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Early Exposure to Applied Health Science Through First-Aid Education: Students' Perceptions and Academic Interest

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ABSTRACT : Background: First-aid education provides adolescents with practical emergency-response skills while introducing fundamental concepts of applied health science. Beyond emergency preparedness, experiential health-science outreach may also provide opportunities for early academic engagement. This study aimed to describe students' perceptions, academic interests, and higher-education engagement following participation in a first-aid educational seminar and practical workshop.

Methods: A post-intervention cross-sectional study was conducted among high school students participating in a first-aid educational outreach program in Semarang, Indonesia. The intervention combined theoretical explanation, case-based discussion, demonstration, and practical exposure covering syncope, bleeding, choking, and sports-related injuries. Immediately following the program, participants completed an online questionnaire assessing academic interests, institutional perceptions, factors influencing university choice, and enrollment readiness. Data were analyzed using descriptive and exploratory statistical methods.

Results: A total of 78 students participated, of whom 25 (32.1%) expressed interest in health-related fields. Favorable responses were reported by more than 80% of participants across all four evaluated perception items. Scholarships (62.8%), university values (61.5%), educational costs (57.7%), and availability of preferred study programs (56.4%) were the most frequently reported considerations when selecting a university. Overall, 50 students (64.1%) reported a fairly high or very high likelihood of recommending the university, while 38 (48.7%) expressed willingness to proceed with enrollment. Enrollment willingness was descriptively higher among students reporting greater institutional consideration, although the exploratory association did not reach statistical significance ($p = 0.070$).

Conclusion: First-aid outreach may provide an accessible platform for early exposure to applied health science while simultaneously facilitating academic engagement among high school students. Further pre–post and longitudinal studies are needed to determine whether such exposure influences subsequent academic interests and educational choices.

KEYWORDS : academic interest, applied health science, educational outreach, experiential learning, first aid, high school students

INTRODUCTION

First aid is an essential component of emergency preparedness and provides individuals with practical skills to respond to common medical emergencies before professional assistance becomes available. For high school students, first-aid education is particularly relevant because emergencies such as syncope, bleeding, choking, and sports-related injuries may occur in school and community settings.[1,2] Beyond its immediate practical value, first-aid training also introduces students to fundamental concepts of applied health science, including airway management, circulation, physiological responses to injury, and basic emergency decision-making.[3,4]

Educational approaches that combine theoretical explanation with case-based discussion, demonstration, and hands-on practice may provide a more tangible learning experience than conventional classroom-based science instruction alone. Through practical activities, students can observe how concepts from biology, physiology, and health sciences are translated into real-life actions. Such experiential exposure may therefore serve not only to improve familiarity with emergency response but also to provide an early introduction to the practical applications of health science.[5,6]

High school is also an important period for the development of academic interests and future educational choices. During this stage, students increasingly explore potential fields of study, career pathways, and higher-education institutions. Exposure to applied health-science activities may create opportunities for students to engage with health-related disciplines outside the formal curriculum while simultaneously considering their academic interests and future study options.[7,8] However, relatively limited information is available regarding students' perceptions and patterns of academic engagement following brief health-science outreach activities, particularly those incorporating practical first-aid education.[1,9]

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Therefore, this study aimed to describe students' perceptions, academic interests, and higher-education engagement following participation in a first-aid educational seminar and practical workshop as an early exposure to applied health science. The study also explored patterns of academic consideration and enrollment readiness among participating students following the educational outreach program.

METHODS

Study Design and Participants

This post-intervention cross-sectional study was conducted among high school students who participated in a first-aid educational outreach program in Semarang, Indonesia, in August 2026. The program was designed to provide early exposure to applied health science through an interactive seminar and practical first-aid workshop. Students attending the program were invited to complete a post-activity questionnaire following the educational session.[10,11]

Participation in the survey was voluntary, and responses were collected using an online questionnaire. All submitted responses available from participating students were considered for inclusion in the study. Responses with insufficient information for analysis were excluded where applicable. Personal identifiers collected for administrative purposes, including names, email addresses, and telephone numbers, were excluded from the analytical dataset to maintain participant confidentiality.[12]

The study used participants' post-outreach responses to characterize their perceptions, academic interests, and higher-education engagement following the educational program. As no pre-intervention assessment or control group was included, the study was designed to describe post-outreach patterns rather than to determine causal effects of the educational intervention.

