



Original Article

Fostering 2nd-year medical students' reflective capacity: A biopsychosocial model course

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ABSTRACT

Objective: The biopsychosocial (BPS) model has been proposed to take into account the interaction of psychological and social factors in medical practice. Although some studies have explored its application in medical education, little has been evaluated about students' reflection in such courses. This study introduced a BPS model course and aimed to assess changes in students' reflective capacity resulting from this course. **Materials and Methods:** Eighty-seven written reflections before and after the course were segmented, coded, and rated using the Reflection Evaluation for Learners' Enhanced Competencies Tool rubric, which contains six factors of reflective capacity, namely description of disease experience, presence, attending to emotions, description of conflict or disorienting dilemma, meaning making, and action. **Results:** After the BPS model course, the overall reflective capacity, as well as the "Presence" and "Meaning making" scores, increased, while scores for "Attending to emotion" decreased significantly. "Description of disease experience," "Description of conflict or disorienting dilemma," and "Action" showed no significant change. **Conclusion:** Pedagogical suggestions are discussed for a BPS model course with reflective training for young medical students.

KEYWORDS: *Biopsychosocial model course, Experiential learning, Medical education, Reflective capacity*

INTRODUCTION

The biopsychosocial (BPS) model, proposed by Engel [1], is gaining increasing attention in medical education and practice. However, patients with chronic disease may frequently encounter social and psychological issues during their long-term medical care [2]. Theoretically, the BPS model in medical practice sheds insight into how social factors influence the treatment process and patients' physiological status [3,4]. In practice, medical staff with awareness of the BPS model are deemed to offer more appropriate treatment by better understanding patients' personal disease experience rather than relying on their purely medical diagnosis. Therefore, the integration of the BPS model into medical education is believed to enrich medical students.

Use of the biopsychosocial model for reflective training in medical education

Educational studies based on the BPS model have been published to evaluate its application in medical education [5-7]. In a recent study, the authors used the techniques of narrative writing and reflective group discussion in the context of the BPS model, suggesting 6 psychological and social issues for interns, patients, and patients' families [8].

According to their study, it is possible to increase students' reflective capacity through its integration with the BPS model because the features of such a course would be particularly appropriate for addressing chronic diseases, which involve many critical issues, including social and psychological factors.

We further propose that theories of BPS could be applied as experiential learning for medical students to grasp abstract concepts in clinical circumstances to transform students' learning of the BPS model into building up medical knowledge and reflective capacity. Experiential learning could foster reflective capacity, which is deemed essential for the development of medical professional competence and lifelong learning [9-16]. Medical students with reflective capacity may have better insight into clinical experiences and thus are better at transferring previous knowledge and experiences to new skills and attitudes [10,17,18].

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Reflective writing is one established method for medical students to cultivate reflective capacity and empathetic interactions with patients [19]. In a BPS-based course, medical students could build up their background knowledge, gain abundant materials from personal or patients' stories, and understand disease from a social and psychological perspective. Through this learning journey, students may be able to analyze meaning and conflicts and critically reflect on the unique wisdom gained from interpreting their own experiences [20-22].

The present study

The purpose of this study was to create a BPS model course for 2nd-year medical students and investigate changes in students' reflective capacity after taking the BPS-based course using their written reflections. The aims of this BPS model course were to raise students' awareness and understanding of the psychosocial issues at play in the context of disease and to empower their perception, attitude, and consideration of psychosocial issues encountered by the patients. We hypothesized that students would enhance their reflective capacity after completing the BPS model course.

MATERIALS AND METHODS

Participants

The participants were students who attended this BPS model course. Totally, 92 2nd-year medical students with an average age of 20.7 ± 2.1 years participated in this course. Sixty-eight students were male (74%). The BPS model course was designed for 2nd-year students who were beginning their medical courses in anticipation of year 3, during which they

would begin to learn medical knowledge such as human anatomy.

Course design: The biopsychosocial model course

This BPS model course was designed as a one-semester elective course for 2nd-year medical students. It consisted of 2 h of coursework once every 2 week for 20 weeks, totaling 20 h of coursework in one semester.

The objectives of the BPS model course were to raise students' awareness and understanding of the psychosocial and social issues of patients who were diagnosed with either epilepsy or depression.

