

ORIGINAL ARTICLE



The Effect of Psychological Skill Training Program and Positive Feedback on Handball Player's Self-Efficacy Beliefs and their Shot Accuracy

¹Hakan Metan , ²Veysel Küçük 

¹Movement and Training Sciences Doctorate Program, Institute of Health Sciences, Marmara University, Istanbul, Turkey. ²Faculty of Sport Sciences, Marmara University, Istanbul, Turkey.

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ABSTRACT

Background. Recent research has revealed the importance of psychological skills training and various physiological exercises to improve sporting performance. In light of all these facts, knowing that psychological skills training is necessary to improve sporting performance, and knowing the importance of the psychological performance program to develop these skills and ensure the control and stability of emotions, particularly in adolescence, led to the emergence of this study. **Objectives.** This study aimed to understand the effect of 10-week psychological skills training and positive feedback on handball players' self-efficacy beliefs and shot accuracy. **Methods.** Thirty-eight female handball players aged between 15 and 19 were included in two study groups and one control group. Whereas the first study group received psychological skill training, the second group received planned positive feedback and psychological skills training. The data were collected through a personal information form, a self-efficacy scale (five-point Likert-type scale), and a shot accuracy measurement scale. Then the pretest-posttest controlled group patterned model was used to determine the differences between the groups. GraphPad Prism 8 was used for statistical analysis with the conventional method. **Results.** 10-week psychological skills training increased the self-efficacy performance of young handball players in both study groups compared to their pretest results ($P<0.01$), and the increase was significant in study group 2 compared to the control group ($P<0.01$). The results also showed that the psychological skills training increased the performance of the shot accuracy of the handball players in both study groups compared to their pretest results. Still, the increase was significant in the study group receiving positive feedback ($P<0.001$). Moreover, the increase in the shot accuracy test performance of the positive feedback-receiving group was higher than the control and non-receiving group ($P<0.01$ and $P<0.001$, respectively). **Conclusion.** In conclusion, this study determined that the psychological skills training program increased the handball players' self-efficacy and shot accuracy. Positive feedback strengthened the effect of the training even more on the self-efficacy beliefs and shot accuracy performance of the young athletes.

KEYWORDS: *Psychological Skills, Positive Feedback, Self-Efficacy, Shot Accuracy, Training.*

INTRODUCTION

Sports events and competition success play an important role locally and internationally in today's societies. Regardless of their capacities and motivation for sport, very high success has been expected from the athletes, which led to the

development of training science (1). The athletes' psychological disposition is a factor researchers increasingly consider key to sports performance (2). It has been shown that training only for physical performance is not enough for sporting

*. Corresponding Author:

Veysel Küçük, Associate Professor

E-mail: veysel.kucuk@marmara.edu.tr

success; improved psychological skills should accompany physical performance training to develop the necessary skills and to use them effectively (3). Psychological skills training is regarded as one of the best auxiliary elements that support the physical training process and increase performance by training athletes and trainers to learn psychological skills such as relaxation that help regulate their psychological states like self-confidence and reduce anxiety (4).

The concept of self-efficacy, frequently used in sport psychology, is defined by Bandura as the belief that a person can initiate action and continue it until getting results (5). Also, it is a person's belief in their ability to succeed in specific situations or accomplish a task. Sports performance is greatly affected by the ability of the "self-efficacy belief" of the athletes. Self-efficacy belief includes believing that one can achieve no matter what happens in the competitive environment and teaches athletes to focus on the present rather than dwelling on past mistakes or future consequences (6). From a different point of view, self-efficacy is defined as individuals with high self-efficacy levels having the power to exercise even when they are faced with obstacles such as fatigue, time pressure, or a bad mood according to the meta-theoretical model, within the framework of the concept of self-efficacy (7).

Psychological skill development and self-efficacy are regarded as very important for sporting success (8); however, Marques et al. described shooting performance as the most critical factor affecting player performance in handball (9). In this respect, the necessity of examining the effect of psychological skills training of handball players on shot accuracy emerged. Marsh et al. described shot accuracy as shooting free of error and defined it as a vital performance variable of sporting success (10). In addition, Zapartidis et al. mentioned the importance of shot accuracy in handball as the winning team is always the side with the most goals when the ball is thrown fast; it has to be accurate simultaneously for an effective shot (11).