First-Aid Educational Intervention

The educational intervention consisted of an interactive seminar and practical workshop designed to introduce high school students to basic first-aid principles and their application in common emergency situations. The program integrated theoretical explanation, case-based discussion, demonstration, and practical exposure to provide students with an accessible introduction to applied health science.[3,13]

The educational content focused on four common situations relevant to adolescents and school environments: syncope, bleeding, choking, and sports-related injuries. Students were introduced to the recognition of these conditions, appropriate initial responses, and situations requiring further professional medical assistance. The seminar emphasized the underlying principles of emergency response, including personal and environmental safety, recognition of potentially urgent conditions, and appropriate first-aid actions while awaiting professional care.[1,9]

The practical component complemented the seminar through demonstrations and guided exposure to selected first-aid techniques. These included positioning an unconscious but breathing individual in the recovery position, basic bleeding-control techniques using direct pressure and pressure dressings, first-aid maneuvers for choking including back blows and abdominal thrusts, and elastic bandaging for selected musculoskeletal injuries. Participants were also introduced to commonly used first-aid equipment and their basic functions.[9,14]

Overall, the program was structured as a brief applied health-science educational intervention in which students could relate basic concepts of human physiology, injury response, airway management, circulation, and emergency decision-making to practical situations encountered in everyday life.

Data Collection and Study Variables

Data were collected immediately following the educational outreach program using a structured online questionnaire. The questionnaire collected information on participants' educational background, intended field of higher education, perceptions related to the university and its educational environment, factors considered when selecting a university, and their level of interest in pursuing further study. Questions consisted of categorical, multiple-response, and Likert-type items.[12,15]

Participant characteristics included grade level and intended program of study. Intended study programs were subsequently categorized into health-related and non-health-related fields to provide an overall description of participants' academic interests. Responses concerning the types of information students wished to obtain about higher education and the factors influencing their university choices were analyzed as multiple-response variables, allowing participants to indicate more than one consideration where applicable.

Post-outreach perceptions were assessed using four Likert-type items included in the questionnaire. These items captured participants' perceptions of selected institutional and educational attributes. Responses were analyzed individually rather than combined into a composite score, as the questionnaire was intended primarily for post-activity evaluation and was not designed as a validated psychometric instrument for measuring changes in academic interest.[15,16]

Higher-education engagement was characterized using participants' reported likelihood of considering the university for future study and their willingness to proceed with enrollment. These variables were used to describe different levels of academic consideration and enrollment readiness following the outreach activity. Where relevant, enrollment pathway preferences were also summarized among students expressing willingness to register.[17,18]

Personal information collected for administrative and communication purposes, including participants' names, email addresses, telephone numbers, and parental contact information, was not included in the analytical dataset. All analyses were conducted using de-identified data.

Statistical Analysis

Data were analyzed using descriptive and exploratory statistical methods. Categorical variables were summarized as frequencies and percentages. For multiple-response questions, each response option was analyzed separately, and the proportion of participants selecting each option was calculated based on the total number of respondents to the respective question. Likert-type items were summarized using response distributions and median values with interquartile ranges, where appropriate.[15,19]

Participants' intended programs of study were categorized into health-related and non-health-related fields and summarized descriptively. Post-outreach perception items were analyzed individually without generating a composite perception score. Academic consideration and enrollment readiness were similarly summarized according to their respective response categories.[17,19]

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To explore patterns of higher-education engagement, cross-tabulations were performed between participants' likelihood of considering the university and their willingness to proceed with enrollment. Associations between categorical variables were examined using the chi-square test or Fisher's exact test when expected cell frequencies were small. These analyses were considered exploratory and were interpreted alongside the descriptive response patterns rather than solely on the basis of statistical significance.[20,21]

All statistical tests were two-sided, and a p-value of <0.05 was considered statistically significant. Missing responses, where present, were excluded from the analysis of the corresponding variable without imputation.[22]

Ethical Considerations

The study protocol underwent ethical review and received ethical clearance from the relevant institutional ethics committee. Participation in the post-activity survey was voluntary, and participant confidentiality was maintained throughout the study. Personal identifiers collected for administrative purposes were excluded from the analytical dataset, and all analyses were performed using de-identified data. The study was conducted in accordance with applicable ethical principles for research involving human participants.

RESULTS

Participant Characteristics and Academic Interests

A total of 78 students completed the post-outreach questionnaire and were included in the analysis. Participants represented three high school grade levels, with Grade 11 students comprising the largest group (n = 35, 44.9%), followed by Grade 12 (n = 24, 30.8%) and Grade 10 students (n = 19, 24.4%).

