

Confidence and Practical Understanding Following Breast-Health Education Among Malaysian Adolescents: A Social Cognitive Theory Perspective

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DOI: 10.29322/IJSRP.16.09.2026.p17716

<https://dx.doi.org/10.29322/IJSRP.16.09.2026.p17716>

Paper Received Date: 20th August 2026

Paper Acceptance Date: 11th September 2026

Paper Publication Date: 20th September 2026

Abstract- Confidence is often used to assess whether health education has prepared learners to act. Yet confidence may not always match practical understanding. This study examined the relationship between confidence and practice-related understanding following a school-based breast-health programme among Malaysian female adolescents. This secondary analysis used data collected from 150 students aged 15-16 years across three secondary schools in Selangor. The students attended a 30-minute bilingual session that included explanation, demonstration, return demonstration and a printed guide. Confidence was measured using six items, with scores ranging from 6 to 30. Practice-related understanding was measured using six scored responses, with scores ranging from 0 to 6. Assessments were conducted before the programme, immediately afterwards and 38 days later. Spearman's rank correlation was used to examine the relationship between the two outcomes and the changes in their scores. Mean confidence scores increased from 15.46 at baseline to 26.40 immediately after the programme and 28.93 at follow-up. Mean practice-related understanding scores increased from 1.01 to 5.71 and remained high at 5.57 during follow-up. Confidence and practice-related understanding were not significantly associated at baseline or immediately after the programme. A moderate positive association was observed at follow-up ($r_s = .484, p < .001$). Confidence and practical understanding improved following the programme, but the two outcomes did not develop in the same way immediately after education. Assessing both outcomes provides a clearer indication of learning than assessing confidence alone.

Index Terms- adolescent girls, breast self-examination, confidence, health education, social cognitive theory

I. INTRODUCTION

Breast-health education during adolescence can provide girls with accurate information about normal breast development, unusual breast changes and appropriate help-seeking. In Malaysia, the national roadmap for breast-cancer downstaging emphasises awareness, recognition of symptoms and timely clinical assessment [1]. When introduced to adolescents, breast self-examination (BSE) should be presented as part of breast awareness rather than as a diagnostic test or a replacement for clinical assessment.

Previous studies have shown that breast-health education can improve knowledge, confidence and practice-related outcomes. Positive findings have been reported following lectures, demonstrations, peer education, digital resources and practical training [2]–[6]. Malaysian studies have reported improvements in breast-health awareness among young women and BSE practices among secondary-school students following structured health education [2], [6]. These findings support school-based education, but improvements in average scores do not indicate whether individual students' confidence matches their practical understanding.

Social Cognitive Theory (SCT) provides a useful framework for examining this relationship. The theory describes learning as an interaction between personal factors, behaviour and the learning environment [7]–[9]. Self-efficacy refers to a person's belief in her ability to perform a task, whereas behavioural capability refers to the knowledge and skills required to perform it. Demonstration, guided practice and feedback may support both outcomes, but confidence and practical understanding still need to be assessed separately.

Self-efficacy has been associated with changes in BSE behaviour [10]. Previous breast-health studies have reported improvements in confidence, knowledge and skills following educational interventions [2], [11], [12]. Bandura described self-efficacy as a person's

judgement of her ability to perform a specific task rather than a broad sense of confidence [13]. A student may believe that she can perform BSE but may not fully understand the correct timing, frequency or technique. A student may also understand the information but remain uncertain about performing the steps independently.

Many breast-health studies have used the Health Belief Model or Theory of Planned Behaviour to examine perceived risk, barriers and behavioural intentions. Theory-based face-to-face and virtual education has improved BSE-related outcomes among adult women [14]. These findings support the use of theory in health education, but they do not explain whether confidence and practical understanding develop together following a brief educational session. The participants in many previous studies were adults or university students, so the findings may not apply directly to secondary-school students.