As Figure 1 shows, the teaching and learning activities for the two diseases contained three topics. First, didactic lectures were given to introduce the clinical and biological science concerning each disease as well as the psychosocial issues. Second, with prior fundamental knowledge, well-trained patients were invited as speakers to share their authentic disease experiences. Third, students were divided into groups to interview the patients after class. Before the group interview, the medical teachers introduced the physiological and social problems associated with the disease and shared interview skills with the students. After the group interview, students presented their interview results and shared group experiences and reflections from the interview activity. The second and third steps aimed to create authentic communication with the patients concerning the physiological and social issues in medical practice. The same teaching and learning activities were conducted for the other clinical case of depression.

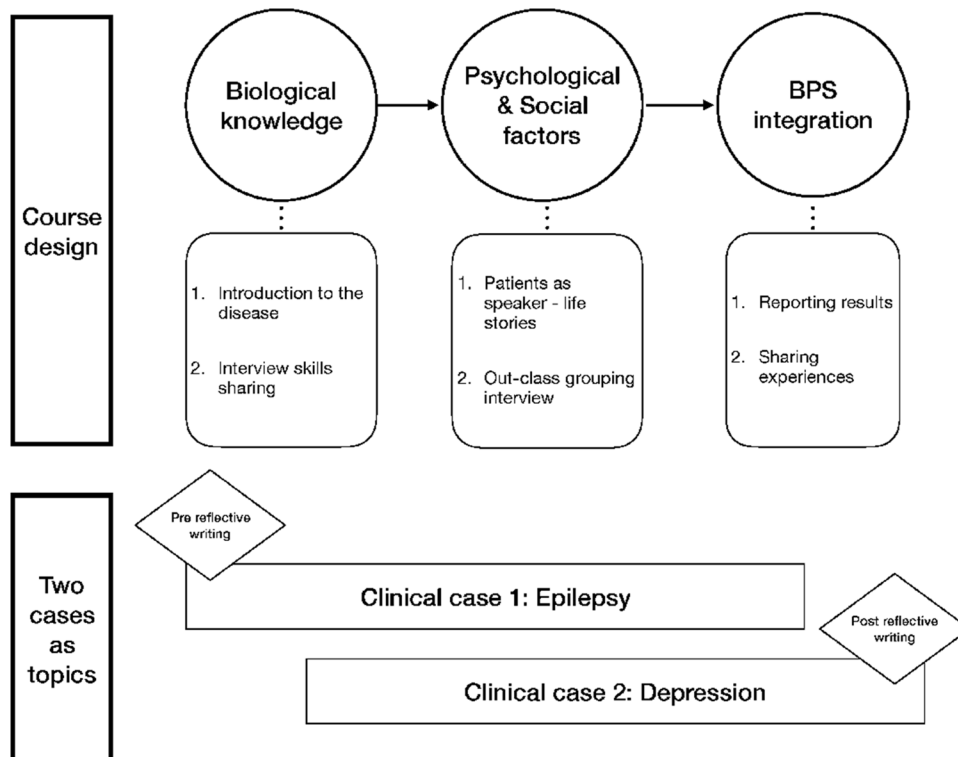


Figure 1: Biopsychosocial model course design

Data collection

At the beginning of the course, students were encouraged to write a reflective essay with the following prompt: "Please write about a disease experience that left an impression on you." The guided questions included the following: (1) What happened? (2) How did you feel? (3) What was the influence? and (4) What did you learn from the experience? Students were given up to 50 min to complete the reflective essay in class. The final reflection was conducted using the same process during the last class.

The students were reassured that evaluation of their reflections would not count toward their course grades. The 87 students submitted their pre- and post-class reflections. The researchers collected data without contacting study subjects, therefore it was exempt from the Institutional Review Board at our institute.

Data analysis

To determine whether students' reflection on disease changed after completing the BPS model course, the written reflections were segmented and coded. The Reflection Evaluation for Learners' Enhanced Competencies Tool (REFLECT) rubric, with rigorous development process [23,24], was applied to evaluate medical students' reflection. The analysis contained two steps: coding the factors of reflection and rating the levels of those factors.

To meet analytic needs, the definition of the REFLECT rubric was first established as coding frame [Table 1]. Then, six factors were defined as a coding frame.

Description of disease experience (description)

The writer described the experience. The writer tried to focus on the points resulting in problems. An example is illustrated below.

My grandpa suffered from cancer and stayed in bed; from then on, my family lost happiness.