Another factor that improves the sporting skills of the athletes is receiving accurate and effective positive feedback. Koka and Hein defined feedback as a vital source of motivation and noticed that it plays an essential role in their learning (12). Trainers should provide individual feedback to each athlete to form an effective

learning environment (13). Also, evaluating the situation of the athletes and giving feedback have been shown as fundamental motivation priorities, as positive feedback increases intrinsic motivation and negative feedback decreases it (14, 15). On the other hand, Bandura emphasizes a different aspect of this concept: feedback increases the individual's self-efficacy only when they are realistic and adjusted to the conditions. Positive and negative feedback that does not fully show the truth can damage the person's self-efficacy, and feedback that is not made on time might be ineffective (16).

Psychological skills will help young athletes become elite athletes by specializing in sports. To improve the athletic capacities of children and adolescent sportspeople, coaches should prioritize the studies to reduce their anxiety and support their self-efficacy (17). So, in this study, we performed psychological skills training based on self-efficacy belief to develop the psychological skills of adolescent athletes and improve their sporting performance by affecting their self-efficacy beliefs and shot accuracy capacities. In addition, the study was structured to assume that positive feedback combined with this program would further strengthen the handball players' psychophysiological performance. Therefore, in this study, we aimed to analyze the effect of psychological skills training and positive feedback in improving the psychophysiological skills of young handball players.

MATERIALS AND METHODS

Demographic Characteristics of Study Groups. Thirty-eight female handball players in two study groups and one control group were included. Each study group was a different handball team from Istanbul, and every player who met the study criteria (Aged 15 to 19 and at least two years of experience) was included in the study. The groups were identified by the convenience sampling method. The athletes' demographic information (age, gender) and sports experience (years of action sports with a license, sports branch) were obtained through a personal information form. All participants were informed about the process, and their approval for participation was taken officially. The study's ethics committee approval was given by the "Marmara University Institute of Health Sciences Ethics Committee." Informed consent was obtained from each patient included in the study.

The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki as reflected in a priori approval by the institution's human research committee. In addition, this research is an original study that has not been published elsewhere.

Study Design. In our study, we analyzed the effect of psychological skills training and positive feedback on the athletes' self-efficacy perceptions and shot accuracy. The aim was to investigate the cause-effect relationships between the applications and the measured results. An experimental design model with a pretest-posttest controlled group patterned model was used in the study. The experimental design was determined as a two-factor experimental design, one showing repeated measures (pretest-posttest) and the other showing subjects (study-control teams) in different categories. The study was performed with one control and two study groups determined by the convenience sampling method. Psychological skills training was performed in one study group after the pretests; the other group received positive feedback and psychological skills training after the pretest. The positive feedback was provided by the trainer of the teams in a planned manner. After the training and feedback, self-efficacy and shot accuracy post-tests were performed for the study groups. The control group received neither the psychological skills training nor positive feedback; only pretests and post-tests were performed with an interval of 10 weeks. During this period, the study and control groups performed interval training with similar intensity and duration in their physiological training.

The psychological skills training program consisted of practices related to group dynamics, imagination, emotion control, and subconscious control, and besides these, it includes mental toughness, hardiness, self-esteem, self-efficacy, dispositional optimism, and positive affectivity (18). The GROW method, developed by Whitmore in 2003 and thought to be a practical and memorable system, was used as a feedback model. The main elements of the model consist of Goal (G), Reality (R), Options (O), and Will (W); it includes positive feedback in all of those stages (19). Positive feedback following the GROW technique was given to the athletes by the trainers.

