International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 10, 2020
ISSN: 1475-7192

# Impact of PETLLEP-based mental imagery on nursing and midwifery students' skill of nasogastric tube insertion and self-efficacy

AZAM SAEIDIKIA[1], S.A. VAGHARSEYYEDIN[2], ZAHRA DANAIE[3], SHAHNAZ TABIEI[4]*

***Abstract***

***Background and Aim:*** *Effective learning of practical and clinical skills is one of the top priorities for nursing and midwifery students. Therefore, the most efficient method(s) for teaching skills should be adopted to maximize student learning. This study aimed to determine the effect of mental imagery practice based on the PETTLEP model on the self-efficacy and skill of nursing and midwifery students in nasogastric tube insertion.*

***Methods:*** *A randomized controlled field trial was conducted with 68 nursing and midwifery students at Birjand University of Medical Sciences (BUMS). At baseline, the participants completed a demographics form, the Revised Movement Imagery Questionnaire (MIQ-R), the Learning Self-Efficacy Scale (L-SES), and a checklist of nasogastric tube insertion skills. Subsequently, the students were randomly assigned to an experimental group and a control group. During a 90-minute session, the researcher taught the mental imagery technique for nasogastric tube insertion to the experimental group based on the PETTLEP model. The experimental group practiced mental imagery for nasogastric tube insertion three times a week for four weeks at the clinical skills lab located in (BUMS). During this time, the control group performed the usual nasogastric tube insertion practice. When the training sessions were finished for all students, the self-efficacy questionnaire and nasogastric tube insertion checklist were completed again.*

***Results:*** *Statistical analysis showed that the frequency distribution of gender and interest in the nursing field had a significant difference between students in experimental and control groups ($p < 0.05$). After adjustment, the covariance analysis showed that the self-efficacy and its mean difference scores were not significantly different between the groups before and after the intervention ($p > 0.05$). However, after adjustment, the mean post-intervention scores of nasogastric tube insertion skill and its mean difference were significantly higher in the experimental group than the control group ($p < 0.05$).*

---

[1] Department of Medical Surgical Nursing, School of Nursing and Midwifery,Birjand University of Medical Sciences, Iran
[2] Associate Professor of Nursing, Department of Medical Surgical Nursing, School of Nursing and Midwifery, Birjand University of Medical Sciences, Iran
[3] Phd of psychology, Birjand University of Medical Sciences, Iran
[4] Instructor of Nursing, Department of Medical Surgical Nursing, School of Nursing and Midwifery, Birjand University of Medical Sciences, Iran
Nurse.saedikia@yahoo.com

**Received: 10 May 2020 | Revised: 25 Jun 2020 | Accepted: 24 July 2020** 

***Conclusion:*** *The PETTLEP-based mental imagery practice contributes to the development of nasogastric tube insertion skills in students. Therefore, the application of this method is suggested for teaching the skills considered in the Fundamentals of nursing course of nursing and midwifery students.*

***Keywords:*** *PETTLEP mental imagery, nasogastric tube insertion, self-efficacy.*

## I. Introduction

Appropriate practical training along with theoretical training constitutes a highly important part of education in nursing and midwifery departments (1). Practical training aims to improve students' skills and self-efficacy (2). Accordingly, more than half of the courses that nursing and midwifery students must take are related to practical and clinical training (3).

Despite the continued emphasis on the importance of teaching practical and clinical skills, research findings indicate that there is a gap between the practical and clinical competence acquired by nursing and midwifery students and the desirable status (4). A 2004 study of 7,500 nursing graduates in the United States by Kenward reported that 75.5% of them were registered nurses, one-fifth of whom had difficulty performing clinical tasks. Moreover, 52% of them reported that they were not prepared to work in a real clinical setting (5). Another study conducted in Iran in 2006 found that 3.61% of nurses and 64% of head-nurses assessed the clinical competence of nurses as low (6). In nursing and midwifery groups, the first course where students learn how to use their nursing skills to care for patients is the *Fundamentals of nursing*. In this course, one of the major learning needs is the training of psychomotor skills, which is practiced in a clinical skills lab and requires a significant amount of time to acquire the skills (7). Therefore, the most efficient skills training methods should be employed to maximize learning and educate students as professionals.

