

Bystanders' Willingness to Perform Basic Life Support and Its Relationship with Facilitative and Obstructive Factors: A Nationwide Survey in Japan

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ABSTRACT

Background The administration of basic life support (BLS) by bystanders is essential to improve the survival rates of patients who have experienced out-of-hospital cardiac arrest (OHCA). Although providing BLS to individuals who experience OHCA greatly improves their chances of survival, the actual implementation rate is low. Therefore, we investigated the association between bystanders' willingness to perform BLS and facilitative/obstructive factors with the objective of identifying educational methods that would improve the likelihood of bystanders performing BLS should they encounter a patient with OHCA.

Methods The study participants included 502 male and 498 female Japanese residents (total, 1000 participants) with no experience in performing BLS and 42 male and 59 female Japanese residents (total 101 participants) with experience in performing BLS. The participants were aged 15–65 years. Both groups graded the strength of their willingness to perform BLS in the future on a 4-point scale, as well as their level of agreement with factors facilitating or obstructing their willingness to perform BLS. These factors were established based on the theory of helping behavior, which defines psychological states when helping others in social psychology. We then analyzed the associations between willingness to perform BLS in the future and their level of agreement with factors facilitating or obstructing their willingness to perform BLS.

Results The willingness to perform BLS decreased in accordance with the increase in the level of intervention required for patients who experienced OHCA, and was significantly associated with four facilitating factors: sufficient ability and experience to perform BLS, personal advantage, high personal norms, and psychological closeness to the patient.

Conclusion Our results suggested that workshops and other educational activities focused on these facilitative factors may be helpful in increasing the rate at which bystanders perform BLS.

Key words basic life support; bystanders; helping behavior; out-of-hospital cardiac arrest

Individuals who experience an out-of-hospital cardiac arrest (OHCA) have a greater chance of survival if they receive basic life support (BLS).^{1–3} Moreover, the administration of BLS by bystanders is essential to improve the survival rates of patients with OHCA. Therefore, in many countries, workshops and other educational activities are offered to lay people to increase awareness on the skills required to perform BLS for patients with OHCA.^{4–7}

However, bystanders are not necessarily likely to perform BLS in cases of patients experiencing OHCA.^{3, 8, 9} For example, although attending a BLS workshop improves the ability to perform BLS,^{9–16} a high proportion of workshop attendees are unable to perform BLS in real-life settings.⁸ Therefore, the willingness of lay people to perform BLS should they encounter a patient with OHCA varies widely. This individual variation is probably due to the physical factors of age and sex, psychological factors, and people's personalities.^{4, 5, 9} However, these have yet to be investigated fully because few studies have analyzed the association between these factors and the willingness to perform BLS.

In this study, we investigated the association between bystanders' willingness to perform BLS and facilitative/obstructive factors with the objective of identifying educational methods that would improve the likelihood of bystanders performing BLS should they encounter a patient experiencing OHCA.

SUBJECTS AND METHODS

Study design

This observational study was conducted using an online nationwide survey in Japan.

Study participants

The study participants were Japanese residents aged

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Abbreviations: BLS, basic life support; OHCA, out-of-hospital cardiac arrest

15–65 years who were registered as survey monitors with a market research company (Cross Marketing Inc., Tokyo, Japan). Batch 1 consisted of 1001 individuals (1000 with no experience in performing BLS and 1 with experience) who consented to participate in the study. The sex and age distributions of the members of Batch 1 matched those of the Japanese population as a whole; similarly, the age and sex distributions of group members in each prefecture matched the age and sex distributions of that prefecture. Batch 2 consisted of 100 registered survey monitors experienced in performing BLS for a patient with OHCA. The survey monitors consented voluntarily to participate after having read an online request to participate in the study. The survey was conducted in the order of receipt until responses had been received from 1000 unexperienced and 100 experienced individuals in Batch 1 and Batch 2, respectively. The survey was designed such that respondents could not proceed to the next question without answering the previous question. The response rate was 100%.

Questionnaire structure

Experience in performing BLS

For all participants, Q1 asked “Have you ever been in a real-life situation in which BLS was required and you provided it?” This question asks whether the participant perceives that he/she has implemented BLS. Depending on the response, the respondents were divided into Group 1 (“No”; no experience: $n = 1000$) or Group 2 (“Yes”; experienced: $n = 101$) (Table 1, Fig. 1).