Self-Efficacy Scale. Muris developed the children's Self-Efficacy Scale in 2002 to measure the self-efficacy of people between the ages of 12-

19. The adaptation of the scale into Turkish was conducted by Telef, used in the study (20). Children's Self-Efficacy Scale is a five-point Likert scale (1 = none and 5 = very good). The scale consists of 21 academic, social, and emotional parts with seven items each. The highest score on the scale is 105, and the lowest is 21. There is no cut-off point in this scale. The high score indicates that the self-efficacy level is high, and the low score indicates that the self-efficacy level is low. The internal consistency coefficients of the self-efficacy scale for children were %86 for the overall scale, %84 for the academic, %64 for the social, and %78 for the emotional part of the self-efficacy test. The test-retest reliability coefficients of the scale were found to vary between %75 and %89 (20).

Shot Accuracy Test. Even though there is no standard shot accuracy test protocol for handball, we analyzed in detail the shot accuracy test protocols used in the literature and developed a shooting test based on Andrade et al. studies, which was suitable for our participant profile (21). Shootings were conducted under the "high base shooting" procedure (22). Briefly, ropes divided the 3x2m handball goal into nine zones equally in width and length. The upper left corner was marked as zone 1, the upper right corner as zone 2, the lower-left corner as zone 3, and the lower right corner as zone 4. The athletes were asked to shoot hard three times, each with open hands, from a distance of 9 meters at the four specified zones. The accurate shot numbers were written under the relevant area in the form. They were considered accurate shots when the balls hit zones 3 and 4 without touching the floor. Each accurate shot hitting zones 1 and 2 were evaluated as 2 points, and each accurate shot hitting zones 3 and 4 was evaluated as 3 points. Thus, an athlete could get 30 points out of 12 shots.

The athletes were randomly divided into two teams to form an environment similar to the situation. This experiment was performed in the atmosphere of a team competition. When each athlete formed their score with accurate shots, they also contributed to the team's total score; this cooperative teaching method was described as the best training method for handball training (23).

Statistical Analysis. GraphPad Prism 8 (GraphPad Software, La Jolla, CA, USA) was used for statistical analysis. To predict the effect of the psychological skills training and feedback on shot accuracy and self-efficacy beliefs of the athletes,

statistical differences between groups were calculated using the non-parametric Kruskal-Wallis test for multiple group comparisons, 2-tailed Mann-Whitney *U* test was performed to compare single comparisons of independent groups, and Wilcoxon test was performed to compare single comparisons of paired groups. Non-parametric Spearman's correlation test performed the correlation analysis of the study groups' pretest and post-test measurements. In addition, distributions of age and years of experience were analyzed by the Chi-square test. The results are shown as median \pm min-max; p-values <0.05 is considered significant and were shown as * $P<0.05$, ** $P<0.01$, *** $P<0.001$, and **** $P<0.0001$ in the figures.

RESULTS

Demographic Data of the Study Groups.

First of all, age and experience distributions were analyzed for Göktürk (control group), Maltepe (the first study group), and Silivri (the second study group) teams in the study. The age medians of Göktürk, Maltepe, and Silivri teams were 15, 18, and 16, respectively. In comparison, a significant difference was detected between Maltepe and Göktürk teams in terms of the age distribution ($P<0.05$), there was no significant difference between the other teams ($P>0.05$). Besides, Silivri showed significantly lower experience years than the other teams ($P<0.01$), and no difference was found between Maltepe and Göktürk teams ($P>0.05$) (Table 1).

Table 1. The Distributions of Age, Gender, and Year of Experience of the Handball Teams

	Control Group	Study Group 1	Study Group 2
Team name	Gokturk	Maltepe	Silivri
Player numbers	13	13	12
Age			
Median	15	18	16
Minimum	15	15	15
Maximum	19	19	17
Gender (W)			
N (%)	13 (100%)	13 (100%)	12 (100%)
Year of experience			
Median	5	6	3
Minimum	3	3	3
Maximum	7	7	4

Self-Efficacy Test Results of the Handball Teams. The self-efficacy of the handball teams was evaluated before the psychological skills training in the absence or presence of positive feedback and ten weeks after the training. The pretest and post-test medians of Göktürk, Maltepe, and Silivri teams were found as 66-70 / 61-66 / 59-68.5, respectively. According to these results, a significant increase between the pretest and post-test of self-efficacy scores was found in both study groups ($P<0.01$). In contrast, there was no significant change in the control group ($P>0.05$) (Figure 1A). These results suggested that the psychological skills training companies by positive feedback practice or alone strengthens the self-efficacy of the handball players.