Measurement may make this relationship difficult to identify. Instruments assessing knowledge, attitudes and practices sometimes combine several constructs within one evaluation, making clear score definitions necessary [15]. Scores may also cluster near the maximum after education. High mean scores can indicate successful learning but provide limited information about differences between individual students. Examining the relationship between confidence and practical understanding at each assessment point can show whether students with greater confidence also demonstrate stronger understanding.

This study used SCT to interpret existing data from a school-based breast-health education programme in Selangor. SCT was not used to design the original intervention. The study examined the relationship between confidence and practice-related understanding at baseline, immediately after education and at follow-up. It also examined whether changes in the two outcomes occurred together and whether their relationship at follow-up differed between the two learning conditions.

A. Social Cognitive Theory Framework

Four components of SCT were relevant to this programme. Confidence represented students' belief in their ability to perform BSE-related actions. Correct responses concerning timing, frequency and technique reflected part of the knowledge required to perform BSE. Responses concerning difficulty and embarrassment reflected students' views about the practice. These responses did not measure their ability to perform BSE. The live demonstration provided observational learning, and the return demonstration provided guided practice. The follow-up assessment, repeated teaching and feedback provided further learning support. Only confidence and questionnaire responses were measured directly.

Two possible patterns were considered. Students with greater confidence might provide more correct practice-related responses, showing that their confidence matches their practical understanding. The two outcomes might also improve at different rates. This could produce substantial overall improvement without a close relationship between the individual scores. In this study, the term educational calibration refers to the extent to which students' confidence matched their practical understanding. The term is used only as a description and is not a formal concept within SCT.

Table 1. Mapping of Social Cognitive Theory Concepts to Study Measures and Educational Activities

Social Cognitive Theory concept	Representation in this study	Application in the programme
Belief in ability related to self-efficacy	Six confidence items about BSE-related actions	Measured as confidence rather than as a complete measure of self-efficacy
Knowledge related to behavioural capability	Responses about timing, frequency and technique; the score also included difficulty and embarrassment	Measured as practice-related understanding rather than observed skill or behaviour
Observational learning and guided practice	Live demonstration and return demonstration	Included in the educational session but not assessed separately
Learning support	Follow-up assessment, repeated teaching, demonstration and feedback	Provided together to 75 students; the separate effects of each component could not be determined

The proposed pathway suggested that observational learning through demonstration and guided practice through return demonstration could improve confidence and practical understanding. The relationship between these outcomes might become stronger over time as students had more time to review what they had learned. The analysis examined the relationship between confidence and practical understanding but did not test the separate effects of each educational activity.

II. METHODS

A. Study design and setting

This secondary analysis used data from a repeated-measures quasi-experimental study conducted in three secondary schools in Selangor, Malaysia. SCT was used to guide the interpretation of the existing data but was not used to design the original study. The schools were identified as Schools A, B and C to protect their identities. All participants received the same core educational intervention and completed assessments at baseline, immediately after the intervention and 38 days later.

After the immediate assessment, participants within each school were randomly assigned to one of two follow-up conditions. One group completed an additional assessment and received a reinforcement session before the final follow-up. The other group received neither the additional assessment nor the reinforcement session. Since the additional assessment and reinforcement were provided together, their separate effects could not be examined.

B. Participants and sampling

The study involved 150 female students aged 15–16 years, with 50 students recruited from each school. The schools were selected purposively after approval was obtained from the relevant education authorities. Eligible students within each school were selected using simple random sampling. Students were eligible if they were enrolled at a participating school, aged 15–16 years and willing to participate. Written student assent and parental or guardian consent were required. Students were excluded if they were preparing for a major examination, unavailable during the baseline assessment, unwilling to participate or did not have the required consent. All 150 participants completed the three main assessment points.

C. Educational intervention

The researcher delivered a 30-minute face-to-face educational session to groups of 25 students. The bilingual session covered breast awareness, possible breast changes and appropriate actions when a change was identified. It also explained the recommended timing and frequency of BSE and the correct sequence of its nine steps. Teaching methods included a standardised slide presentation, explanation, live demonstration, return demonstration and a question-and-answer session. The same educator, content and teaching approach were used across the three schools.