Participants reported diverse intended fields of higher education (Table 1). Medicine and psychology were the most frequently selected programs, each reported by 11 students (14.1%), followed by law (n = 9, 11.5%), management (n = 8, 10.3%), and accounting (n = 7, 9.0%). Biotechnology was selected by five students (6.4%), while pharmacy was selected by three students (3.8%). Overall, 25 students (32.1%) expressed an intention to pursue health-related programs, including medicine, psychology, and pharmacy. The remaining participants reported interests across life sciences, engineering and technology, business, law, communication, and other academic fields.

Table 1. Participant characteristics and intended programs of study (N = 78)

Characteristic	n	%
Grade level		
Grade 10	19	24.4
Grade 11	35	44.9
Grade 12	24	30.8
Intended program of study		
Medicine	11	14.1
Psychology	11	14.1
Law	9	11.5
Management	8	10.3
Accounting	7	9.0
Biotechnology	5	6.4
Industrial Engineering	4	5.1
Communication Science	3	3.8
Food Technology	3	3.8
Pharmacy	3	3.8
Mechanical Engineering	3	3.8
Information Systems	2	2.6
Tourism	2	2.6
Business Administration	2	2.6
Electrical Engineering	2	2.6
Culinary Studies	1	1.3
Digital Business	1	1.3
English Education	1	1.3
Academic interest classification		
Health-related fields*	25	32.1
Other fields	53	67.9

***Health-related fields included medicine, psychology, and pharmacy.**

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Students' Perceptions Following the First-Aid Educational Outreach

Participants generally reported favorable perceptions of the university and its educational attributes following the outreach program (Table 2). Academic reputation received particularly positive responses, with 69 of 78 students (88.5%) assigning a rating of 4 or 5. A similar proportion (88.5%) gave favorable ratings to institutional integrity. The median rating for academic reputation was 5 (IQR: 4–5), while institutional integrity had a median rating of 4 (IQR: 4–5).

Positive perceptions were also observed regarding the university's engagement with industry and the accessibility of institutional information. Among the 77 students who responded to the item on industry collaboration, 63 (81.8%) assigned a rating of 4 or 5, with a median rating of 5 (IQR: 4–5). Similarly, 66 of 78 students (84.6%) favorably rated the accessibility and comprehensibility of university information, with a median rating of 5 (IQR: 4–5). Overall, favorable responses exceeded 80% across all four perception items.

Table 2. Post-outreach perceptions of institutional and educational attributes

Perception item	n	Rating 1, n (%)	Rating 2, n (%)	Rating 3, n (%)	Rating 4, n (%)	Rating 5, n (%)	Favorable response*, n (%)	Median (IQR)
Good academic reputation	78	1 (1.3)	1 (1.3)	7 (9.0)	28 (35.9)	41 (52.6)	69 (88.5)	5 (4–5)
Institutional integrity	78	2 (2.6)	0 (0.0)	7 (9.0)	31 (39.7)	38 (48.7)	69 (88.5)	4 (4–5)
Active collaboration with industry	77	2 (2.6)	0 (0.0)	12 (15.6)	24 (31.2)	39 (50.6)	63 (81.8)	5 (4–5)
Accessible and understandable information	78	2 (2.6)	0 (0.0)	10 (12.8)	26 (33.3)	40 (51.3)	66 (84.6)	5 (4–5)

***Favorable responses were defined descriptively as ratings of 4 or 5 on the five-point response scale. Percentages may not total 100% because of rounding.**

Factors Shaping Higher-Education Interest

Students reported multiple considerations when evaluating their future higher-education options (Table 3). Scholarships were the most frequently selected consideration (n = 49, 62.8%), closely followed by university values (n = 48, 61.5%). Educational cost (n = 45, 57.7%), availability of preferred study programs (n = 44, 56.4%), and facilities (n = 42, 53.8%) were also selected by more than half of the participants. Career prospects and location were each considered by 37 students (47.4%). Recommendations from friends or relatives were less frequently reported (n = 9, 11.5%).

Participants also identified several perceived institutional strengths relevant to their higher-education consideration. Among the 77 students who responded to this question, academic quality was the most frequently recognized strength (n = 60, 77.9%), followed by the institutional environment and humanistic values (n = 40, 51.9%) and international programs (n = 32, 41.6%). Strategic campus location (n = 27, 35.1%), industry connectivity (n = 24, 31.2%), and reasonable educational costs (n = 23, 29.9%) were also identified.