Assessment of willingness to perform BLS

To assess the participant’s willingness to perform BLS in future, Q2 asked “If you were to discover someone having a heart attack in future, would you be able to carry out actions i), ii), and iii)?” (Fig. 1). Actions i), ii), and iii) reflected the three actions that form the main sequence of the BLS algorithm: i) check the patient’s condition, ii) seek assistance, and iii) provide life support

treatment.^{17, 18} Willingness was assessed on a 4-point scale as Class 1 (“No”), Class 2 (“Probably not”), Class 3 (“Maybe”), or Class 4 (“Yes”). Those whose responses were Class 1 or 2 were classified as unwilling, and those whose responses were Class 3 or 4 as willing.

Assessment of facilitative and obstructive factors affecting the willingness to perform BLS

Six facilitative and six obstructive factors known to encourage and impede psychosocial helping behavior, respectively,^{19, 20} were suggested, and the study participants were asked how much each of these candidate factors applied to them (Fig. 1, Tables 2 and 3). In previous studies, the factors that were identified as facilitating or obstructing helping behavior included a good experience of helping or being helped,¹⁹ personal advantage or disadvantage,²⁰ patient’s advantage or disadvantage,²⁰ high personal norms or lack of interest,²⁰ psychological closeness to or distance from the patient,¹⁹ and a positive or negative image of BLS.²¹ We modified these factors to fit the context of BLS without changing their importance by designating six candidate facilitative factors (A–F) and six candidate obstructive factors (a–f). The relevance of each candidate factor was scored on a 4-point scale as follows: 1, disagree; 2, somewhat disagree; 3, somewhat agree; or 4, agree.

Participants classified as “willing” were asked concerning the candidate facilitative factors, and those classified as “unwilling” were asked regarding the candidate obstructive factors. The mean values of the relevance scores for the six facilitative and six obstructive factors were calculated as the relevance value for the respective subscale.

Statistical analyses

Statistical analyses were performed using SPSS version 27 for Windows (IBM Corp, Armonk, NY). A Mann–Whitney U test with Bonferroni correction was used for the intergroup comparisons and logistic regression

Table 1. Numbers of study participants in each sex and age group

	Sex	Age group			Total
		Youth (15–20 years)	Young adult (21–40 years)	Middle-aged (41–65 years)	
Group 1 (no experience)	Male	33	182	287	502
	Female	31	176	291	498
	Total	64	358	578	1000
Group 2 (experienced)	Male	7	19	16	42
	Female	3	26	30	59
	Total	10	45	46	101

Q1; Have you ever been in a real-life situation in which basic life support was required and you provided it?

Q1: Have you ever been in a real-life situation in which BLS was required and you provided it?

No (Group 1, $n = 1000$)

Yes (Group 2, $n = 101$)

Q2: If you were to discover someone having a heart attack in future, would you be able to carry out the following actions i – iii)?