In the secondary analysis, the live demonstration was linked to observational learning, and the return demonstration was linked to guided practice. The printed guide, repeated teaching and feedback were treated as forms of learning support. These links were used to interpret the intervention through SCT, but the separate effect of each component was not measured.

Measures

A. Confidence

Confidence was assessed using six items. The items asked about students' confidence in performing BSE, completing the steps correctly and independently, recognising an unusual breast change, taking appropriate action and explaining BSE to others. Each item was rated from 1 to 5, producing a total score ranging from 6 to 30. Higher scores indicated greater confidence. The items were not taken from a validated self-efficacy scale. The total score was therefore treated as a measure related to students' belief in their ability rather than as a complete measure of self-efficacy.

B. Practice-related understanding

Practice-related understanding was assessed using six questionnaire items. The items covered the time required to perform BSE, perceived difficulty, embarrassment, recommended frequency, appropriate timing and technique. Each correct response received one point, producing a total score ranging from 0 to 6. The items assessed students' knowledge and views related to BSE practice. They did not measure regular BSE behaviour or directly observed performance. For this reason, the outcome was described as practice-related understanding.

C. Instrument preparation

The questionnaire was adapted from the protocol developed by Masawa and Mboineki [16] and was administered in Bahasa Melayu and English. A bilingual expert reviewed the Bahasa Melayu version to assess its clarity and consistency with the English version. The questionnaire was pilot tested with 15 female students who were not included in the main study. The pilot test produced an overall Cronbach's alpha of .78. Reliability was not calculated separately for each section.

D. Data collection and ethics

Baseline and immediate post-intervention data were collected on 24 June 2026. The additional assessment and reinforcement session were conducted on 15 July 2026. The final follow-up assessment was completed on 1 August 2026, 38 days after the educational intervention. Unique study codes were used to link each participant's responses across the assessment points. Ethical approval was obtained from the Lincoln University College Research Ethics Committee on 3 October 2025. Permission to conduct the study was granted by the Ministry of Education Malaysia under reference KPM.600-3/2/3-eras (28090) and the Selangor State Education Department under reference JPNS.SPD.600-1/1/2 JLD.72 (17). Written consent was obtained from parents or legal guardians, and each student provided written assent before participating.

E. Statistical analysis

Data were analysed using IBM SPSS Statistics for Windows, version 30.0. The reported calculations were independently checked. Means, standard deviations, frequencies and percentages were used to describe the data. Spearman's rank correlation was used to examine the relationship between confidence and practice-related understanding at each assessment point. This test was selected because both scores had fixed limits and many participants achieved scores near the maximum after the educational intervention. Change scores were calculated for three intervals: baseline to immediate post-intervention, immediate post-intervention to final follow-up and baseline to final follow-up. Spearman's rank correlation was used to examine whether changes in confidence were associated with changes in practice-related understanding. The relationship between the two outcomes at final follow-up was also examined separately for each learning condition. Statistical significance was set at $p < .05$. The correlations were interpreted cautiously because many post-intervention scores were close to the maximum. Approximate 95% confidence intervals were calculated for the correlation coefficients. The analysis by learning condition was exploratory. It was not used to conclude that either condition caused the observed differences.

III. RESULTS

A. Participant characteristics

The study included 150 female students. Of these, 66 students were aged 15 years (44.0%) and 84 were aged 16 years (56.0%). Most participants were Malay (72.7%), followed by Indian (14.7%), Chinese (10.0%) and other ethnic groups (2.7%). Twelve students (8.0%) had previously performed BSE, and 23 students (15.3%) had previously received BSE education. Each follow-up condition included 75 participants. All participants completed the three main assessment points, with no missing outcome data.