Although the use of traditional face-to-face teaching methods, used in clinical skills labs, is considered a valuable strategy in teaching, skills training should be based on students' learning needs. Moreover, varying learning styles that maximize the effect of teaching and strengthen students' self-efficacy should be used (7). In this line, some researchers have tried to maximize the learning of practical skills in students using a variety of new methods such as peer education and mobile technology (8, 9). Another method in this field is the use of mental imagery training. Imagery is a process in which a person imagines a real experience using different senses (visual, olfactory, and taste, among others) without anything being experienced in the real world (10). When one consciously displays a certain activity in our minds through imagery, the same regions of the brain that are activated during a motor skill are activated subconsciously (11). This means that there is a "functional equivalence" between mental imagery and physical function (12).

This mental technique has been widely used in some fields, including medical science. Its applications in medical science comprise teaching basic surgical and laparoscopy skills, facilitating the transfer of newly graduated nurses into the workplace, and teaching dental and nursing students (11-15). The applied benefits of this method have been shown, some of which include increased self-confidence and motivation, improved self-efficacy, reduced anxiety, and improved psychomotor skills or performance (10, 16). In fact, psychological and mental structures are needed to establish stable performance. In this line, mental imagery is a highly useful psychological skill that can help (12, 17).

In 2001, Holmes and Collins introduced a type of mental imagery called the PETTLEP model to the world of neuroscience to achieve higher levels of functional equivalence. They stated that mental imagery would be useful when it involves all the emotions experienced by an individual at the time of performing an activity in the real world (17). The term PETTLEP is an acronym, any component of which is concerned with an important practical concept that should be considered during mental imagery. The letters denote physical (similarity between the situation and equipment in imagery and real-life practice), environmental (sameness of imagery and real-life environment), task or skill (similarity between the imaged task and real-life activity), timing (same timing of imagery and that of actual work), learning (adapting the imagery contents as related to learning), emotion (involvement of emotions related to completing the work during imagery), and perspective (imagery from the first- or third-person perspective ) (12, 18).

Various studies have shown the superiority of PETTLEP-based imagery over traditional imagery, including the study of Afroozeh and Afroozeh (2010), which showed that the PETTLEP imagery model is more effective in learning badminton short service skills (backhand) than the traditional method of mental imagery (17). A 2015 study by Philip et al. also showed that imagery, along with physical activity, is very useful in learning complex motor skills, and that imaging alone can help maintain the mastery of the acquired basic skills (19). Wright et al.'s 2008 study suggested that the use of the PETTLEP-based mental imagery was not only useful in enhancing motor skills and techniques but that it could be used in other professions such as nursing to improve professional skills. It is because some care techniques in nursing (such as measuring blood pressure and body temperature, nasogastric tube insertion, aseptic techniques, etc.) have a skills aspect in addition to their care standards dimension, making it necessary for nurses to have skills and mastery in performing these techniques (12). On the other hand, when a new skill is being learned, the associated stress and anxiety can negatively affect its learning, which in turn reduces self-confidence and self-efficacy (20).

Therefore, mental imagery is used to reduce stress when acquiring skills. In this regard, the literature indicates that the more a skill is completely reviewed in the mind, the less one may experience anxiety and stress when s/he is performing the skill in the real world. Moreover, since there is an inseparable relationship between self-esteem and self-efficacy, lower levels of anxiety in an individual can improve his/her self-confidence and self-efficacy (14, 20).

Given that this method has been used in only a few studies regarding certain nursing skills (12, 21), further research evidence is required to confirm the effectiveness of this method in improving clinical nursing skills. One of the most widely used nursing techniques is nasogastric tube insertion, which requires proper practice and performance in terms of skill and technique. If performed weakly, it causes discomfort to the patient and can also reduce confidence in the professional performance of nurses. Taking this into account, this study was designed to evaluate the effect of mental imagery practice based on the PETTLEP model on students' self-efficacy and skill in performing nasogastric tube insertion.

## II. Experimental, Materials and Methods

The present study is a randomized controlled field trial conducted with 68 nursing and midwifery students in the clinical skills lab of Birjand University of Medical Sciences.

### 2.1 Procedure

After the ethical code (IR.BUMS.REC.1398.293) was obtained from Birjand University of Medical Sciences to perform the study, the researcher introduced the study goals to the students at the faculty of nursing and midwifery. Eligibility criteria involved having a willingness to participate, signing consent forms, and scoring above 16 on the revised movement imagery questionnaire (MIQ-R). Students were excluded if they had a history of working in hospitals and medical centers and/or receiving mental imaging training.