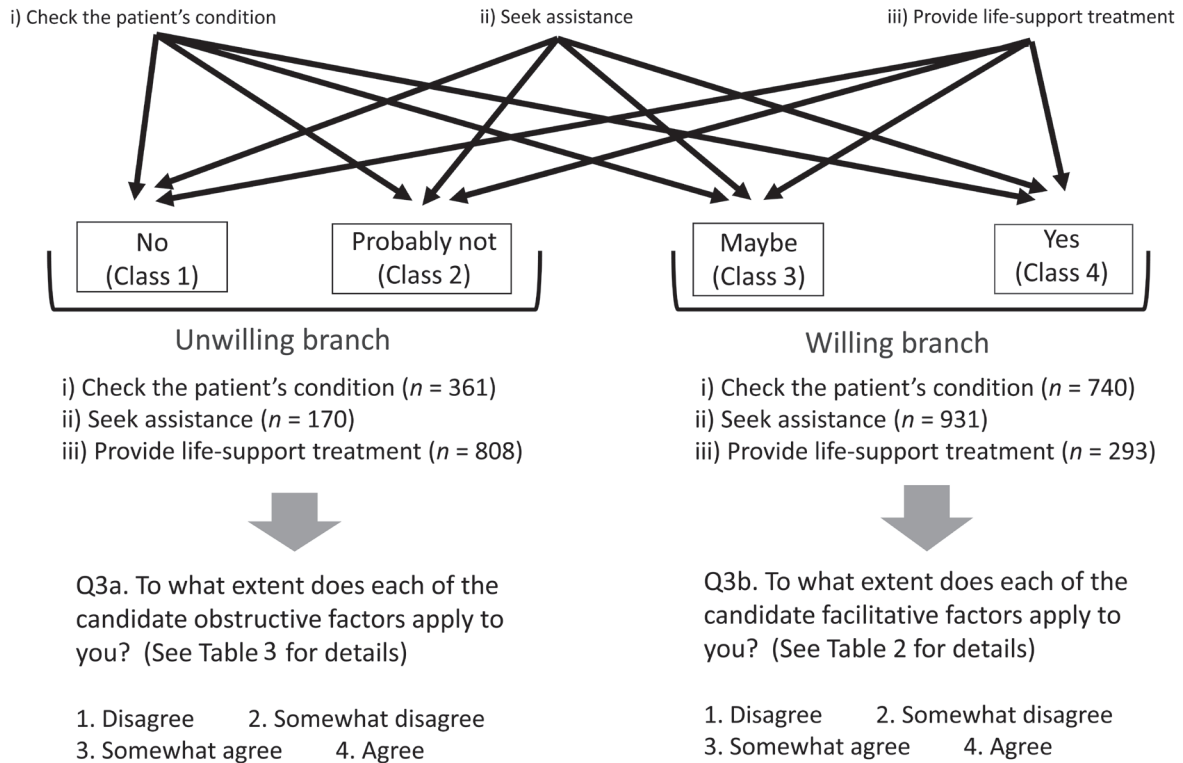


Fig. 1. Flow of analysis of willingness to perform BLS and related factors.

analysis for the multivariate analysis, with a P -value < 0.05 considered significant.

Ethical considerations

This study was approved by the Ethics Committee of Tottori University Faculty of Medicine (20A120). In the survey conducted by Cross Marketing, the study participants responded anonymously, and their response to the questions was taken as consent.

RESULTS

Willingness to perform BLS (class breakdown)

The number of respondents who stated that they would check the patient's condition (action i) if they came across a patient experiencing OHCA in future was 668 (66.3%) in Group 1 and 77 (67.2%) in Group 2. The number of respondents who stated that they would seek assistance (action ii) was 843 (84.3%) in Group 1 and 88 (87.1%) in Group 2. The number of respondents who stated that they would provide life-support treatment

(action iii) was 224 (22.4%) in Group 1 and 69 (68.3%) in Group 2. Comparisons between the groups were made using a Mann-Whitney U test with Bonferroni correction. For actions i) and iii), the proportion of respondents willing to perform BLS (Class 3 or 4) was significantly higher in Group 2 than in Group 1 ($P < 0.001$ and $P < 0.001$, respectively) (Fig. 2).

The proportion of respondents willing to administer BLS in both Group 1 [$P < 0.001$ between actions i), ii), and iii); Fig. 2] and Group 2 [$P = 0.001$ between actions ii) and iii). $P = 0.034$ between actions i) and iii); Fig. 2] was the highest for action ii), lower for action i), and lowest for action iii).

Relevance scores for candidate facilitative factors for BLS

The median relevance scores for the six candidate facilitative factors were in the range of 1.8–3.0 in Group 1 and 2.0–3.3 in Group 2. The relevance scores for five of the six candidate factors were significantly higher

Table 2. Candidate facilitative factors for the performance of BLS

A: Sufficient ability and experience to perform BLS (12)	I think my age is suitable for BLS.
	I think my sex is suitable for BLS.
	I think my physique is unsuitable for BLS.
	I am confident in my physical strength.
	I think I can do it calmly.
	I have (a lot of) experience in actually providing BLS.
	I know how to give BLS.
	I am confident in my BLS skills.
	I think I can improve the patient's condition.
	I was able to perform BLS well in a previous BLS workshop
	I was praised, when I actually did BLS.
	I did BLS well, when I actually did BLS.
B: Personal advantage (5)	I know that they will admire me for it, if I improve the condition of patients who have experienced OHCA.
	I think I will be blamed for not performing BLS.
	I think I am to be commended for performing BLS.
	I think we can stand out by performing BLS.
C: Advantage to the patient (3)	I think they expect me to perform BLS.
	It will make the patient happy if their condition improves
	I think the patient seems to be suffering (or in pain).
D: Personal norms (7)	The patient is in trouble.
	I think we have a responsibility to perform BLS.
	I think BLS is important.
	I think BLS is necessary.
	I know I will regret not performing BLS.
	I think it is morally right to perform BLS.
	I feel I have to perform BLS.
I want to help the patient.	
E: Psychological closeness to the patient (3)	I do not mind touching the patient
	I do not feel frightened of the patient
	I have a close connection with the patient
F: Positive image of BLS (1)	I have a good image concerning BLS.