Presence

The writer expressed his/her perspectives regarding the experience. The segment began with "I think that..." or "In my opinion ...," as in the example below.

I think that doctors who have seen many serious diseases may consider it (a fishbone stuck in the throat) as a minor case.

Attending to emotions (emotion)

The writer recognized feelings that resulted from the experience. The writer elaborated on these feelings or used metaphors to describe them. The segment might begin with "I feel that..."

Although the physician told us that the success rate of this kind of operation was very high, I personally not only experienced but also realized the anxiety with "endless fear."

Description of conflict or disorienting dilemma (conflict)

The writer described the problem or dilemma and tried to analyze the conflict from different perspectives. An example is shown below.

From mom's talk, I can feel that grandpa became more sensitive after he suffered from the stroke. His powerlessness (due to the stroke) also greatly influenced his interaction with family.

Meaning making (meaning)

The writer reflected self-belief and meaning coming from the experience. An example of this is below.

My grandpa was being transferred to different departments in the hospital. From the people I met, I realized that the attitude was the major concern in medical practice.

Action

The writer mentioned actions that he/she would or will take. The segment often began with "I decide to..." "I want to..." "I should..." An example of this is listed below.

I decided to put effort into the prevention of stroke in the future and helping a lot of people.

Second, the scoring of coded segment was established. Nonreflection was coded 0, introspection was coded 1, reflection was coded 2, and critical reflection was coded 3.

Segments were coded and rated by two researchers independently. The two researchers discussed the results, revised the definition, and reached initial agreement. Then, the revised

Table 1: Factors of students' reflective writing

Score	1	2	3
Category	Introspection	Reflection	Critical reflection
Description	Fact reporting or vague impressions	Elaborated descriptive writing approach and impressions	Elaborated descriptive writing approach and impressions with further analysis or explanation
Presence	Sense of writer being partially present	Sense of writer being largely present	Sense of writer being fully present
Emotions	Recognition but no exploration of emotions	Recognition, exploration, and awareness of emotions	Awareness of emotions and gain of emotional insight
Conflict	Weak description of the disorienting dilemma	Clear description of the disorienting dilemma, conflict, challenge, or issue of concern	Full description of the disorienting dilemma, conflict, challenge, or issue of concern that includes multiple perspectives, exploring alternative explanations, and challenging assumptions
Meaning	Little or unclear meaning making	Clear meaning making	Comprehensive meaning making through the analysis of previous experience
Action	Weak intention to conduct the action	Clear intention to conduct the action	Clear intention to conduct the action with plans, strategies, or reasons

rubric and coded segments were given to a research assistant to re-examine the codes and scores. The optimal score for reflection was 18 (6 factors \times 3 points).

To test reliability, after 1 year, one researcher randomly selected 8 written reflections (10%) to score. A reliability of 0.86 in terms of Cronbach's alpha was achieved. We compared the median change from pre- and post-reflective writing using the Wilcoxon rank-sum test.

RESULTS

Overall, students achieved significant improvement (+1.5, $P = 0.002$) on reflection after completing the BPS model course [Table 2]. "Presence" and "Meaning making" increased significantly after the course (+0.7, $P \leq 0.001$; +1.5, $P \leq 0.001$, respectively); However, "Attending to emotions" decreased significantly (-1.0, $P \leq 0.001$). "Description of illness experience," "Description of conflict or disorienting dilemma," and "Action" did not change significantly.

Box plots of the reflective capacity scores are shown in Figure 2. The scores for the two factors that significantly increased, "Presence" and "Meaning making," changed from low scores (0–1 points) in prereflection to high scores (2–3 points) in postreflection. This change was particularly prominent for "Meaning making," for which the number of 0 scores decreased dramatically in students' postreflection. Due to this dramatic change, these two factors increased significantly after the course. Conversely, for "Attending to emotions," which decreased significantly, students' prereflection scores fell in the 0- to 2-point range; however, the postreflection scores clustered at approximately 0, hence the reason for the significant decrease in those scores following the course. The distribution of "Description of illness experience" scores was similar in pre- and post-reflection, with major decreases in scores in the 1–2-point range. For "Description of conflict or disorienting dilemma," the pre- and post-reflection showed that scores increased by 1 or 2 points in postreflection. In addition, in postreflection, the number of 0 scores decreased, while the number of scores in the 2- to 3-point range increased, but the change from pre- to post-scores for this factor was not significant. Regarding "Action," students' pre- and post-reflection scores were mostly 0. Although the number of 0 scores decreased and the number of 1 and 2 scores increased at postreflection, this change did not achieve significance.