All students completed the Learning Self-Efficacy Scale (L-SES) at baseline. They also took the OSCE test for the nasogastric tube insertion skill as a pretest. Subsequently, they were assigned randomly to experimental (n=4) and control (n=34) groups. Afterward, during a 90-minute session, the researcher introduced the mental imagery technique to the experimental group based on the PETTLEP model. The educational content was already approved by a specialized psychologist. The experimental group practiced mental imagery three times a week for four consecutive weeks based on the PETTLEP model for nasogastric tube insertion skill at the clinical skills lab in the presence of a research assistant. The psychologist also attended on certain sessions for further supervision. During this time, the control group practiced with the routine nasogastric tube insertion skill. At the end of the training sessions, the OSCE (post-test) test was given again. Notably, the evaluation of students in the nasogastric tube insertion skill station in the pre- and post-test phases was performed by one same evaluator using one same checklist.

### 2.2 Research tools

The data collection tools comprised a demographics form (The demographics form covered age, gender, and interest in their academic field of study), the L-SES, the MIQ-R, and a nasogastric tube insertion skill checklist.

The Movement Imaginary Questionnaire was developed by Hall and Pongrac in 1983 and was modified by Hall and Martin in 1997 (23). It is an 8-item instrument that examines one's visual and sensory-motor abilities. Responses to the items are based on a 7-point Likert scale (1 = very difficult to picture/feel; 7 = very easy to picture/feel), and a total score can range from 8 to 52, with higher scores meaning higher mental imagery ability and lower scores meaning low imagery ability. The MIQ-R was used in the present study for screening purposes, where a minimum score of 16 was required (indicating a moderate mental imagery ability). The reliability of the questionnaire is reported to range with an internal consistency coefficient from 0.83 to 0.89 for visual and sensory-motor dimensions (12, 18, 19, 24). In the present study, Cronbach's alpha estimation was used to estimate the reliability of the tool. Cronbach's alpha coefficient was calculated to be 0.85, which indicates that the reliability of this tool is satisfactory.

The Learning Self-Efficacy Scale (L-SES) was developed by Kang et al. in 2019 (22) and includes 4 items in each of the cognitive, emotional, and psychomotor domains. The items are responded on a 5-point Likert scale (1 = disagreement and 6 = agreement) with total scores ranging from 12 to 60. Higher scores denote higher self-efficacy, and lower scores suggest lower self-efficacy. A Cronbach's alpha coefficient of 0.80 was calculated in this study, which indicates that the reliability of this tool is satisfactory.

The checklist of nasogastric tube insertion skills was developed by the faculty members of the Nursing and Midwifery School at Birjand University of Medical Sciences in 2018 based on Taylor's (2018) *Clinical Nursing Skills*. The checklist comprised 15 items that assessed students' abilities in nasogastric tube insertion. The total score ranged between 0 and 10, and a higher score meant a higher skill level. In the present study, this checklist was given again to five faculty members of the Nursing and Midwifery School, who confirmed its content validity. Afterward, the OSCE test was designed and implemented for 15 students to determine the reliability of the checklist. To estimate the inter-rater reliability of the nasogastric tube insertion checklist, the ICC (intraclass correlation coefficient) estimate was used. The reliability value was 0.7, which suggests appropriate inter-rater reliability.

### 2.3 Methods of data analysis

Data were analyzed using SPSS 15 statistical software. First, the Kolmogorov-Smirnov test was used to check for the normal distribution of the data. Given the normal distribution of the data (Table 1), the study employed the independent t-test (to compare within-group and between-group mean self-efficacy and nasogastric tube insertion skill scores before and after the intervention), paired t-test (to compare mean differences in self-efficacy and skill scores before and after the intervention), and analysis of covariance (ANCOVA). Chi-square statistical test was used to compare demographic characteristics in the two groups. The significance level was considered to be <0.05.

Table 1. The results of the Kolmogorov-Smirnov test to determine the status of data distribution

| Variable | Group | Experimental | | Control | |
|---|---|---|---|---|---|
| | | Z statistic | P | Z statistic | P |
| Nasogastric tube insertion skill | Before intervention | 0.61 | 0.85 | 0.81 | 0.52 |
| | After intervention | 1.05 | 0.22 | 0.73 | 0.66 |
| | Before-after differences | 0.72 | 0.68 | 0.78 | 0.57 |
| Self-efficacy | Before intervention | 0.82 | 0.52 | 0.73 | 0.66 |
| | After intervention | 0.78 | 0.58 | 0.66 | 0.77 |
| | Before-after differences | 0.73 | 0.67 | 0.92 | 0.37 |

Received: 10 May 2020 | Revised: 25 Jun 2020 | Accepted: 24 July 2020

## III. Findings

Of the 68 students, 34 (50%) were in the experimental group and 34 (50%) in the control group. The frequency distribution of students' demographic characteristics in the two groups is displayed in Table 2.