Students had encountered information about the university through a range of channels. Social media was the most frequently reported source (n = 38, 48.7%), followed by educational exhibitions (n = 31, 39.7%), friends or family (n = 30, 38.5%), and schools or guidance counselors (n = 21, 26.9%). Official websites (n = 7, 9.0%), alumni (n = 6, 7.7%), and campus activities (n = 6, 7.7%) were reported less frequently.

Table 3. Factors and information sources shaping participants' higher-education interest

Domain and response	n	%
Considerations when selecting a university (N = 78)		
Scholarships	49	62.8
University values	48	61.5
Educational cost	45	57.7
Availability of preferred study programs	44	56.4
Facilities	42	53.8
Career prospects	37	47.4
Location	37	47.4
Recommendations from friends or relatives	9	11.5
Other: employment connections	1	1.3
Perceived institutional strengths (n = 77)		
Academic quality	60	77.9
Institutional environment and humanistic values	40	51.9
International programs	32	41.6
Strategic campus location	27	35.1
Industry connectivity	24	31.2
Reasonable educational costs	23	29.9
Sources of university information (N = 78)		
Social media	38	48.7
Educational exhibitions	31	39.7

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Friends or family	30	38.5
School or guidance counselors	21	26.9
Official website	7	9.0
Alumni	6	7.7
Campus activities	6	7.7

***Participants could select more than one response within each domain; therefore, percentages do not total 100%.**

From Exposure to Engagement: Patterns of Academic Consideration and Enrollment Readiness

Following the educational outreach program, participants demonstrated varying levels of institutional consideration and enrollment readiness. When asked about their likelihood of recommending the university as a place to pursue higher education, 39 students (50.0%) reported a "fairly high" likelihood and 11 (14.1%) reported a "very high" likelihood. Together, these categories represented 50 of 78 participants (64.1%). In contrast, 21 students (26.9%) remained uncertain, while seven (9.0%) reported a relatively low likelihood of recommending the institution.

Enrollment readiness represented a more immediate level of engagement. Overall, 38 students (48.7%) indicated that they were willing to proceed with enrollment, whereas 40 (51.3%) were not ready to register at the time of the survey. Among students expressing willingness to enroll, 27 (71.1%) preferred the academic-report pathway, while 11 (28.9%) preferred the admission-test pathway.

A descriptive pattern was observed between institutional consideration and enrollment readiness (Table 4). Among students reporting a fairly high likelihood of recommending the university, 23 of 39 (59.0%) were willing to enroll. Enrollment willingness was also reported by six of 11 students (54.5%) in the very-high-likelihood group. In comparison, seven of 21 students (33.3%) who remained uncertain and two of seven students (28.6%) reporting a relatively low likelihood were willing to enroll. When the three enrollment categories were considered separately, the overall association did not reach conventional statistical significance ($\chi^2 = 11.67$, $p = 0.070$).

Table 4. Institutional consideration and enrollment readiness following the educational outreach program

Likelihood of recommending the university	Total, n (%)	Not willing to enroll, n (%)	Academic-report pathway, n (%)	Admission-test pathway, n (%)	Overall willing to enroll, n (%)
Very high	11 (14.1)	5 (45.5)	5 (45.5)	1 (9.1)	6 (54.5)
Fairly high	39 (50.0)	16 (41.0)	19 (48.7)	4 (10.3)	23 (59.0)
Uncertain	21 (26.9)	14 (66.7)	2 (9.5)	5 (23.8)	7 (33.3)
Relatively low	7 (9.0)	5 (71.4)	1 (14.3)	1 (14.3)	2 (28.6)
Overall	**78 (100)**	**40 (51.3)**	**27 (34.6)**	**11 (14.1)**	**38 (48.7)**

***Percentages within enrollment categories are calculated within each level of institutional consideration. The overall association between likelihood of recommending the university and enrollment pathway was explored using the chi-square test ($\chi^2 = 11.67$, $p = 0.070$).[20]**

DISCUSSION

This study described students' perceptions, academic interests, and higher-education engagement following participation in a first-aid educational seminar and practical workshop. Several findings emerged from the post-outreach survey. Participants represented diverse academic interests, with approximately one-third indicating an intention to pursue health-related fields. Perceptions of the institution and its educational attributes were generally favorable, with more than 80% of respondents providing favorable ratings across all four evaluated attributes. Students also identified multiple considerations in selecting higher education, particularly scholarships, university values, educational costs, preferred study programs, and facilities. Furthermore, approximately two-thirds of participants expressed a fairly high or very high likelihood of recommending the university, while nearly half indicated willingness to proceed with enrollment. Together, these findings illustrate a spectrum of perceptions and academic engagement observed following the outreach activity.[23,24]

