

# Impact of shift in focus of attention on learning table tennis backhand with self-talk in high school females students

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## Annotation:

**Aim:** The purpose of the present study was to investigate the effect of variability of attentional focus distance by self-talk on the learning of table tennis backhand. **Methods:** Therefore, 80 high school girls by mean age  $16(\pm 0/62)$  yr. were randomly selected from sport school of Sanandaj and assigned to 5 groups. After pretest, the participants performed 180 forehand strokes during 6 sessions with repeating the words "slightly rotation" in the internal focus group "slightly open" in the near external focus group, "over the net" in the far external focus group, and each of the words "slightly rotation, slightly open, and over the net" respectively in each 2 sessions in the increasing distance of attentional focus group. Control group performed without self-talk during acquisition phase. Retention test was performed 48 hours after acquisition test in the same situation without self-talk, and after half an hour break, transfer test was done by changing the direction of target (parallel forehand) without self-talk. The accuracy and the pattern of forehand strokes were measured by a 5 point-scale (Liao and Masters, 2001) and researcher-made scale, respectively. At the end of acquisition phase, participants filled out the frequency and self-talk beliefs questionnaire. **Results:** According to the results of 2-factor mixed ANOVA, acquisition, retention, and transfer of backhand accuracy in internal focus of attention group were significantly lower than other groups ( $p < 0.05$ ). Furthermore, the effect of increasing attentional focus distance on acquisition of backhand pattern was significant. The effect of near external attentional focus on retention of pattern was significant. But transfer of stroke pattern in control group was significantly more than far external focus group ( $p < 0.05$ ). **Conclusions:** Thus, it is recommended to use self-talk by increasing attentional focus and near external attentional focus and not to use internal focus of attention to instruct backhand to novice adolescents.

## Keywords:

increasing, distance, external, attentional, focus, self-talk, table tennis, movement, pattern, adolescent.

**Гхазалі Мохамад, Масооме Шояєє, Афхам Данешфар, Захра Нілі Ахмадабад.** Вплив переміщення центру уваги на навчання з настільного тенісу ударом зліва з само промовлянням учнів двічі середньої школи. **Мета:** Метою цього дослідження було вивчення впливу здатності до зміни фокусної дистанції на само промовлянням при навчанні настільному тенісу ударом зліва. **Методи:** Таким чином, 80 школярок (вік  $16 \pm 0/62$  років) спортивної школи Санандай випадковим чином були вибрані і розподілені на 5 груп. Після попереднього тестування учасники виконували 180 ударів справа протягом 6 серій з повторенням слів: «незначне обертання» у всередину, «незначно відкрити», «через сітку». У подальшому кожні слова - незначне обертання, незначно відкрити, через сітку, повторювалися, відповідно, в кожному з 2-х сеансів в міру віддалення фокусу уваги. Контрольна група виконувала вправи без промовляння у фазі володіння. Продовжували використання тесту через 48 годин після оволодіння в такій же ситуації без промовляння і після півгодинної перерви. Тест переміщення був проведений шляхом зміни напрямку мети (паралельно удару праворуч) без промовляння. Точність і структура удару справа вимірювали за 5-бальною шкалою (Liao and Masters, 2001). Наприкінці тестування учасники заповнили запитальник проговорюється-переконавання. **Результати:** За результатами 2-факторного аналізу ANOVA (оволодіння, збереження і удар ліворуч) точності у внутрішньому центрі уваги групи були значно нижче, ніж в інших групах ( $p < 0,05$ ). Крім того, ефект від збільшення уваги до фокусної відстані на оволодіння і удар зліва було значним. Ефект найближчої зовнішньої фокусної уваги на збереження структури був значним. Але перенесення структури ударів в контрольній групі було більш значимим для далекої зовнішньої фокусної групи ( $p < 0,05$ ). **Висновки:** Таким чином, рекомендується використовувати само промовляння, збільшуючи фокус уваги і не використовувати внутрішню фокусну увагу, а також давати вказівки на удар зліва для початківців спортсменів.

збільшення, відстань, зовнішній, увагу, фокус, само промовляння, настільний теніс, рух, структура, підлітки.