Table 2. Comparison of the frequency distribution of demographic characteristics in experimental and control groups

| Variable | Group | Experimental | Control | Chi-square p-value |
|---|---|---|---|---|
| | | Number (percent) | Number (percent) | |
| Gender | Male | 19 (55.9) | 4 (11.8) | <0.001 |
| | Female | 15 (44.1) | 30 (88.2) | |
| Age | 18 y | 10 (29.4) | 9 (26.5) | 0.95 |
| | 19 y | 14 (41.2) | 14 (41.2) | |
| | 20 or older | 10 (29.4) | 11 (32.4) | |
| Interest in the field of study | No | 8 (23.5) | 2 (5.9) | 0.04 |
| | Yes | 26 (76.5) | 32 (94.1) | |

The results of Table 2 indicate that the frequency distribution of gender and interest in the field of study was significantly different in students of experimental and control groups ($p < 0.05$). However, age was not distributed significantly differently in the two groups ($p = 0.95$).

The results showed that the two groups had significant differences in terms of gender and interest in the field of study. Hence, the ANCOVA was used to eliminate the confounding effect of these two variables. As for the self-efficacy variable, the ANCOVA showed that gender and interest in the field of study did not have a significant effect on the mean self-efficacy and its mean difference scores before and after the intervention ($p > 0.05$). Nevertheless, for adjustment purposes, the mean scores of gender and interest in the field were considered as 1.66 and 0.85, respectively. After adjustment, the mean score of self-efficacy before and after the intervention, and the mean score of its difference was not significantly different in the experimental and control groups ($p > 0.05$) (Table 3).

Received: 10 May 2020 | Revised: 25 Jun 2020 | Accepted: 24 July 2020 

Table 3. Results of ANCOVA for self-efficacy mean scores before and after the intervention and the mean score differences in study groups after adjustment based on gender and interest in the field of study

| Stage | Source of differences | Sum of squares | Degree of freedom | Average of squares | F | Significance level |
|---|---|---|---|---|---|---|
| Before intervention | Gender | 28.47 | 1 | 57.47 | 0.56 | 0.46 |
| | Interest in the field of study | 1.83 | 1 | 1.83 | 0.04 | 0.85 |
| | Group | 85.32 | 1 | 85.32 | 1.69 | 1.20 |
| After intervention | Gender | 0.24 | 1 | 0.24 | 0.003 | 0.96 |
| | Interest in the field of study | 7.88 | 1 | 7.88 | 0.09 | 0.76 |
| | Group | 152.88 | 1 | 152.88 | 1.79 | 0.19 |
| Mean differences | Gender | 33.95 | 1 | 33.95 | 0.43 | 0.52 |
| | Interest in the field of study | 2.11 | 1 | 2.11 | 0.03 | 0.87 |
| | Group | 9.78 | 1 | 9.78 | 0.12 | 0.73 |

As shown in Table 4, after adjustment, the mean score of self-efficacy before and after the intervention and the mean differences were higher in the experimental group. However, the difference was not statistically significant ($p > 0.05$) (Table 4).

Table 4. Mean score of self-efficacy before and after the intervention and its mean differences in study groups before and after adjustment based on gender and interest in the field of study

| Group | | Before adjustment | | After adjustment | |
|---|---|---|---|---|---|
| | | Mean | Standard deviation | Mean | Standard deviation |
| Before | Experimental | 41.15 | 6.50 | 41.53 | 1.31 |

| | | | | | |
|---|---|---|---|---|---|
| intervention | Control | 39.35 | 7.55 | 38.97 | 1.31 |
| After intervention | Experimental | 43.65 | 8.97 | 43.70 | 1.70 |
| | Control | 40.32 | 9.23 | 40.27 | 1.70 |
| Mean differences | Experimental | 2.50 | 9.43 | 2.17 | 1.64 |
| | Control | 0.97 | 8.10 | 1.30 | 1.64 |

After adjustment, the ANCOVA results showed, the mean score of nasogastric tube insertion skill was not significantly different in the groups before the intervention (p = 0.53). However, after the intervention, there was a significant difference between the two groups (p = 0.01). There was also a significant difference between the groups concerning the mean difference in the skill score before and after the intervention (p = 0.003) (Table 5).