DISCUSSION

Table 2: Change in reflective capacity

Factors	n	Pretest			Posttest			P
		Median	25%	75%	Median	25%	75%	
Description	87	1.500	1.000	2.000	1.500	1.000	2.000	0.794
Presence	87	1.500	0.000	2.000	2.200	1.710	3.000	<0.001*
Emotions	87	1.000	0.000	2.000	0.000	0.000	1.000	<0.001*
Conflict	87	0.000	0.000	2.000	0.000	0.000	2.000	0.192
Meaning	87	0.000	0.000	1.000	1.500	0.000	2.333	<0.001*
Action	87	0.000	0.000	0.000	0.000	0.000	1.000	0.877
Overall	87	5.500	4.000	7.667	7.000	5.125	8.500	0.002*

* $P < 0.05$

This is the first study that has examined change in reflective capacity in the context of medical education using the BPS model. This BPS model course is an innovative teaching model in Taiwan's medical schools. The course seeks to connect students' previous disease experiences with medical learning using the BPS model as a teaching framework and connecting elements of reflective capacity. The results show that medical students' reflective performance improved after completing the BPS model course, thereby identifying the course's effectiveness, as well as its inherent problems. This study offers pedagogical insights for tertiary education teachers and researchers interested in the BPS model course and reflective capacity. In summary, this study contributes to the knowledge about the development of medical students' reflective capacity through the BPS model and potential improvements to the pedagogical approach for instilling reflective capacity in medical students.

The BPS model course is practical for fostering medical students' reflective capacity, particularly as pertains to the development of "Presence" and "Meaning making" regarding expressing personal perspectives in medical learning. Medical students have an opportunity to see how complex a particular case may be, as it might involve disease stories generated by multiple accounts [25], which may stimulate them to determine possible solutions and reconstruct personal meanings from the interpretation of the disease. Moreover, guided questions and reflective writing offer prompts for students to recall these factors that are involved in a disease experience.

Second, students' reflective capacity regarding "Action" increased but not to expected levels following the course. It is possible that 2nd-year medical students do not enter their 3rd year which marks a dramatic change in which they transition from students to practitioners [26]. Without increased experiences in medical practice, it is not easy for them to figure out what a physician should do when encountering patients' psychological or social problems. This lack of clinical experience may also explain the little growth and extreme distribution found for "Description of conflict or disorienting dilemma." This feature may be the source of polarities as well as dissonance found in reflective writings [26]. When students fail to select critical issues in medical settings during recall, their reflections might not differ from a superficial description of the facts. However, when they choose critical points, the following conflict analysis, meaning the making and taking of action, may follow a smooth reasoning process. A key element of critical reflection is the development of abstract concepts [27]. Those medical students who perform well in their reflections may unconsciously acquire the ability to transform their observation into abstract concepts. By contrast, medical students who are unable to do so may need instruction to construct abstract concepts from superficial facts to develop new beliefs about previous disease experiences.

The decrease in scores for "Attending to emotions" was an interesting finding in this study. We propose that emotion and empathy seem to be unclear concepts to our 2nd-year medical students. In this course, students experienced relationships with patients in their early medical education, particularly in terms