Parentheses indicate the number of items in each subscale. BLS, basic life support.

in Group 2 than in Group 1. These were (A) sufficient ability and experience in performing BLS ($P < 0.001$), (B) personal advantage ($P < 0.001$), (D) high personal norms ($P = 0.001$), (E) psychological closeness to the patient ($P < 0.001$), and (F) positive image of BLS ($P < 0.001$) (Fig. 3).

Relevance scores for candidate obstructive factors

for BLS

The median relevance scores for the six candidate obstructive factors were in the range of 1.9–2.4 in Group 1 and 2.0–2.3 in Group 2. The relevance scores for one candidate factor, c: disadvantage to the patient, was significantly higher in Group 2 than in Group 1 ($P = 0.005$), and those for two candidate factors [d: lack of interest ($P = 0.004$) and f: a negative image of BLS ($P = 0.026$)], were significantly higher in Group 1 than in Group 2 (Fig. 3).

Table 3. Candidate obstructive factors for the performance of BLS

a: Insufficient ability and experience to perform BLS (13)	I think my age is unsuitable for BLS.
	I think my sex is unsuitable for BLS.
	I think my physique is unsuitable for BLS.
	I am not confident in my physical strength.
	I think it would upset me.
	I have no (little) experience in actually administering BLS.
	I do not know how to give BLS.
	I am not confident in my BLS skills.
	I do not think I can improve the patient's condition.
	I was not able to perform BLS well in a previous BLS workshop
	I could not do BLS well, when I actually did .
	I was accused, when I actually did BLS.
	I do not think non-medical people should perform BLS.
b: Personal disadvantage (6)	I think you will be blamed if I exacerbate the patient's condition.
	I think I will be blamed for not performing BLS.
	I do not think there is anything to be gained by performing BLS.
	I do not want to stand out by performing BLS.
	I do not think I'm expected to perform BLS.
I think I will regret performing BLS.	
c: Disadvantage to the patient (1)	I feel bad for the patients who have experienced OHCA if I exacerbate their condition.
d: Lack of interest (5)	I do not think you are responsible for performing BLS.
	I do not think BLS is important.
	I do not think BLS is what I need.
	I know others will help the patients who have experienced OHCA.
	I do not want to help the patients who have experienced OHCA.
e: Psychological distance from the patient (3)	I mind touching the patient
	I feel frightened of the patient
	I do not have a close connection with the patient
f: Negative image of BLS (1)	I have a bad image regarding BLS

Parentheses indicate the number of items in each subscale. BLS, basic life support.

Association between the relevance scores for candidate facilitative factors and willingness to perform BLS

We performed a logistic regression analysis for Groups 1 and 2 with the relevance scores for the candidate facilitative factors (A–F) as explanatory variables and the willingness to take action i), ii), or iii) in the future as the target variable (Table 4).

In Group 1, four factors were significantly associated with a willingness to check the patient's condition [action i)]. These were (A) sufficient ability and experience in performing BLS ($P = 0.005$), (B) personal advantage ($P = 0.005$), (D) high personal norms ($P = 0.029$), and (E) psychological closeness to the patient

($P = 0.007$) (Table 4). Three factors were significantly associated with a willingness to seek assistance [action ii)]. These were (A) sufficient ability and experience in performing BLS ($P = 0.002$), (B) personal advantage ($P < 0.001$), and (D) high personal norms ($P < 0.001$) (Table 4). The only factor that was significantly associated with a willingness to provide life-support treatment [action iii)]. was D: high personal norms ($P = 0.044$) (Table 4).

In Group 2, the factor D: high personal norms was the only factor that was significantly associated with a willingness to perform any of the actions i), ii), or iii) ($P = 0.011$, 0.021 , and 0.015 , respectively) (Table 4).

In both Groups 1 and 2, the factor D: high personal norms was a facilitative factor that was significantly