Table 5. The ANCOVA results for the mean nasogastric tube insertion skill score and its mean differences before and after the intervention upon adjustment for gender and interest in the field of study

| Stage | Source of differences | Sum of squares | Degree of freedom | Average of squares | F | Significance level |
|---|---|---|---|---|---|---|
| Before intervention | Gender | 0.48 | 1 | 0.48 | 0.20 | 0.65 |
| | Interest in the field of study | 0.27 | 1 | 0.27 | 0.11 | 0.74 |
| | Group | 0.94 | 1 | 0.94 | 0.40 | 0.53 |
| After intervention | Gender | 1.52 | 1 | 1.52 | 0.56 | 0.46 |
| | Interest in the field of study | 0.10 | 1 | 0.10 | 0.04 | 0.85 |
| | Group | 18.30 | 1 | 18.30 | 6.67 | 0.01 |
| Mean differences | Gender | 0.29 | 1 | 0.29 | 0.10 | 0.75 |
| | Interest in the field of study | 0.04 | 1 | 0.04 | 0.02 | 0.90 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Group | 27.51 | 1 | 27.51 | 9.44 | 0.003 |

As Table 6 shows, the mean score of nasogastric tube insertion skill before the intervention and after adjustment was higher in the control group than in the experiment group, although the difference was not statistically significant ($p = 0.53$). However, after adjustment, the mean nasogastric tube insertion skill score after intervention as well as the mean before-after score was significantly higher in the experimental group than in the control group ($p < 0.05$).

Table 6. The mean nasogastric tube insertion skill score before and after the intervention and its mean difference in experimental and control groups before and after adjustment based on the variables of gender and interest in the field of study

| Group | | Before adjustment | | After adjustment | |
|---|---|---|---|---|---|
| | | Mean | Standard deviation | Mean | Standard deviation |
| Before intervention | Experimental | 7.02 | 1.23 | 6.96 | 0.28 |
| | Control | 7.17 | 1.76 | 7.23 | 0.28 |
| After intervention | Experimental | 8.59 | 1.24 | 8.50 | 0.31 |
| | Control | 7.22 | 1.96 | 7.31 | 0.31 |
| Mean differences | Experimental | 1.57 | 1.75 | 1.54 | 0.32 |
| | Control | 0.05 | 1.62 | 0.08 | 0.32 |

## IV. Discussion

This study aimed to determine the effect of mental imagery practice based on the PETTLEP model on self-efficacy and nasogastric tube insertion skills of nursing and midwifery students. The mean self-efficacy score before and after the intervention, as well as its mean difference, did not show a statistically significant difference in the experimental and control groups. Forlenza's (2010) study did not find a significant difference between the use of mental imagery and the mean score of students' self-efficacy (23). Some other studies such as those of Short et al. (2002), Beauchamp et al. (2002), Chandler et al. (2008), and Hutchinson (2016) have reported a significant relationship between these two variables (24-27).

As to why the self-efficacy scores of students in the present study were not significant, the anxiety and stress surrounding the practical nursing exam (OSCE) may be proposed. According to Bandura (1986), among the factors affecting a person's self-efficacy are stress and anxiety (28-30). He believed that if we are not aroused or nervous or if we experience less stress, we are more likely to solve problems successfully. In other words, the higher our physiological and emotional arousal, the lower our sense of efficiency and self-efficacy (29). In a study of second-year medical students, Artino et al. (2010) showed that negative emotions such as stress and anxiety could affect a person's self-efficacy perceptions (31). According to previous studies, nursing and midwifery students consider the OSCE exam as one of the most stressful exams during their academic life (32). In a descriptive study of 25 nursing students, Bagheri et al. (2012) showed that the OSCE method of assessment is more troublesome for students than the traditional methods of examination due to the relatively large number of test cases and time constraints (33). Sheikh Abu Masoudi et al. (2015) discussed the presence of the evaluator as a stressor in students during the OSCE exam, showing that the level of anxiety in the group directly supervised by the evaluator was higher than the group with indirect supervision. Thus, Sheikh described the presence of the assessor at the designated stations as one of the reasons for the anxiety associated with the OSCE exam (34). This being said, one may highlight the OSCE exam as a reason for the as the reason why no significant difference was found between the the study groups regarding self-efficacy scores.

