sports participants with disabilities. The results showed statistically significant differences in the importance and performance of all seven-safety education areas, with their importance exceeding their performance. Similarly, there were statistically significant differences in the importance and performance of all 52-safety education sub-items. Their importance scores surpassed their performance scores, indicating subpar performance compared to importance.

Sports participants with disabilities have unique needs and emotional characteristics that make it difficult to identify harmful and dangerous factors around them. This makes it necessary to provide safety education that is tailored to the type and degree of disability, rather than providing conventional safety education to sports participants with disabilities. Based on the results of this study, sports instructors with disabilities consider it extremely important to provide safety education to sports participants with disabilities. However, there are many reasons why it is challenging to provide safety education to these individuals. These challenges include the absence of a safety education program, insufficient facilities for delivering safety education, the lack of clarity on the content to be taught, and inadequate safety knowledge among instructors (9-10).

We created an IPA matrix to identify the areas and sub-items requiring urgent improvement and those requiring long-term improvement. Regarding the safety education areas, the first quadrant (denoting high importance and high performance) included the "violence and personal safety" area, thus requiring sustained efforts. The second

quadrant (denoting high importance but low performance) included the "traffic safety" and "disaster safety" areas, thus requiring urgent improvement. The third quadrant (denoting low importance and low performance) included the "life safety" and "occupational safety" areas, thus requiring improvement in the long term. Finally, the fourth quadrant (denoting low importance but high performance) included the "drug and cyber addiction" and "first aid" areas, indicating excessive efforts.

Regarding the sub-items, the first quadrant comprised three items of the "traffic safety" area, four items of the "violence and personal safety" area, and four items of the "disaster safety" area, thus requiring sustained efforts. The second quadrant included seven items of the "traffic safety" area, two from the "violence and personal safety" area, and three from the "disaster safety" domain, requiring urgent improvement. The third quadrant consisted of three items of the "life safety" area, three items of the "drug and cyber addiction" area, and nine items of the "occupational safety" area, needing long-term improvement. Finally, the fourth quadrant showed more than necessary efforts on all seven items of the "first aid" area, two items of the "life safety" area, two items of the "violence and personal safety" area, and three items of the "drug and cyber addiction" area.

Safety education for sports participants with disabilities should go beyond being a one-time event and be recognized as an essential, ongoing educational process to uphold the fundamental learning rights of these individuals (11-13). Developing and implementing a safety education program can be challenging due to the substantial workload, administrative responsibilities, and caregiving duties shouldered by sports instructors with disabilities (11-13). However, as the results of this study show, safety education is closely related not only to the safety of sports participants with disabilities during sports activities but also to their safety in daily life. Additionally, it plays a vital role in making these individuals self-reliant members of society (13). Therefore, delivering proper and ongoing safety education to sports participants with disabilities may have a positive effect on sustainable growth and development.

Based on the results of this study, we present specific measures to improve safety education for sports participants with disabilities. First, considering that safety accidents occur because of the interaction between physical and human factors, it is necessary to understand this interaction and the resulting accidents. This understanding will help identify dangerous situations that may lead to accidents and devise appropriate measures. Additionally, continuous safety education must be provided to equip sports participants with disabilities to recognize risk factors and protect themselves from accidents. Compared with those without disabilities, sports participants with disabilities possess significantly less knowledge and ability to gauge risk factors and prevent or deal with accidents. They also experience issues with physical mobility. Therefore, continuous safety education must be provided to these individuals to cultivate their knowledge and empower them to apply it in real-life accident situations (14)

Second, systematic education must be delivered in the traffic and disaster safety domains, as they showed high importance but low performance, requiring urgent improvement. It is well recognized that traffic and disaster situations are major risk factors for accidents. However, safety education as an educational activity is conducted through formal or informal education, and when organizing the disabled sports education curriculum, safety-related content is organized into each participant's education and life guidance content. For disability sports, safety education is primarily delivered through a brief, 5-min session before various activities. These sessions focus on explaining potential risk factors and response methods pertinent to the upcoming activity. These sessions are provided before training and experience activities, experimental activities, practical and labor activities, and care classes (15). Consequently, the safety education provided in the field of disability sports contains mostly general and formal content rather than content that can be imbibed. Therefore, safety education should include realistic and practical content to

provide tangible support. Additionally, pre-planned safety education related to specific activities must be delivered substantively to truly enhance participants' preparedness.

Third, it is imperative to investigate the status of safety education in the life safety and occupational safety areas (as they require long-term improvement) and develop appropriate educational programs for sports participants with disabilities. The fact that all items of the occupational area were located in the third quadrant means that the current occupational safety education is not suitable for sports participants with disabilities. Therefore, occupational safety education should be tailored to the needs and characteristics of these individuals. Sports participants with disabilities must be equipped to handle all kinds of accidents that may occur in their daily lives, as they tend to struggle to identify harmful factors both within the sports field and in broader social contexts. However, in reality, safety education is provided to these individuals in one or few sessions, thus hampering their ability to follow safety rules in their daily lives or respond properly when an accident occurs. Ultimately, the occurrence of an accident will inevitably increase the likelihood of secondary accidents or other high-risk accidents. This makes it vital to implement various support systems to increase both the importance and performance of the "life safety" and "occupational safety" areas of safety education.

Conclusion

Given the unpredictable and varied nature of accidents, long-term educational improvements in safety education for sports participants with disabilities require its integration into their daily lives.

Journalism Ethics considerations

Ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy, have been completely observed by the authors.

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Conflict of Interest

The author declares no conflicts of interest.

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