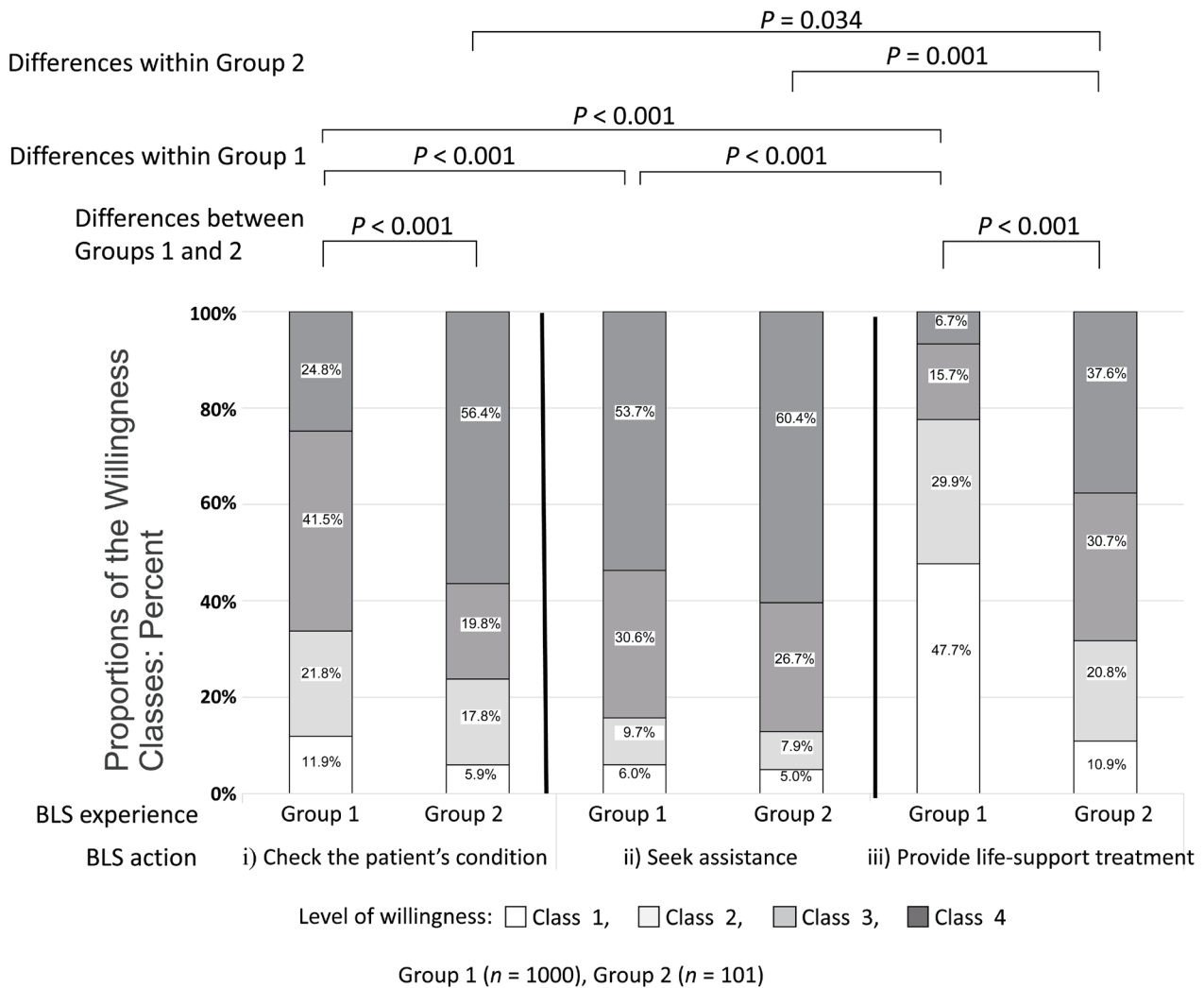


Fig. 2. Proportions of the levels of willingness to perform BLS (Classes 1–4). The proportion of the levels of willingness to perform each action were compared by dividing participants into two groups: those who were unwilling (Classes 1 and 2) and those who were willing (Classes 3 and 4).

associated with a willingness to perform all of actions i), ii), and iii).

Association between the relevance scores for candidate obstructive factors and willingness to perform BLS

We performed a similar logistic regression analysis with the relevance scores for the candidate obstructive factors (a–f) as explanatory variables and the willingness to perform actions i), ii), or iii) in the future being the target variable.

In Group 1, no obstructive factor exhibited a significant association with a willingness to perform BLS. This analysis was not conducted in Group 2 because of the small sample size.

DISCUSSION

While many studies have investigated factors that inhibit the willingness to perform BLS, few previous studies have used facilitative and obstructive factors associated with willingness to perform BLS based on the theory of helping behavior. This study provided suggestions for future investigations of BLS education from a psychological aspect.