Another reason for the non-significant difference in the self-efficacy scores between the groups in this study may be the fact that they, as first-semester undergraduate students, had not passed the internship course or did not have enough experience to perform nasogastric tube insertion. In this regard, Haqqani et al.'s (2013) study aimed at investigating the correlation between self-efficacy and clinical performance of 51 internship nursing students (in their 8th semester). The study concluded that self-efficacy plays an important role in education, as it is effective in future performance (2). ….Alongside this, the students' lack of experience in performing golf in Florence's (2010) study was raised as a reason why the self-efficacy scores of students were not significant (23).

As regards the students' skill of nasogastric tube insertion, the statistical results showed that upon adjustment, the mean post-intervention score of nasogastric tube insertion skill, as well as its mean score difference, was significantly higher in the experimental group than in the control group. In this regard, Wright et al. (2008) conducted a study with 56 students to investigate the effect of a PETTLEP-based mental imagery training program on the performance of nursing skills. They reported a statistically significant difference between the experimental and control groups ($p = 0.038$) such that the students in the experimental group achieved a higher score in terms of blood pressure measurement technique. Also, a significantly positive relationship has been reported between mental imagery and the mean skill score of participants in the studies of Sanders et al. (2004), Butcher (1993), Sanders et al. (2008), Bramson et al. (2011), Afroozeh et al. (2013), Wright et al. (2007), Wright and Smith (2007), and Wright et al. (2014) (12, 15, 35-41).

However, in the study of Wright et al. (2008), there were no significant differences between experimental and control groups in terms of the mean scores of students in performing aseptic skills ($p = 0.69$). In this regard, the researchers believed that the aseptic technique requires a constant reminder of its implementation method, for which the PETTLEP technique, which is based on neural firing and performance reminder, may not be effective at one or another stage of the technique (12). Also, in Forlensa's (2010) study, there was no statistically significant difference in golf playing scores between the mental imagery and control groups (12, 23).

The PETTLEP mental imagery results in maximum learning because it involves both physical and cognitive elements in learning at the time of practice. As McMorris (2004) argues, imagery helps improve learning as it activates the right hemisphere of the brain concerning the information about what we see, sense, or focus on. Researchers also emphasize the role of imagery in both the first stage of learning and the problem-solving process. For example, when a student attempts to learn nasogastric tube insertion for the first time, mental imagery can substantially help him/her to learn the skill if it is used in the early stages of learning. Besides, imagery is effective in preparing a person to implement a well-learned skill. In this approach, the person imagines his/her successful performance through mental practice. Hence, mental imagery combines the characteristics of learning and performance situations and facilitates the storage of the action in memory and its retrieval from memory (42).

Many cognitive researchers such as Schmidt (1975), Magel (1976), Fitz and Posner (1976), and Bohan (1991) believe that mental imagery in the early stages of learning psychomotor skills, where there are many ambiguities to the learner, helps the person to answer several questions about performing the movement. At this stage, the person attempts to answer questions such as "What should I do?" "How should I perform the skill?", and "What is the next step?". Thus, the use of mental imagery helps review the symbolic components, understand the movement patterns, codify in the brain the movements required to perform a skill, and create a movement program in the central nervous system. McMorris (2004) considered the creation of a model in the central nervous system as evidence for the efficacy of imagery. According to him, learning at the time of imagining an action is similar to the time that action is being performed in actuality. Therefore, when an individual images a motor activity, s/he benefits from extra practice. On the other hand, a transition from the cognitive stage of motor factors become more important, since PETTLEP-based mental imagery involves both cognitive and motor elements and seems to be applicable in both the early and the later stages of practice (42).

The results of this study strongly support the PETTLEP-based mental imagery model. This model is not limited to a specific age group, level of experience, or sports assignments. It seems that a reason as to why PETTLEP-based mental imagery is superior to practice alone is the storage of information in memory because this method incorporates more physical and psychological factors as well as the whole senses. According to Holmes and Collins (2001), the more senses are involved in the PETTLEP-based mental imagery, the more effective this method will be (43).

Given that the PETTLEP-based mental imagery was used only for one psychomotor skill in a nursing and midwifery group of students in the current study, it is recommended that research be conducted with a focus on the type of skill (i.e., simple and complex) for several psychomotor skills in students of other medical sciences (e.g., medicine, anesthesia, and operating room, among others).

## V. Conclusion:

Mental imagery based on the PATTLEP model is contributory to the development of the nasogastric tube insertion skill of students. Therefore, the application of this method is suggested for teaching the skills within the *Fundamentals of nursing* course of nursing and midwifery students.