First-aid education provides a practical context in which fundamental concepts of health science can be translated into situations relevant to everyday life. Recognizing syncope, responding to bleeding, managing airway obstruction, and providing initial care for musculoskeletal injuries require students to engage with principles related to human physiology, circulation, airway function, injury response, and clinical decision-making. The combination of theoretical explanation, case-based discussion, demonstration, and practical exposure used in the present program therefore extended beyond the acquisition of isolated first-aid procedures. It provided an accessible opportunity for students to encounter applied health science through observable problems and practical responses. Such an approach may be particularly valuable at the high school level, where students are still developing their understanding of how concepts learned in biological sciences translate into health-related practice.[3,25]

An important feature of the present findings was the diversity of participants' intended academic pathways. Although medicine and psychology were among the most frequently selected programs, most participants reported interests outside health-related fields. This suggests that applied health-science outreach can engage a broader student population rather than exclusively those who have already decided to pursue health professions. In this context, first-aid education may function as an accessible point of contact with health science regardless of participants' existing academic preferences. The observed progression from favorable institutional perceptions to varying levels of consideration and enrollment readiness also provides a useful perspective on post-outreach engagement. Students with higher levels of institutional consideration tended descriptively to report greater willingness to enroll than those who were uncertain or reported lower consideration, although the exploratory association did not reach conventional statistical significance. This pattern should therefore be viewed as descriptive rather than as evidence that the outreach intervention altered subsequent educational decisions.[26,27]

The findings also demonstrate that students' higher-education interests were shaped by multiple academic, financial, and institutional considerations. Scholarships and university values were the most frequently identified considerations, followed closely by educational costs,

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availability of preferred study programs, and facilities. Academic quality was also the most frequently recognized institutional strength. These findings highlight that early academic engagement is unlikely to depend solely on exposure to a particular scientific discipline or educational activity. Rather, students appear to evaluate future educational opportunities within a broader framework that incorporates academic quality, affordability, institutional identity, available programs, and future opportunities. The prominence of social media, educational exhibitions, and interpersonal sources as channels of university information further suggests that students encounter higher-education information through multiple complementary pathways.[28,29]

From an educational perspective, first-aid outreach may therefore serve two complementary purposes. Its primary function remains the introduction of practical knowledge and responses relevant to emergency preparedness. At the same time, the applied and experiential nature of first-aid education provides an opportunity to introduce younger learners to health science outside conventional classroom instruction. Integrating practical scientific content with opportunities to explore related academic pathways may help educational outreach programs connect scientific learning with students' broader educational interests. Future programs could strengthen this approach by incorporating structured reflection on the scientific principles underlying first-aid procedures, alongside pre- and post-activity assessments of knowledge, perceptions, and academic interest. Such designs would allow the educational and academic-engagement dimensions of health-science outreach to be evaluated more rigorously.[9,30]

This study has several strengths, including its evaluation of a real-world educational outreach activity and the integration of theoretical, case-based, demonstrative, and practical components within the intervention. The immediate post-activity survey also captured students' perceptions and academic considerations in close temporal proximity to the educational experience. Nevertheless, several limitations should be acknowledged. The study involved a relatively small sample from a single educational setting and used a convenience sample of participating students, limiting the generalizability of the findings. No pre-intervention assessment or control group was available, preventing evaluation of changes attributable to the first-aid program. The questionnaire was originally designed for post-activity evaluation and was not a validated psychometric instrument for measuring changes in health-science interest. Responses were self-reported and may also have been influenced by the immediate context of the outreach activity. Finally, willingness to enroll represented stated intention at a single time point rather than subsequent enrollment behavior. The findings should therefore be interpreted as patterns of perception and academic engagement observed following the outreach program, rather than evidence of a causal effect of first-aid education on students' academic interests or higher-education choices.[3,25]

CONCLUSION

First-aid education provided high school students with an opportunity for early exposure to applied health science through the integration of theoretical, case-based, and practical learning. Following the educational outreach program, participants demonstrated generally favorable perceptions, diverse academic interests, and varying levels of higher-education engagement, with nearly half expressing readiness to proceed with enrollment. These findings suggest that first-aid outreach may serve not only as a platform for introducing practical emergency preparedness but also as an accessible context for engaging students with the application of health science and related educational pathways. Further studies incorporating pre- and post-intervention assessments, comparison groups, and longitudinal follow-up are needed to determine whether such early exposure influences subsequent academic interests and educational choices.

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