In this study, we assessed the willingness to perform BLS by asking the participants of the survey concerning three representative actions that are part of the sequence of the BLS algorithm for the standard treatment of patients with OHCA and found major differences in the levels of willingness to perform these different actions. The three actions comprise the following: i) check the patient's condition (for example by

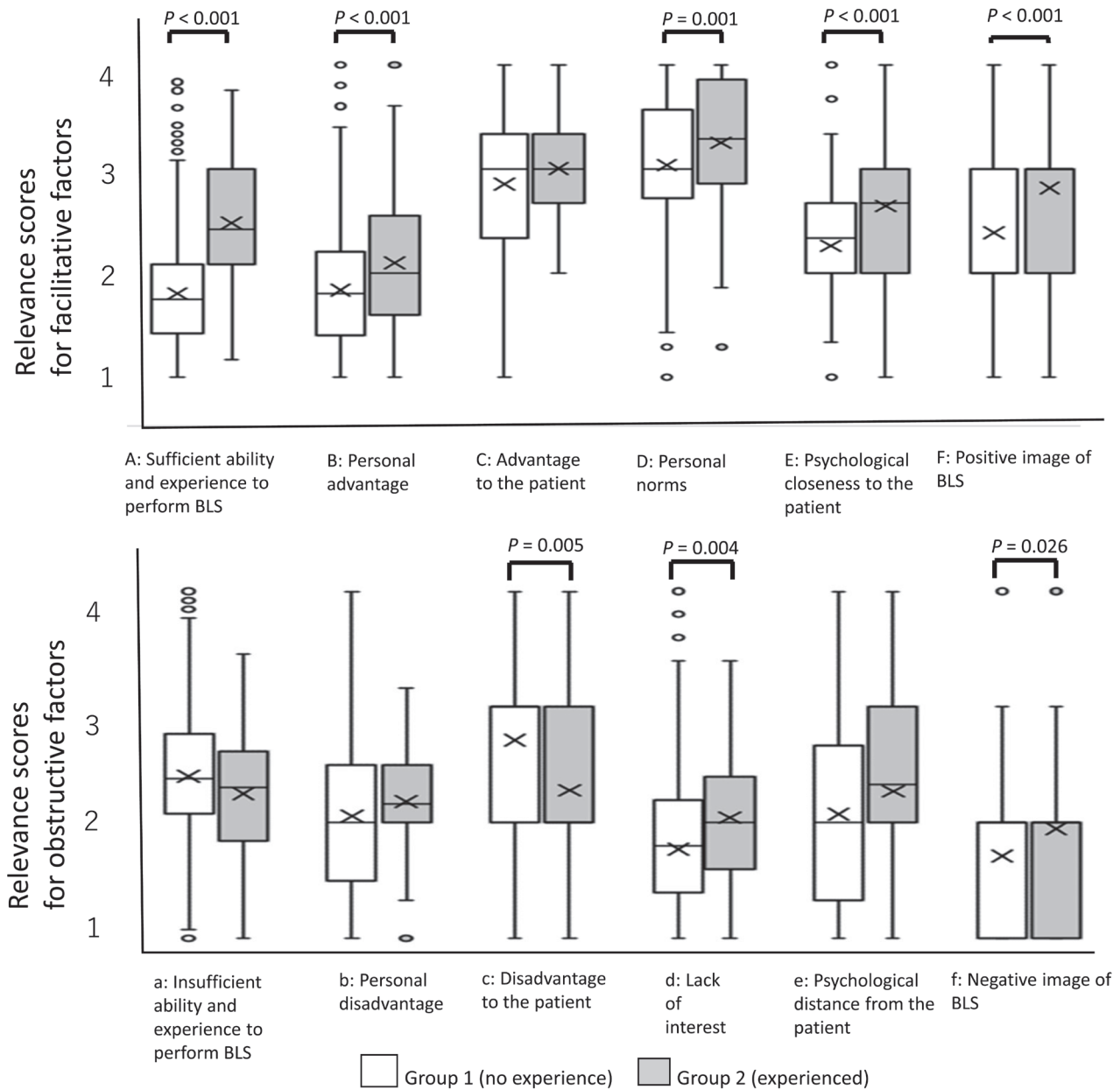


Fig. 3. Relevance of the six facilitative/obstructive factors for BLS (comparison of Groups 1 and 2). The bottom of the whiskers represents the minimum value, the bottom of the box represents the first quartile, the line within the box represents the second quartile (median), the top of the box represents the third quartile, the top of the whiskers represents the maximum value, and x represents the average value.

asking them if they are all right), ii) seek assistance (call a third party), and iii) provide life-support treatment (for example chest compressions). The participants' unwillingness to intervene in the case of a patient experiencing OHCA increased in the order of ii), i), and iii). Their willingness to perform BLS decreased as the levels of intervention required for that action increased. Previous studies have also found that people are more willing to perform an action that requires a lower level

of intervention (for example, checking the patient's level of consciousness) than one that requires a high-level intervention (i.e., chest compressions).^{22, 23} However, in the current study, we found that more than 60% of the study participants who had performed BLS previously were very willing to perform actions requiring high-level interventions. This may be interpreted in two ways: a previous experience in performing BLS increases the willingness to perform it in future, and people who are