## References

1. Shadadi H, Sheyback M, Balouchi A, Shoorvazi M. The barriers of clinical education in nursing: A systematic review. Biomedical Research. 2018;29(19):3616-23.
2. Fariba H, Fariba A, Sulmaz Z, Hagar UM. Correlation between Self-Efficacy and Clinical Performance of the Internship Nursing Students Research in Medical Education. 2013;1(5. (prrsian)).
3. Delaram M, Shams S. Perspective of Attending, Resident and Intern Students on Performance of Clinical Instructors at Faculty of Nursing and Midwifery. Educational Development of Judishapur. 2019;9(1):11-9. (persian).
4. Ezzati R, Tafazoli M, Mazlom sr, Asgharipour N. Evaluattion of the extent of achieve clinical competencies in midwifery student and relattion with some of the demographic factors The J Urmia Nurs Midwifery Fac. 2018;16(9):678-85. (persian).
5. Hickey MT. Baccalaureate nursing graduates' perceptions of their clinical instructional experiences and preparation for practice. Journal of professional nursing. 2010;26(1):35-41.
6. Azemian A. The standards of professionalism in nursing: the nursing instructors’ experiences. Evidence Based Care. 2014;4(1):27-40. (persian).
7. Sheikhaboumasoudi R, Bagheri M, Hosseini SA, Ashouri E, Elahi N. Improving nursing students' learning outcomes in fundamentals of nursing course through combination of traditional and e-learning methods. Iranian journal of nursing and midwifery research. 2018;23(3):217.
8. Hancock KE, Naber JL, Cross S, Mailow TL. An analysis of peer teaching between adult health and nursing assessment students. 2016.
9. Lee H, Min H, Oh S-m, Shim K. Mobile Technology in Undergraduate Nursing Education: A Systematic Review. Healthcare informatics research. 2018;24(2):97-108.
10. Anuar N, Williams SE, Cumming J. Comparing PETTLEP imagery against observation imagery on vividness and ease of movement imagery. International Journal of Sport and Exercise Psychology. 2018;16(2):150-63.
11. Cumming J, Williams SE. The role of imagery in performance. Handbook of sport and performance psychology. 2012:213-32.

12. Wright C, Hogard E, Ellis R, Smith D, Kelly C. Effect of PETTLEP imagery training on performance of nursing skills: Pilot study. Journal of advanced nursing. 2008;63(3):259-65.

13. Hui Y. The Role of Mental Imagery Ability in Learning Clinical Skills: Development of the Clinical Skills Imagery Ability Questionnaire (CS-IAQ) 2015.

14. Boehm LB, Alice MT. Application of guided imagery to facilitate the transition of new graduate registered nurses. The Journal of Continuing Education in Nursing. 2013;44(3):113-6.

15. Wright DJ, Wakefield CJ, Smith D. Using PETTLEP imagery to improve music performance: A review. Musicae Scientiae. 2014;18(4):448-63.

16. Revermann J. The effects of guided imagery as mental practice during the learning of a novel psychomotor skill. 2019.

17. Afroozeh MS, Afroozeh M. A Comparison of the Traditional Mutual Imagery and the Traditional Imagination Approach to Learning Badminton Short Service Skills (Beck India). Journal of Developmental and Motor Learning. 2010;2(3):(persian).

18. Razieh K, Hasan K, Reza Y. The Effect of PETTLEP Imagery and Balance Practice on Dynamic Balance of the Elderly. Journal of Developmental and Motor Learning. 2016;8(1):79-98.(persian).

19. Post PG, Williams CD, Simpson D, Berning JM. The effects of a PETTLEP imagery intervention on the learning of a complex motor skill. Journal of Imagery Research in Sport and Physical Activity. 2015;10(1):19-30.

20. Parchebafieh S, Safavi M, Mashouf S, Salehi S, Zanjani SE, Bakhshandeh H. Effect of using Peer Assisted Learning Approach on clinical Self-efficacy of Nursing Students at Islamic Azad University of Tehran Medical Sciences Branch. Journal of Nursing Education. 2018;6(6):8-15.(persian).

21. Melincavage SM. Student nurses' experiences of anxiety in the clinical setting. Nurse education today. 2011;31(8):785-9.

22. Kang Y-N, Chang C-H, Kao C-C, Chen C-Y, Wu C-C. Development of a short and universal learning self-efficacy scale for clinical skills. PloS one. 2019;14(1):e0209155.