B. Confidence, practice-related understanding and their association

Mean confidence scores increased from 15.46 (SD = 1.64) at baseline to 26.40 (SD = 1.45) immediately after the educational intervention and 28.93 (SD = 1.73) at final follow-up. Mean practice-related understanding scores increased from 1.01 (SD = 0.84) at baseline to 5.71 (SD = 0.45) immediately after the intervention. The mean score remained high at final follow-up at 5.57 (SD = 0.75). No participant achieved the maximum practice-related understanding score at baseline. The maximum score was achieved by 107 students (71.3%) immediately after the intervention and by 107 students (71.3%) at final follow-up. Confidence was not significantly associated with practice-related understanding at baseline ($r_s = -.008$, 95% CI [-.168, .152], $p = .926$) or immediately after the educational intervention ($r_s = -.072$, 95% CI [-.230, .089], $p = .378$). At final follow-up, the two outcomes showed a moderate positive association ($r_s = .484$, 95% CI [.351, .598], $p < .001$). Students with higher confidence at final follow-up tended to have stronger practice-related understanding.

Table 2. Confidence, practice-related understanding and their association across assessment points

Assessment	Confidence, mean (SD)	Practice-related understanding, mean (SD)	Maximum practice-related understanding score, n (%)	Spearman r_s (95% CI) _s	p
Baseline	15.46 (1.64)	1.01 (0.84)	0 (0.0)	-.008 [-.168, .152]	.926
Immediate post-intervention	26.40 (1.45)	5.71 (0.45)	107 (71.3)	-.072 [-.230, .089]	.378
Final follow-up	28.93 (1.73)	5.57 (0.75)	107 (71.3)	.484 [.351, .598]	<.001

Note. Confidence score range = 6–30; practice-related understanding score range = 0–6; N = 150 at each assessment.

C. Correspondence between changes in the two outcomes

The immediate increases in confidence and practice-related understanding were not significantly associated at the individual level ($r_s = .026$, $p = .749$). From immediate post-intervention to final follow-up, changes in confidence showed a small positive association with changes in practice-related understanding ($r_s = .267$, $p = .001$). Across the full assessment period, changes in the two outcomes also showed a small positive association ($r_s = .243$, $p = .003$).

Table 3. Associations Between Changes in Confidence and Practice-Related Understanding

Interval	Confidence mean (SD) change,	Practice-related change, mean (SD)	Spearman r_s	p
Baseline to immediate post-intervention	10.94 (2.13)	4.71 (0.95)	.026	.749

Immediate post-intervention to final follow-up	2.53 (2.25)	-0.14 (0.91)	.267	.001
Baseline to follow-up	13.47 (2.33)	4.57 (1.19)	.243	.003

Note. Positive change indicates an increase from the earlier assessment; N = 150.

D. Exploratory analysis by follow-up condition

At final follow-up, scores in the additional-assessment-and-reinforcement condition were close to the maximum. Of the 75 students in this condition, 61 (81.3%) achieved the maximum practice-related understanding score. Confidence was not significantly associated with practice-related understanding ($r_s = -.154$, 95% CI $[-.368, .076]$, $p = .188$).

In the condition that received neither the additional assessment nor reinforcement, 46 of the 75 students (61.3%) achieved the maximum practice-related understanding score. A strong positive association was observed between confidence and practice-related understanding ($r_s = .629$, 95% CI $[.469, .749]$, $p < .001$).

These findings do not show that the follow-up conditions caused the difference in the observed associations. The limited variation in scores within the additional-assessment-and-reinforcement condition may have weakened the correlation.

Table 4. Final Follow-Up Outcomes by Condition

Follow-up condition	Confidence, mean (SD)	Practice-related understanding, mean (SD)	Maximum practice-related understanding score, n (%)	Spearman r_s	p
Additional assessment and reinforcement	29.88 (0.40)	5.81 (0.39)	61 (81.3)	-.154	.188
Neither additional assessment nor reinforcement	27.99 (2.01)	5.33 (0.93)	46 (61.3)	.629	<.001

Note. Each condition included 75 participants. The additional assessment and reinforcement were delivered together.