When we analyzed the difference between the teams for their self-efficacy pretest scores, the medians of the Maltepe, Silivri, and Göktürk teams (medians 61, 59, and 66, respectively), the second study group had a lower self-efficacy score compared to the first study group at the beginning of the study ($P<0,05$). There was no significant difference between the other teams ($P>0.05$). So, we further evaluated the differences between the teams in terms of their evolutions by using the changes in the self-efficacy pretest and post-test scores. We found that the second study group, which received psychological skills training and positive feedback, showed significantly higher levels of increase compared to the control group ($P<0.01$) and higher levels of increase for some athletes compared to the first study group, which was not statistically different ($P>0.05$) (Figure 1B).

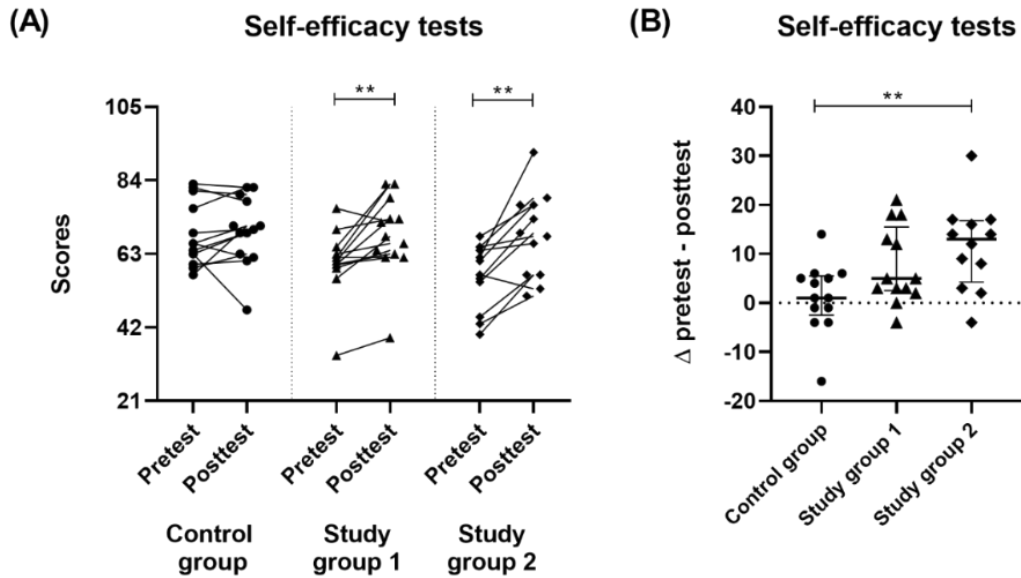


Figure 1. Self-efficacy pretests and post-tests results of the handball teams. (A) The self-efficacy pretests and post-tests of each handball team were performed by using Wilcoxon signed-rank test, and the paired values are shown in the graph. (B) The difference among the teams in terms of self-efficacy post-test, calculated by the deduction of the pretest, was performed using the Kruskal Wallis test, and the individual values are shown in the graph. Statistical significance is shown as * $P < 0.05$, ** $P < 0.01$, and *** $P < 0.001$.