23. Forlenza ST. Imagery Speed, Task Difficulty, and Self-Efficacy: How Fast (or Slow) to Go? : Miami University; 2010.

24. Short SE, Bruggeman JM, Engel SG, Marback TL, Wang LJ, Willadsen A, et al. The effect of imagery function and imagery direction on self-efficacy and performance on a golf-putting task. The sport psychologist. 2002;16(1):48-67.

25. Beauchamp MR, Bray SR, Albinson JG. Pre-competition imagery, self-efficacy and performance in collegiate golfers. Journal of Sports Sciences. 2002;20(9):697-705.

26. Buck DJ, Hutchinson JC, Winter CR, Thompson BA. The effects of mental imagery with video-modeling on self-efficacy and maximal front squat ability. Sports. 2016;4(2):23.

27. Munroe-Chandler K, Hall C, Fishburne G. Playing with confidence: The relationship between imagery use and self-confidence and self-efficacy in youth soccer players. Journal of sports sciences. 2008;26(14):1539-46.

28. Mohammadpoorfard Z. The Relationship Between Learning Motivation And Self Efficacy in Clinical Competence Among Nursing Students of Tabriz University of Medical Science [A Dissertation Submitted For Master Of Science Nursing.]: Tabriz University of Medical Sciences 2014. (persian).

29. Mohammadi MJ. Evaluation of the relationship between Academic self-efficacy and learning anxiety in medical student studying at azad university of Qom in year 2017: Islamic Azad University Qom Medical Branch; 2017.(persian).

30. Deljoo H. The relationship between self-efficacy and quality of learning experiences with students' academic stress: Allameh Tabatabaei University; 2011.

31. Artino AR, La Rochelle JS, Durning SJ. Second-year medical students' motivational beliefs, emotions, and achievement. Medical education. 2010;44(12):1203-12.

32. Adib-Hajbaghery M, Yazdani M. Effects of OSCE on learning, satisfaction and test anxiety of nursing students: a review study. Education in medical sciences. 2018;18:70-83.(persian).

33. Bagheri M, Forotgheh MS, Fallah MS. The comparison of stressors in the assessment of basic clinical skills with traditional method and OSCE in nursing students. Life Science Journal. 2012;9(4):1748-854.(persian).

34. Sheikh aR, Moghimian M, Hashemi M, Kashani F, Karimi T, Atashi V, et al. Comparison the Effect of Objective Structured Clinical Evaluation (OSCE) with Direct and Indirect Supervision on Nursing Student's Test Anxiety. Journal of nursing education (JNE). 2015;4:1-18.(persian).

35. Sanders CW, Sadoski M, Bramson R, Wiprud R, Van Walsum K. Comparing the effects of physical practice and mental imagery rehearsal on learning basic surgical skills by medical students. American journal of obstetrics and gynecology. 2004;191(5):1811-4.

36. Bucher L. The effects of imagery abilities and mental rehearsal on learning a nursing skill. Journal of Nursing Education. 1993;32(7):318-24.

37. Sanders CW, Sadoski M, van Walsum K, Bramson R, Wiprud R, Fossum TW. Learning basic surgical skills with mental imagery: using the simulation centre in the mind. Medical education. 2008;42(6):607-12.

38. Afrouzeh M, Sohrabi M, Torbati HRT, Gorgin F, Mallett C. Effect of PETTLEP imagery training on learning of new skills in novice volleyball players. Life Science Journal. 2013;10(1s):231-8.(persian).

39. Bramson R, Sanders CW, Sadoski M, West C, Wiprud R, English M, et al. Comparing the effects of mental imagery rehearsal and physical practice on learning lumbar puncture by medical students. Annals of Behavioral Science and Medical Education. 2011;17(2):3-6.

40. Wright C, Smith D, editors. The effect of PETTLEP-based imagery on strength performance. 12th Annual Congress of the ECSS; 2007.

41. Wright CJ, Smith DK. The effect of a short-term PETTLEP imagery intervention on a cognitive task. Journal of imagery research in sport and physical activity. 2007;2(1).

42. Asareh E. The effect of traditional imaging and PETTLEP imaging on throwing a free basketball shot at both beginner and advanced levels: School of Physical Education and Sports Sciences; 2013.(persian).

43. Ghorbani AH, Varzaneh AG, Oghaz JPK. Comparison of the effect of Patelp mental imaging and physical exercise on acquisition and memorization of dart throwing skill. Motor Behavior (Sports Science Research). 1392;5(13):125-38.(persian).