IV. DISCUSSION

The main finding was that confidence and practice-related understanding did not change in the same pattern. Both scores increased following the educational intervention, but the two outcomes were not significantly associated immediately afterwards. A moderate positive association was observed at final follow-up. From an SCT perspective, belief in one's ability and knowledge of how to perform an action are related but remain distinct learning outcomes.

A. Confidence and practice-related understanding

The confidence score represented students' belief in their ability to perform BSE-related actions. The practice-related understanding score reflected their knowledge and views concerning BSE practice. Assessing the two outcomes separately showed that confidence could not be used as a substitute for practical understanding.

At baseline, students' confidence was not significantly associated with their limited practical understanding. Both scores increased immediately after the educational intervention, but students with the greatest increase in confidence did not necessarily show the greatest increase in practical understanding. Clear explanations and successful participation in the session may have increased some students' confidence before they fully understood the information. Other students may have understood the content but remained cautious about performing BSE independently. These findings show why confidence should be assessed together with practical understanding.

At final follow-up, confidence and practice-related understanding showed a moderate positive association. This indicated that the two outcomes were more closely matched at the later assessment. The study describes this pattern as educational calibration. Students had time to review or reconsider the lesson after the educational session, but their independent review and practice were not recorded. The reason for the stronger association at follow-up remains unclear.

B. Modelling, guided performance and immediate response

The live demonstration and return demonstration provided opportunities for observational learning and guided practice. These activities may have reduced uncertainty and supported students' confidence. Their separate contributions to the observed changes could not be determined from the available data.

The absence of an immediate association does not mean that demonstration or guided practice was ineffective. Many students achieved scores near the maximum, leaving limited differences between participants and possibly weakening the correlation. The

supportive classroom setting may also have increased students' confidence before they considered their ability to perform the steps outside the session. Future studies could assess confidence and performance after each educational activity to examine the contribution of each component.

C. Environmental learning support and the follow-up context

The additional assessment, repeated teaching, demonstration and feedback provided further learning support to one follow-up condition. At final follow-up, most students in this condition achieved scores near the maximum. The limited differences between their scores may have weakened the relationship between confidence and practice-related understanding. Since the activities were provided together, the contribution of each component could not be examined separately.

Scores varied more in the condition that received neither the additional assessment nor reinforcement. In this condition, students with stronger practice-related understanding tended to report greater confidence. This finding does not show that the additional learning support changed the relationship between the two outcomes. Future research should examine repeated assessment, feedback, demonstration and independent practice as separate components.

D. Comparison with theory-informed breast-health research

Previous breast-health studies have linked self-efficacy with BSE practice and behaviour [2], [10]-[12]. Several studies used the Health Belief Model to examine perceived risk, benefits and barriers. The present analysis addressed a different question by examining whether students' confidence matched their practical understanding. The dataset did not include the main measures needed to compare SCT directly with the Health Belief Model or Theory of Planned Behaviour.

This study adds a different finding to the existing evidence. Improvement in two learning outcomes does not mean that both outcomes improve together for each student. The association observed at final follow-up suggests that confidence and practical understanding may become more closely matched after the immediate teaching period. Previous intervention research has also shown that theory-related measures and behaviour can change at different rates [17]. Future studies should examine this pattern using validated SCT measures and direct observation of performance.

The absence of an immediate association needs to be interpreted at the individual level. The substantial increase in both mean scores showed improvement across the participant group. The correlation answered a different question: whether students with greater confidence were the same students who showed stronger practical understanding. This relationship was not observed immediately after the intervention. Reporting only the changes in group means could conceal the difference between overall improvement and the relationship between the two outcomes for individual students.