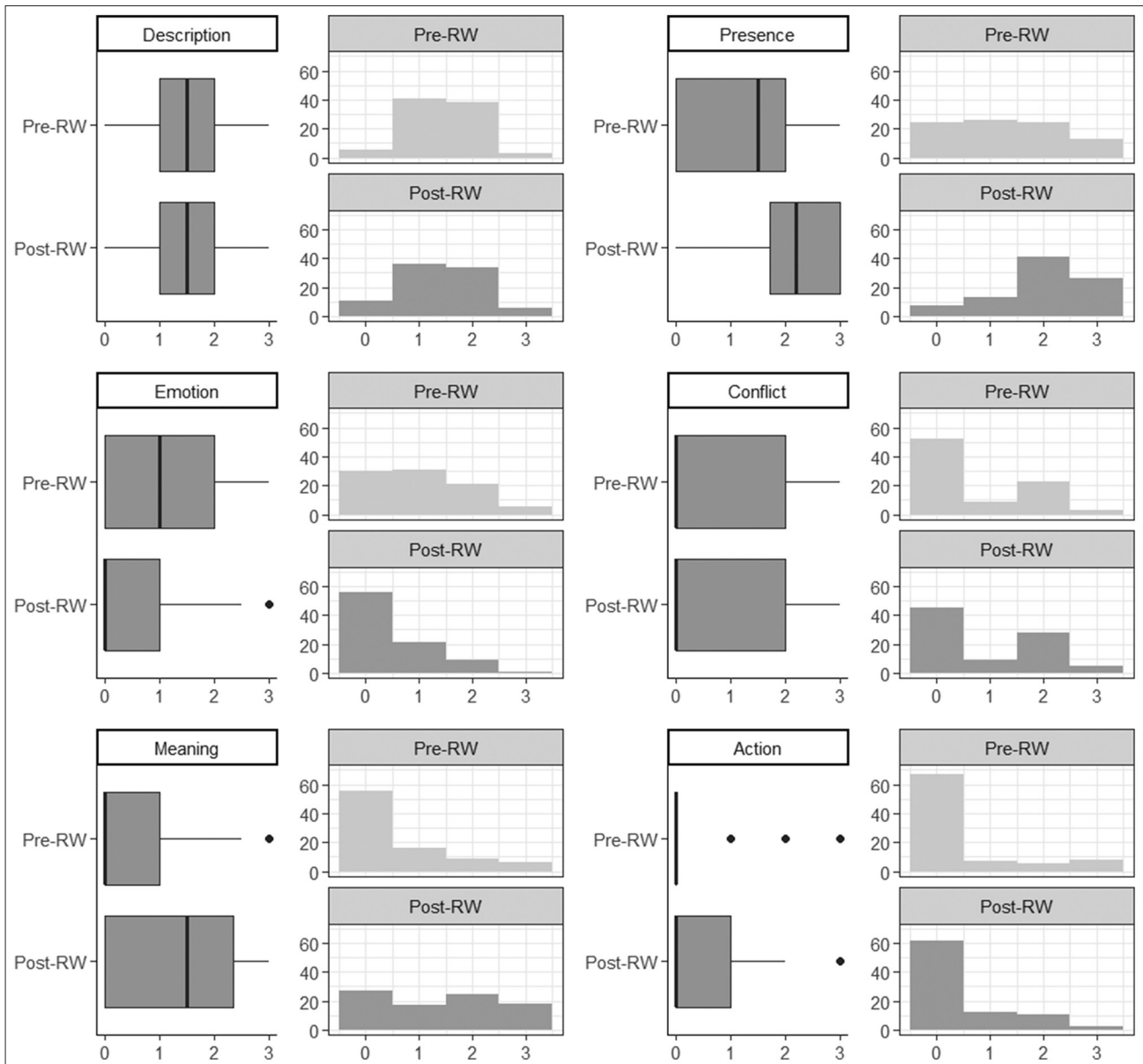


Figure 2: Histogram and box plots of pre- and post-course reflective capacity factors

of feeling and displaying emotions, adjusting, role finding, and participation. The interplay among emotions, meaning, and identity was complex [28]. These ambiguous emotional expressions were similar with the findings which found that 3rd-year students often described themselves as anxious, uncertain, confused, and frustrated [29]. In our study, the use of emotional word in students' reflective writing stopped at superficial description, with little clear elaboration of emotion. Moreover, reflections regarding emotions may blend with analysis or personal perspectives, thus decreasing the deeper exploration of the function of emotion in disease experiences. Previous studies have shown that empathy contains cognitive and emotional aspects [30]. Students in the BPS model may need instruction for emotion recognition. This instruction may help clarify for them the use of emotion and empathy in medical practice so that they can then be able to approach

difficult interactions with specific problem-solving skills while maintaining an empathic, patient-centered approach.

Conclusively, this study achieved the learning goals of introducing patients' life stories and fostering students' awareness of chronic diseases' psychological and social problems. However, some factors need to be considered to achieve an effective BPS model course design for naive medical students.

Implications

Based on the findings of this study, a revised BPS model course was proposed for medical students who are in an early stage of clinical exposure [Figure 3].