**Гхазал Мохамادی, Масооме Шояєє, Афхам Данешфар, Захра Нілі Ахмадабади.** Влияние перемещения центра внимания на обучение по настольному теннису ударом слева с самопроговариванием учащихся девушек средней школы. **Цель:** Целью настоящего исследования было изучение влияния способности к изменению фокусной дистанции на самопроговаривание при обучении настольному теннису ударом слева. **Методы:** Таким образом, 80 школьниц (возраст  $16 \pm 0/62$  лет) спортивной школы Санандай случайным образом были выбраны и распределены на 5 групп. После предварительного тестирования участницы выполняли 180 ударов справа в течение 6 серий с повторением слов: «незначительное вращение» во внутрь, «незначительно приоткрыть», «через сетку». В дальнейшем каждые слова - незначительное вращение, незначительно приоткрыть, через сетку, повторялись, соответственно, в каждом из 2-х сеансов по мере удаления фокуса внимания. Контрольная группа выполняла упражнения без проговаривания в фазе владения. Продолжали использование теста через 48 часов после овладения в такой же ситуации без проговаривания и после получасового перерыва. Тест перемещения был проведен путем изменения направления цели (параллельно удару справа) без проговаривания. Точность и структура удара справа измеряли по 5-балльной шкале (Liao and Masters, 2001). В конце тестирования участницы заполнили вопросник проговаривания-убеждения. **Результаты:** По результатам 2-факторного анализа ANOVA (овладение, сохранение и удар слева) точности во внутреннем центре внимания группы были значительно ниже, чем в других группах ( $p < 0,05$ ). Кроме того, эффект от увеличения внимания к фокусному расстоянию на овладение и удар слева было значительным. Эффект ближайшего внешнего фокусного внимания на сохранение структуры было значительным. Но перенос структуры ударов в контрольной группе был более значительным для дальнейшей внешней фокусной группы ( $p < 0,05$ ). **Выводы:** Таким образом, рекомендуется использовать самопроговаривание, увеличивая фокус внимания и и не использовать внутреннее фокусное внимание, а также давать указания на удар слева для начинающих спортсменок.

увеличение, расстояние, внешний, внимание, фокус, самопроговаривание, настольный теннис, движение, структура, подростки.

## Introduction

One of essential features characterizing attention towards learning and performing motor skills is focus of attention. It indicates how and to where athletes focus their attention at the time of making movements. As regards direction, focus of attention can be internal (movements and actions of the body) or external (effect of movements

on environment and sports equipment) (Schmidt & Timothy, 2011; Magill, 2011). Athletes can take verbal cues for focusing attention to essential details of skills. Sports psychologists call this approach *self-talk* (Chroni et al., 2007). Self-talk results from one word (verbally) and/or from thought, smile or frown (non-verbally) and serves two chief functions. Instructional self-talk improves motor performance through concentration on movements, effective techniques, and effective strategies.

And, motivational self-talk improves motor performance due to more power and attempts and it controls for anxiety (Hatzigeorgadis et al, 2011). According to Nideffer's model of attention (1976), athletes can draw their attention from one purpose to another purpose. He appreciates the impact of self-talk on improvement in motor performance and believes that self-talk provides athletes with focus of attention.

A great number of studies have demonstrated superiority of external focus of attention in terms of performance and learning of motor skills. For instance, all male experienced athletes in discus-throwing competitions demonstrated greater superiority as regards external focus of attention as compared with internal focus of attention (Wulf & Su, 2007; Wulf, 2012; Wulf & Dufek, 2009). Also, increase in distance of external focus of attention yield improvement in motor performance and learning (Wulf, 2007; Danghiyan & Shojaee, 2007). A comparison of findings indicates that external focus of attention offers greater benefits when an increase in distance occurs (Wulf, 2012). As findings on types of focus of attention, levels of skills, and distance of external focus of attention show, it seems focus of attention exerts positive impacts on motor performance and skill learning. Instructional self-talk produces more effects upon production of deft movements (Tod et al., 2009). Hardy et al. (2009) point out self-talk exerts more impacts on performance of students and novice persons relative to athletes. In most previous studies, educational instructions and feedback have been given for shift in focus of attention, yet in one study (Parvizi, 2010), self-talk is taken into consideration for shift in focus of attention. As that study indicates, shift in focus of attention by using instructional self-talk does not produce positive effect in cases of free throws in basketball. This condition results from closed nature of this movement (Parvizi, 2010).