The final follow-up findings need to be interpreted cautiously. The moderate association across the full sample showed that confidence and practical understanding were more closely matched at the later assessment. It did not show that the passage of time caused this relationship to become stronger. Students may have reviewed the printed guide, discussed the lesson or reconsidered their own ability, but these activities were not measured. Differences in assessment and learning support between the follow-up conditions may also have influenced the findings. The later association should be viewed as a statistical relationship rather than evidence of a specific learning process.

Limited variation in the scores provides another possible explanation. When most students answer nearly every item correctly, the score becomes less able to distinguish between different levels of understanding. This ceiling effect can weaken the observed correlation. In additional-assessment-and-reinforcement conditions, most students achieved the maximum practice-related understanding score. Future evaluations could include more challenging scenarios, application-based questions and an observed skills checklist. These measures could provide a clearer assessment of whether confidence matches practical ability.

E. Theoretical and practical implications

Future breast-health programmes should clearly explain how each educational activity is expected to support learning. Demonstration, guided practice and feedback can be linked with confidence, knowledge, observed performance and appropriate help-seeking. Evaluations should assess several relevant SCT components rather than relying only on self-efficacy [9]. Confidence and practical understanding should be reported as separate outcomes because each represents a different aspect of learning. Validated measures would allow findings to be compared more consistently across studies [18].

School health programmes do not require lengthy assessments to examine whether confidence matches practical understanding. A brief assessment could combine task-specific confidence items, one or two scenario-based questions and a structured return demonstration. Students with correct understanding but low confidence may benefit from further guided practice. Students with high confidence but incorrect responses may require specific corrective feedback. This approach could help educators provide support according to students' learning needs.

The timing of programme evaluation also requires consideration. An immediate assessment can show what students understood during the educational session, but it may capture confidence developed in a supportive classroom setting. A later assessment can examine whether confidence remains consistent with practical understanding after direct support has ended. Using both assessment points provides a fuller account of learning. Longer follow-up periods are needed to examine whether this relationship is maintained and whether it predicts appropriate help-seeking or accurate performance.

In adolescent breast-health education, readiness should be defined within clear limits. It refers to understanding the educational steps, recognising the limits of self-examination and responding appropriately to an unusual or persistent breast change. It does not mean

that students can diagnose breast disease or replace clinical assessment. The educational focus should remain on breast awareness, including informing a trusted adult and seeking assessment from a healthcare professional when a concerning change is identified.

F. Strengths and limitations

The study included complete repeated-measures data from 150 students, with equal numbers recruited from three schools. The same educator, educational content and teaching approach were used across the schools, supporting consistency in programme delivery. Confidence and practice-related understanding were assessed separately at three assessment points. This allowed changes in both outcomes and the relationship between them to be examined over time.

Several limitations need to be considered. SCT was applied during the secondary analysis and did not guide the design of the original intervention. The confidence items were not taken from a validated self-efficacy scale. The practice-related understanding score combined knowledge with views concerning difficulty and embarrassment. The study did not assess directly observed performance, regular BSE behaviour or other SCT components. Many post-intervention scores were close to the maximum, which limited the differences between participants.

The study did not include an untreated control group, and the follow-up period ended after 38 days. Half of the participants received an additional assessment and reinforcement session. These activities were provided together, so their separate contributions could not be examined. The three schools were located in one Malaysian state, which may limit the application of the findings to other settings. Related manuscripts used data from the same participant group but examined different research questions and outcomes.

V. CONCLUSION

Confidence and practice-related understanding scores increased following the school-based breast-health education programme among Malaysian female adolescents. The two outcomes were not significantly associated immediately after the programme but showed a moderate positive association at final follow-up. Increases in the group mean scores did not mean that confidence matched practical understanding for each student. Both outcomes should be assessed separately when evaluating students' educational readiness. SCT provided a useful framework for interpreting this difference, although only selected components of the theory were measured. Future research should use validated measures, assess performance through direct observation and include longer follow-up periods.

ACKNOWLEDGMENT

The authors would like to thank the participating students, their parents or guardians, the participating schools and the relevant education authorities for their support and cooperation throughout the study.

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