The goal of the revised model is to foster comprehensive reflective learning within the context of the BPS model. One chronic disease is chosen as a learning topic for beginning medical students to acquire biological knowledge and

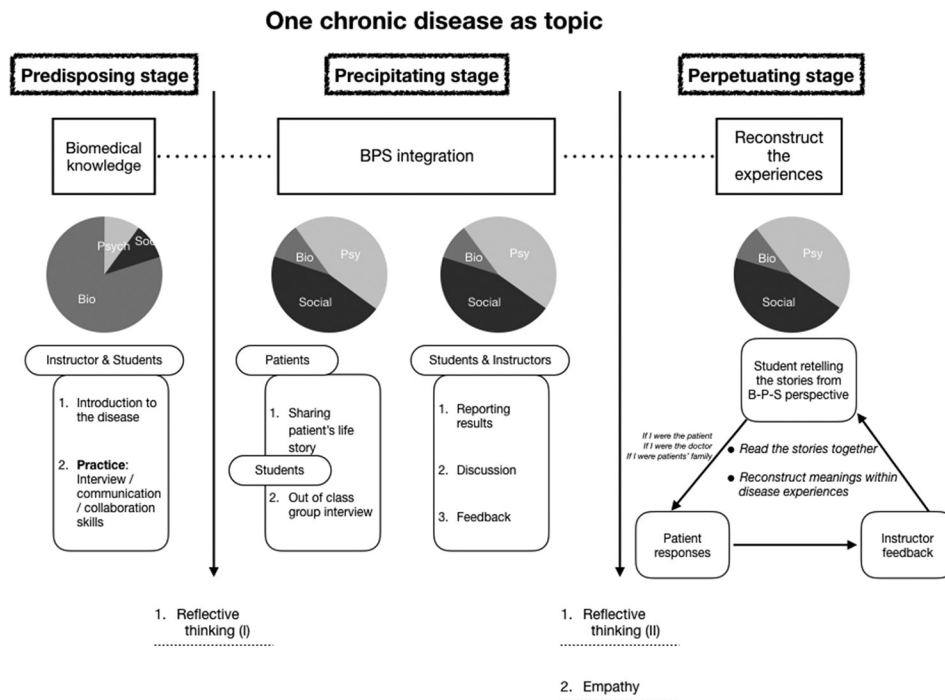


Figure 3: Revised biopsychosocial model course design

in particular, experience psychological–social problems that accompany the disease. First, a predisposing stage is set up for beginning medical learners to build up their background knowledge of the selected disease. During this stage, fundamental biomedical knowledge can be taught as background knowledge. In addition, to prepare students for the patient contact that will follow, a short pause may be made for reflective thinking. Interview skills and collaborative training can be inserted here for the outside-of-the-classroom group interview afterward. The next stage is used for integration of biological–psychological–social factors, in particular, the latter two factors. Authentic patient contact is added for motivation and raising awareness, followed by teacher feedback. Before proceeding to the last stage, medical teachers may discuss reflective learning and empathy based on students’ previous patient contact experience. With the clear picture provided during the first two stages, the last stage may be used to reconstruct the entire learning journey. We suggest that narrative learning is useful to promote students’ review of what they learned and to transfer their learning by forming multiple perspectives surrounding the disease/life stories. By retelling stories with patients, it might be helpful for students to review their role in a disease story and deepen their reflection.

Limitations

Studies based on BPS model courses in medical education are emerging, whereas the assessment of reflective capacity to promote medical experiential learning has only recently been noticed. There are limitations regarding the application of the BPS model course proposed in this study. First, we noted that the age of the students in this study may have influenced our results. In American medical education, students are mostly postundergraduate students, whereas our students have just

graduated from high school. We consider that differences in cultural and educational background may lead to differences in performance when compared with western medical education [5]. Therefore, more research is necessary to determine whether a revised BPS model course may be applicable to other education systems. Second, the open-ended questions were designed based on previous studies [31] so that the questions contained no fixed clues for students to guess the research purpose. The repeated writing was meant to compare similar experiences of students so that the error coming from differences could be reduced. However, we suggest that future research include a retrospective part for investigating the development of reflective capacity using the explicit guided questions and practice. Finally, we note the importance of further empirical research that examines the empathy and emotion recognition shown in young medical students’ reflection under a BPS setting. A BPS model exploring students’ feelings might need further investigation.

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Conflicts of interest

There are no conflicts of interest.

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