We can report much more findings about shift in focus of attention with self-talk, by carrying out further studies on more targeted physical activities and exercises. As a result, we examine backhand in table tennis as an open skill. As mentioned above, enormous studies have made comparison between internal and external foci of attention and have concerned different distances as regards external focus of attention. But, nothing has been considered, as far as increase in distance of focus of attention and shift of focus (from internal focus of attention to distant external focus of attention) are concerned. The present study attempts to evaluate impact of shift in focus of attention on learning and performance of backhand through self-talk.

## Materials and methods

### Methodology

This study was a semi-empirical and survey-based research. We conducted pretest and posttest for our population with a mixed two-factor design (factors of random groups and sessions). The factor of groups (or groups of focus of attention with instructional self-talk) contained five levels: internal focus of attention, near external focus of attention, distant external focus of

attention, increase in distance of focus of attention, and control. The factor of sessions contained 8 sessions: one pretest session, 6 exercise sessions, and one session for retention and transfer of movement pattern).

### Population

The population of this study consisted of girls in Sports High school of Sanandaj (a city of Iran). They were in age range of 16-18 years old and right-handed with physical and mental health. Prior to this study, they had not taken part in competitions of table tennis or other racquet sports. Even, they had not received official education and had not done related exercises. As regards table tennis in Sanandaj, the mean height of players, and distance between their two open hands were  $1.61 \pm 6.24$  cm, and  $1.62 \pm 6.29$  cm respectively. Also, girls of our study had the mean age of table tennis in Sanandaj (12.2 years old) (Karimi & Fayaz Moghadam, 2009). Of this population, we selected 80 girls by using convenience sampling. Then, we divided them into 5 groups (16 girls in each group) by using random assignment: 4 treatment groups and 1 control group. The mean and standard deviation of age range were  $16.62 \pm 0.62$ .

### Task & Tool

We asked the participants to do exercise of backhand on a standard table with length of 274 cm, width of 152.2 cm, height of 76 cm, and net height of 15.25 cm. We tested accuracy of forehand by doing accuracy test of backhand and leveled its scores on a 5-value scale.

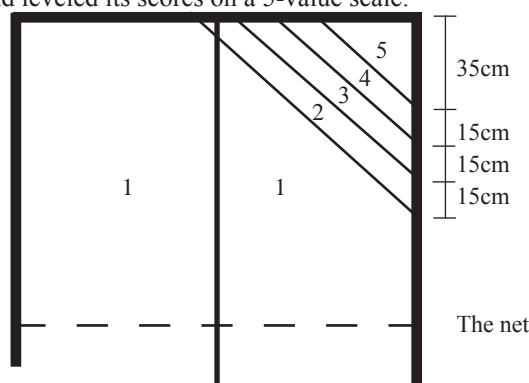


Fig1. Liao's & Master's Accuracy Test of Backhand in Table Tennis (2001)

We utilized researcher-made five-value scale for evaluation of backhand in Table Tennis. We computed temporal stability and content validity of the scale, using intra-class correlation coefficient and content validity ratio and index respectively. A validity of 80 % and a reliability of 86 % have been measured for Ante's handedness inventory (1970) (Rezaee, 2011).

Analysis of Belief in Self-talk and Frequency Questionnaires Weinberg and Gould (2003) and Zinsser et al. (2001), and assessment of its face and content validity as well as reliability have been done by a number of experts (Hatzigeorgiadis et al., 2008). Also, we used NEWGY ROBO-PONG 540 for throwing balls.

### Procedure

The sports teacher produced movement of backhand and provided its details (including posture stance behind

tennis table, way of racquet taking, and good performance of backhand) one by one by organizing a sectional training program (including position of hands, posture of body and continuance of movement) and at the same time by giving verbal cues.

Before pretest, we distributed handedness inventory among participants and divided them randomly into 5 groups (4 treatment groups and one control group). In general, 8 sessions took place: 1 pretest session, 6 exercise sessions and 1 session for retention and transfer of movement pattern. At the beginning of each exercise session, on the basis of the selected type of self-talk for each treatment group, we reminded them about cued words and we asked them to repeat the related words prior to any movement of backhand. The cued words for internal focus of attention, near external focus of attention and distant external focus of attention were respectively as follows: “slight swing”, “slightly open”, and “over the net”. As regards increase in distance of focus of attention, we used “slight swing, slightly open, and above the net” in every two sessions respectively.