Table 4. Association between willingness to perform BLS actions i), ii), and iii) and facilitative factors

	Facilitative factor	i) Willingness to check the patient's condition				ii) Willingness to seek assistance				iii) Willingness to provide life-support treatment			
		95% CI				95% CI				95% CI			
		Odds ratio	Lower bound	Upper bound	P-value	Odds ratio	Lower bound	Upper bound	P-value	Odds ratio	Lower bound	Upper bound	P-value
Group 1 (no experience)	A: Sufficient ability and experience to perform BLS	1.9	1.2	2.9	0.005**	1.9	1.3	3	0.002**	1.5	0.7	3.2	0.278
	B: Personal advantage	0.6	0.4	0.9	0.005**	0.5	0.4	0.8	< 0.001***	0.7	0.4	1.2	0.147
	C: Advantage to the patient	1.3	0.9	1.9	0.189	1.2	0.8	1.7	0.33	0.5	0.3	1.1	0.082
	D: Personal norms	1.7	1.1	2.6	0.029*	2.5	1.7	3.8	< 0.001 ***	2.4	1	5.4	0.044*
	E: Psychological closeness to the patient	1.5	1.1	1.9	0.007**	1.3	1	1.7	0.06	1.4	0.8	2.4	0.226
	F: Positive image of BLS	1	0.8	1.3	0.767	0.9	0.7	1.1	0.16	1.5	0.9	2.4	0.105
Group 2 (experienced)	A: Sufficient ability and experience to perform BLS	0.9	0.1	6.2	0.874	1.9	0.6	6.2	0.312	1.7	0.5	5.9	0.441
	B: Personal advantage	0.6	0.1	2.5	0.45	0.7	0.3	1.8	0.492	1.1	0.4	3	0.856
	C: Advantage to the patient	0.7	0.1	4.5	0.686	0.7	0.2	2.9	0.647	1.1	0.2	5.1	0.897
	D: Personal norms	12.2	1.8	84.2	0.011*	6	1.3	27.3	0.021*	7.9	1.5	41.7	0.015*
	E: Psychological closeness to the patient	3.4	0.9	12.6	0.072	1.1	0.5	2.8	0.766	1.2	0.5	2.8	0.647
	F: Positive image of BLS	1.5	0.5	4.7	0.484	0.6	0.3	1.3	0.183	0.7	0.3	1.5	0.311

* $P < 0.05$. ** $P < 0.01$. *** $P < 0.001$. BLS, basic life support.

intrinsically willing to perform BLS may be more likely to have had experience in performing it.

Four of the candidate facilitative factors, namely, sufficient ability and experience in performing BLS, personal advantage, high personal norms, and psychological closeness to the patient, were associated with the willingness to perform BLS. We discuss these below.

Facilitative factor i), i.e., sufficient ability and experience in performing BLS, is also a known factor in socio-psychologically defined helping behavior.^{19, 20} Previous studies have also reported that the awareness of having the ability to perform BLS and the experience of success leads to the actual performing of BLS.^{2, 12, 24–27} However, it is important to note that it is

only the willingness to perform actions that entail a low level of intervention that is encouraged by this ability and experience, as demonstrated by our results.

Facilitative factor ii) was personal advantage. Helping behavior is more likely to occur when people think they will benefit, according to socio-psychological studies.²⁰ This was consistent with the current study result. This indicated that informing participants of the personal advantage of performing BLS during the BLS training course may strengthen their willingness to perform BLS.

Facilitative factor iii) was high personal norms. Reykowski et al. reported that lay people were more likely to engage in helping behavior when it was in

accordance with their moral outlook and personal norms.²⁰ Regarding the effect of personal norms for BLS, Malta Hansen et al. showed that the personal norm of “I should act in this way” was a factor that facilitated the administration of BLS.²⁸ Our finding in this study was that the factor high personal norms, assessed in terms of agreement with the statements “Because I want to help” and “Because I think I ought to,” was positively correlated with the willingness to act. This was consistent with the results reported by Malta Hansen et al.²⁸ Furthermore, the factor of high personal norms was also significantly associated with the willingness to perform actions requiring high-level interventions, suggesting that educational methods that make lay people aware of their own personal norms may be effective in encouraging actions involving high-level interventions that are effective in saving the lives of patients experiencing OHCA.