Within this period, the control group did exercise without any self-talk and they did not receive any instruction in this regard. In the first session when we offered explanations about self-talk in 5 minutes, we just explained size of tennis table and net. But, we did not give detailed information regarding purpose of study and groups of participants.

The exercise sessions were held twice per week and three sets of tasks (10 tasks in each set) were performed in each session. Balls were thrown from NEWGY ROBO-PONG 540 towards girls’ backhand with constant speed (3 m/s) and without any curve. Then, they made movement of backhand. After 5-minute warm-up, the sports teacher asked them to take 10 tasks as pretest in order to control for the reduced effect of warm-up, after performing 4 backhands. Two cameras filmed their performance of backhand the areas in which balls were landed. We tested the mean accuracy of 10 shots by performing accuracy test (Liao & Master, 2001) and examined patterns of movement by using a researcher-designed scale. We

recorded scores of crossed backhands in exercise sessions and analyzed them for evaluation of improvement in girls’ performance. At the end of last exercise session, we asked treatment groups to complete a seven-question self-talk questionnaire examining their understanding of self-talk effectiveness (Hatzigeorgiadis et al., 2008). After two days, we performed retention test about one 10-task set in similar conditions and after a half-hour break, we performed transfer test in case of target direction shift (parallel backhand). In both tests, we did not utilize any self-talk.

#### Statistical Analysis

We utilized descriptive statistics for calculation of mean, and standard deviation and for representation of diagrams. Moreover, we used inferential statistics for examining null hypotheses. In order to ensure the occurrence of retention and transfer, we separately compared pretest scores of any group with the last exercise session scores, retention scores, and transfer scores by using repeated analysis of variance. In case of significant relationship, we performed Bonferroni’s post hoc test. Data analysis was done by using SPSS Software. The level of significance in all tests was  $p < 0/05$ .

#### Results

Mean and standard deviation of age, height, and distance between two open hands in all groups are shown in Table 1.

As Table 2 and Fig 1 show, the accuracy of backhand performance was improved in treatment groups within 6 exercise sessions. Conversely, the control group had lower accurate backhand performance within six exercise sessions. Treatment groups’ means and standard deviations of backhand movement pattern in exercise session, and retention-transfer session are shown in Table 3.

Results of Kolmogorov-Smirnov test showed a normal distribution of Performance accuracy and Backhand movement pattern over different levels of our independent variable and assumption of normality for using parametric statistics was accepted.

For comparing accuracy of performance and movement patterns among participants in pretest session,

Table 1

*Distribution of Frequency & Characteristics of Participants*

distance between two open hands (M±SD)	Height (M±SD)	Age (M±SD)	Groups
1.60±6.52	1.60±7.53	16.62±0.50	Control
1.64±6.14	1.65±6.11	17±0.73	Self-talk for internal focus of attention
1.66±5.72	1.63±6.07	16.75±0.68	Self-talk for near external focus of attention
1.60±5.67	1.60±5.58	16.43±0.51	Self-talk for distant external focus of attention
1.59±4.13	1.61±6.24	16.31±0.47	Self-talk for increase in distance of focus of attention

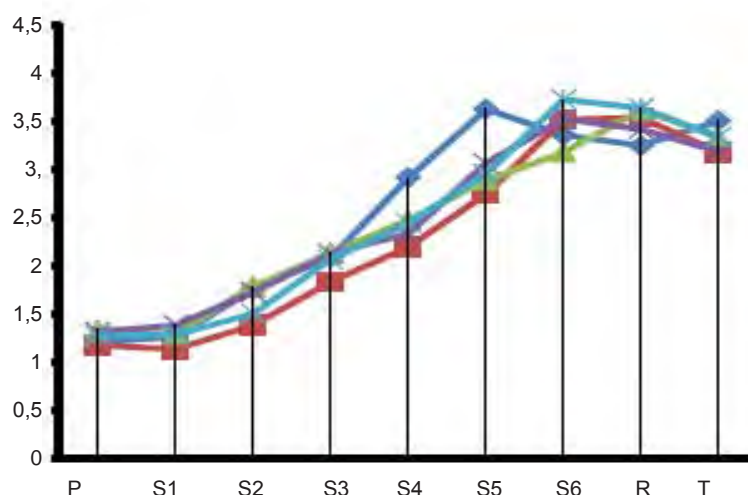


Fig 1. Students' Mean Backhand Accuracy in Pretest Session (P), Exercise Sessions (S1-S6) & Retention-Transfer Session (R & T)

Control Group; Group of Internal Focus of Attention; Group of Near External Focus of Attention; Group of Distant Focus of Attention; Group of Increase in Focus of Attention

Table 2

Backhand Accuracy Scores in Six Exercise Sessions ( $M \pm SD$ )

Sessions		Group				
		Control	Internal focus of attention	Near external focus of attention	Distant external focus of attention	Increase in distance of focus of attention
Pretest		0.75±0.17	0.75±0.19	0.68±0.30	0.69±0.26	0.71±0.18
Exercise Sessions	Session 1	1.3±0.34	1.18±0.26	1.18±0.29	1.03±0.37	1.31±0.33
	Session 2	1.10±0.33	1.87±0.33	2.25±0.36	2.29±0.31	1.41±0.37
	Session 3	1.93±0.35	2.34±0.41	2.59±0.24	2.76±0.23	2.81±0.20
	Session 4	1.42±0.34	2.57±0.44	2.74±0.22	2.83±0.21	2.71±0.24
	Session 5	1.95±0.40	2.69±0.32	3.04±0.29	3.23±0.35	3.14±0.29
	Session 1	2.88±0.32	3.50±0.35	3.59±0.34	4.11±0.28	4.12±0.37
Retention & Transfer		3.21±0.50	3.79±0.27	4.45±0.34	4.29±0.20	4.26±0.32
		2.71±0.32	3.28±0.42	3.75±0.35	3.89±0.34	3.91±0.36

Table 3

Backhand Movement Pattern of Treatment Groups in Six Exercise Sessions ( $M \pm SD$ )

Sessions		Group				
		Control	Internal focus of attention	Near external focus of attention	Distant external focus of attention	Increase in distance of focus of attention
Pretest		1.21±0.12	1.18±0.99	1.34±0.14	1.32±0.88	1.28±0.16
Exercise Sessions	Session 1	1.27±0.11	1.14±0.09	1.30±0.12	1.39±0.09	1.28±0.11
	Session 2	1.76±0.09	1.39±0.13	1.79±0.31	1.73±0.15	1.51±0.15
	Session 3	2.09±0.14	1.84±0.24	2.14±0.17	2.13±0.11	2.07±0.22
	Session 4	2.92±0.81	2.20±0.05	2.84±0.16	2.34±0.27	2.54±0.15
	Session 5	3.63±0.36	2.75±0.26	2.89±0.14	3.07±0.38	2.96±0.37
	Session 1	3.36±0.31	3.52±0.36	3.18±0.44	3.53±0.31	3.73±0.15
Retention & Transfer		3.25±0.15	3.54±0.50	3.62±0.21	3.42±0.35	3.64±0.12
		3.51±0.30	3.18±0.41	3.34±0.29	3.19±0.35	3.34±0.27

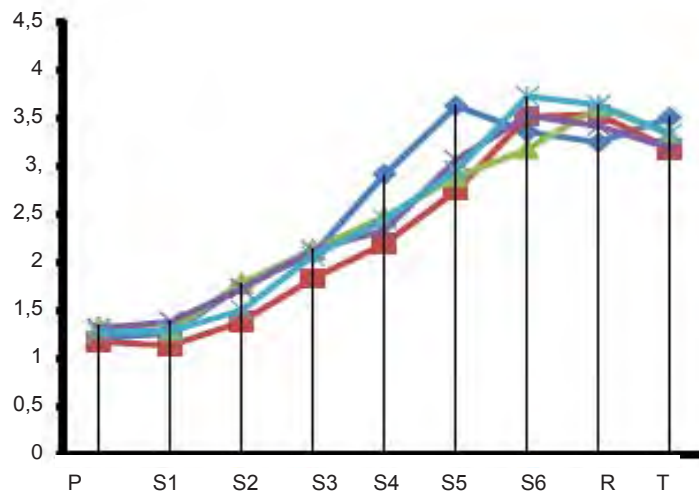


Fig 2. Mean Performance of Treatment Groups in Pretest Session (P), Exercise Sessions (S1-S6) & Retention-Transfer Session (R & T)