Facilitative factor iv) was a psychological distance from the patient. Socio-psychological studies have found that helping behavior is more likely to occur in response to the needs of people who are psychologically closer.^{19, 20} In the current study, we assessed agreement with the three statements “I do not mind touching the patient,” “I do not feel frightened of the patient,” and “I have a close connection with the patient” to determine the psychological closeness to the patient. Psychological distance included two elements: the strength of the bystander's personal relationship with the patient, and fear and aversion toward the patient's condition. This was consistent with previous reports that indicated that people would rather perform BLS for close family members than for strangers,^{2, 27, 29, 30} and that fear and aversion toward the patient inhibited the administration of BLS.²⁸ Given that the relationship with the patient is unalterable, educational activities that reduce fear and aversion toward the patient may decrease the psychological distance and encourage the administration of BLS.

Previous studies have reported “benefit to the patient” as a factor that facilitated the administration of BLS. Furthermore, performing BLS may protect the patient's interests^{19, 20} and improve their condition,²⁸ thus, encouraging its administration. However, in the current study, when we assessed whether the benefit to the patient was a factor by asking whether the study participants agreed with statements, such as “Because it will make the patient happy if their condition improves” and “Because the patient is in trouble,” we found that it was unrelated to the willingness to perform BLS. This difference between our study results and those of previous studies may be attributed to differences in the

survey or evaluation methods used, although a specific reason may be the fact that this survey did not involve envisaging a specific patient with OHCA and, therefore, it did not provide the participants a clear awareness of the benefit to the patient.

Previously reported factors that obstruct the administration of BLS include insufficient skills and experience in performing BLS and the concern that BLS may actually worsen the patient's condition.^{8, 23, 31} However, in the current study, none of the six candidate obstructive factors exhibited a significant association with the willingness to perform BLS. This discrepancy may have been caused because most of the previous studies investigated factors obstructing BLS immediately after the participants had performed it in real life or attended a workshop offering a simulated experience, whereas our study asked regarding factors obstructing BLS while our study participants were in their everyday mental state.

The results of this study may provide useful information for holding effective workshops with the goal of increasing the number of laypeople capable of taking action and performing BLS.

Having the ability to perform BLS or having experienced doing so successfully were the facilitative factors for BLS. Considering that turning this into an emotional experience³² and reviewing it with someone else immediately afterward³¹ are believed to strengthen the facilitative factors, it may be effective to use media, such as video or virtual reality, to recreate the scene more realistically in BLS workshops and generate an emotional effect on the workshop participants through this simulated experience.³³ Furthermore, having families or groups of friends participate in workshops together provides an opportunity for them to look back on the simulated experience with each other.⁶

The personal advantage of performing BLS was also a facilitative factor for BLS. Informing BLS course participants of newspaper articles wherein BLS practitioners were honored by the fire department or companies could help them recognize the benefits to them and possibly strengthen their willingness to perform BLS.³⁴

The high personal norms factor, such as a sense of moral obligation, was also a facilitative factor for performing BLS. The effective ways of fostering personal norms may include talking about BLS with family, friends, colleagues, or others in one's own home, school, or work community, hearing about actual experiences of BLS from workshop instructors, and experiencing simulated BLS through roleplay.³⁵ The current study shows that high personal norms are required to perform BLS actions involving high-level interventions;

therefore, fostering personal norms should be an active goal of BLS workshops.

Psychological closeness to the patient, and particularly the absence of fear or aversion toward the patient, was also a facilitative factor for BLS. To prevent misunderstandings and prejudice, it is important that workshops provide evidence-based explanations for the fear or aversion toward patients that lay people may feel. The goal must be to help people feel secure, possibly by using easy-to-understand pamphlets or flowcharts to encourage an understanding of patients experiencing cardiopulmonary arrest.

However, our study had some limitations. Given that the study participants were aware that performing BLS for patients experiencing cardiopulmonary arrest is a socially required activity, their responses may have been biased (social desirability bias). Moreover, this survey was conducted in Japan and its results may have reflected the Japanese cultural background. Therefore, there may be limits on the generalizability of the findings of this study. As this study is a questionnaire survey, respondents' BLS experience was not directly confirmed by the authors. Therefore, there are certain limitations in evaluating the results of this study.

In conclusion, the willingness to perform BLS decreased in accordance with the level of intervention required for the action concerning the patient. We identified four facilitating factors: sufficient ability and experience in performing BLS, personal advantage, high personal norms, and psychological closeness to the patient, which may provide the basis for the design of BLS workshops.

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