Control Group; Group of Internal Focus of Attention; Group of Near External Focus of Attention; Group of Distant Focus of Attention; Group of Increase in Focus of Attention

we performed one-way ANOVA analysis. The findings reflected no significant difference between variances ( $P=0.308$ ) and accuracy of performance ( $P=0.85$ ) and movement patterns ( $P=0.001$ ). Results of variance analysis highlighted no significant difference with results of frequent in-group comparisons of performance accuracy and movement patterns. The frequent examination on groups of participants and exercise sessions indicated main impact of groups of participants ( $P<0.001$ ), main impact of exercise sessions ( $P<0.001$ ), and group-session interaction ( $P<0.001$ ). Therefore, as far as differences in scores between retention tests, transfer test and pretest were concerned we did one-way ANOVA analysis instead of one-way covariance analysis. The variance of retention test and pretest was not considered significant. Conversely, as regards transfer test and pretest, we observed significant variance. As a result, we performed Dunnett's post hoc test and Bonferroni's post hoc test respectively for retention and transfer. Findings of Bonferroni's post hoc test making paired comparison of performance accuracy in different exercise sessions demonstrated that accuracy of treatment groups was improved from first session (1.149) to last session (3.717) ( $P<0.05$ ). Also, they showed that accuracy in control group was significantly lower (1.707;  $p<0.001$ ) than that of treatment groups and the accuracy of the treatment group in which we did self-talk for internal focus of attention was lower (2.362;  $p<0.001$ ) than the accuracy of the treatment groups in which we did self-talk for external focus of attention and increase in distance of focus of attention. But, there was no significant difference between the treatment groups in which we did self-talk for external focus of attention and increase in distance of focus of attention.

Moreover, in our one-way variance analysis, we could not find significant difference in performance accuracy among treatment groups in retention test ( $P<0.001$ ) and

transfer test ( $P<0.001$ ). Results of Bonferroni's post hoc test indicated that levels of retention and transfer of movement pattern in control group were significantly lower than those in treatment groups ( $P<0.001$ ). And, levels of retention and transfer of movement pattern in the treatment group in which we did self-talk for internal focus of attention were significantly lower than those in the treatment groups in which we did self-talk for external focus of attention and increase in distance of focus of attention ( $P<0.05$ ). But, we could not find any significant difference between the treatment groups in which we did self-talk for external focus of attention and increase in distance of focus of attention.

#### Discussion & Conclusion

The present study aimed at increasing distance of attentional focus through instructional self-talk in cases of backhand learning and performance in high school girls. Instructional self-talk exerts more impact on learning and performing complex, elegant, and open skills (Hatzigeorgadis et al., 2011). Findings of this paper revealed that instructional self-talk causes shift in focus of attention in novice students learning table tennis. In addition, there was significant difference in performance accuracy and movement pattern between treatment groups and control group. These findings were not consistent with study of Parvizi (2010) who examined impact of instructional self-talk on learning and doing free throw as a closed skill in basketball.

As our findings suggested, treatment groups showed a higher degree of learning, performance, retention, and transfer relative to the control group. Also, three treatment groups put in greater performance in all sessions as compared with the group of internal focus of attention. They were as follows: group of near external focus of attention, group of distant external focus of attention, and group of increase in distance of attentional focus.

This result was consistent with some previous findings. For instance, in studies of Wulf, et al. (1998), Totska and Wulf (2003), and Wulf et al. (1999) on ski simulator and golf learning, external focus of attention had superiority as regards retention. Similarly, In respect of transfer test, Totska and Wulf (2003) found that group of external focus of attention put in greater performance than group of internal focus of attention in pedalo movements.

In compliance with Action Effect Hypothesis, Hommel and Elsner (2000) examining relationship between effect and action in cases of learning showed that environmental impact being created immediately after a particular action had capacity of choosing and activating that action. As Conscious Processing Hypothesis suggests, instruction of internal focus of attention in targeting tasks focuses attention not only towards internal information but also towards external basic information. Consequently, instruction on attentional focus imposes greater burden upon attentional resources or working memory, resulting in their poor performance (Wulf & Dufek, 2009).

Also, findings of this study supported findings of Tahmasbi (2004) who examined the impact of internal and external foci of attention on learning and performing soccer skills in novice students and findings of Wulf and Su (2007) who evaluated the impact of external focus of attention on golf shot accuracy in novice players. A large number of studies have investigated attention towards effect of movements vs. attention towards actual movements. Their findings revealed that external focus of attention had advantage in different sports such as Tennis (Wulf et al., 2000), baseball (Castaneda & Gray, 2007), dart (Marjanete, 2007), jumping (Porter et al., 2007), discus throwing in male participants (Zarghami et al., 2012), and agile movements (Porter, 2010). Due to movement patterns, group of near external focus of attention achieved superiority in retention.

Also, increase in distance of attentional focus gradually gave appropriate cues as the result of gradual shift in focus of attention and caused the related treatment group to move away internal conscious control and to move towards automatic external condition. Shift in focus of attention at different times of exercise could achieve greater conformity with requirements and assigned tasks of this group Thus, scholars are required to conduct further studies about conditions in which focus of attention is provided since we could not find significant difference in frequency and belief on self-talk i.e. difference among our groups did not arise from these two factors.

As Constrained Action Hypothesis suggests, internal focus of attention is viewed as a type of conscious control. Conscious effort and internal focus of attention cause small blocks in motor system and therefore automatic control system is weakened and the quality of performance is impaired. Conversely, external focus of attention establishes more automatic control, going through flexible, rapid, and unconscious process. The correlational studies and different examinations on teaching external focus of attention have indicated decreased distribution of attentional capacity (Wulf et al., 2001), compromised

motor system with higher frequency (McNevin et al., 2003), and more rapid reaction.

Our study showed no significant difference in backhand movement accuracy in group of near external focus of attention, group of distant external focus of attention, and group of increase in distance of attentional focus in cases of acquisition, retention, and transfer. Therefore, it challenged findings of Totska and Wulf (2003), Park (2000), Danghiyan and Shojaee (2007), Banker (2012), Bell and Hardy (2009), MacCay and Wulf (2012), and McNevin et al. (2003) who highlighted this significant difference in groups with greater distance of external focus of attention. This contradiction in findings might result from the fact that students in group of near external focus of attention required to devote greater attention to near focus of attention for performance of backhand so far as it diverted their attention away from accurate performance in distant external focus of attention. But, students in group of distant external focus of attention should devote greater attention to distant focus of attention, and therefore it diverted their attention away from accurate performance in near external focus of attention. The small distance between near external focus of attention and distant focus of attention and small distance between ball and target points might be considered the other causes of contradiction in findings.

Furthermore, insignificant difference in treatment groups' scores as to frequency and belief in self-talk was an indication of the fact that differences among groups did not arise from these two factors. From the other hand, presence of cameras for recording scores of accuracy in performance and movement patterns diverted attention of students away from cues. As a consequence, there was no significant difference in their performance accuracy and movement patterns and they failed to communicate with cues related to distant external focus of attention.

To sum up, effectiveness of focus of attention with self-talk depended on types and levels of skills. As our findings suggested, increase in distance of attentional focus with instructional self-talk exerted impact on acquisition and retention of movement patterns in high school girls. Students in group of near external focus of attention, group of distant external focus of attention, and group of increase in distance of attentional focus put in greater performance in acquisition, retention, and transfer, as compared with group of internal focus of attention. These three groups did not reflect significant difference in acquisition, retention, and transfer. Their Greater performance, consistent with James' Ideo-Motion Theory, Prinz's Common Coding, Hommel's and Elsner's Action Effect Hypothesis, Constrained Action Hypothesis, and Conscious Processing Hypothesis, reflected the positive impact of external focus of attention on learning and performing movements.

Future studies can perform more detailed examination on focus of attention with self-talk and can control for it more strictly. Self-talk effectiveness is associated with types and complexity of tasks. Therefore, it seems sports teachers provide novice students with near external

focus of attention, distant external focus of attention, and increase in distance of attentional focus for teaching backhand movement in table tennis.

Other suggestions for further studies are as follows: (1) comparison between instructional self-talk and motivational self-talk in cases of focus of attention; (2) impact of instructional self-talk on different skills of sports

in cases of near and distant external focus of attention; and (3) effect of instructional self-talk on performance of males and females in cases of focus of attention.

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