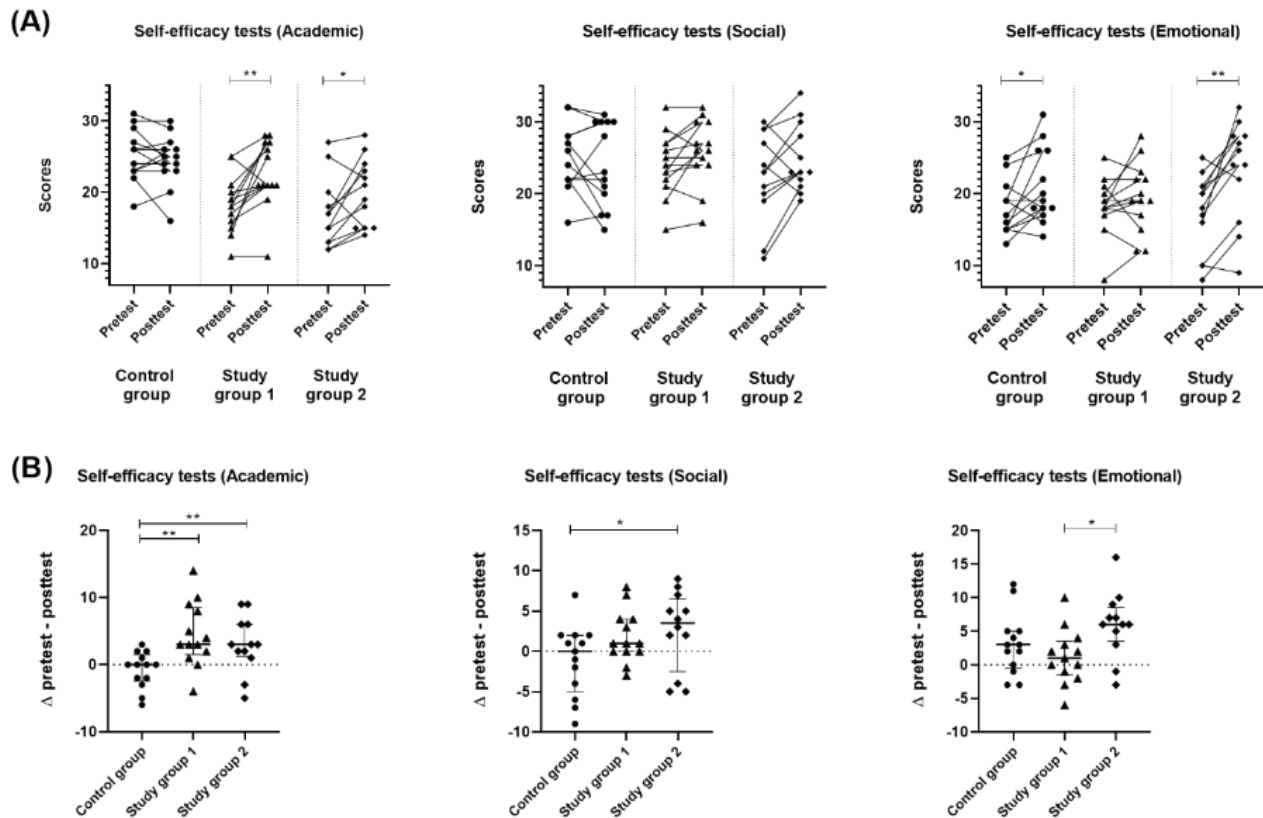


Figure 2. The test results of the academic, social, and emotional parts of the self-efficacy pretests and post-tests of the handball teams. (A) The academic, social, and emotional parts of self-efficacy pretests and post-tests of each handball team were performed by using Wilcoxon signed-rank test, and the paired values are shown in the graph. (B) The difference among the teams in terms of academic, social, and emotional parts of self-efficacy post-test, calculated by the deduction of the pretest, was performed using the Kruskal Wallis test, and the individual values are shown in the graph. Statistical significance is shown as * $P < 0.05$, ** $P < 0.01$, and *** $P < 0.001$.

Results of different parts of Self-Efficacy Tests of the Handball Teams. We also in-depth analyzed different parts of the self-efficacy test, academic, social and emotional parts. Whereas the study group 1 and 2 showed a significant increase after training in the academic part of the self-efficacy test ($P<0.01$ and $P<0.05$, respectively), study group 2 and the control group had a significant increase between the pretest and post-test in the emotional part of the self-efficacy test ($P<0.01$ and $P<0.05$, respectively). There was no

significant change in the social part of the test ($P>0.05$) (Figure 2A). We also analyzed the differences between the teams for their evolutions by using the changes in different parts of the self-efficacy pretest and post-test scores. We observed that the second study group, receiving psychological skills training and positive feedback, showed higher levels of increase than other groups in both academic, social, and emotional parts of the tests ($P<0.01$, $P<0.05$, and $P<0.05$, respectively) (Figure 2B).

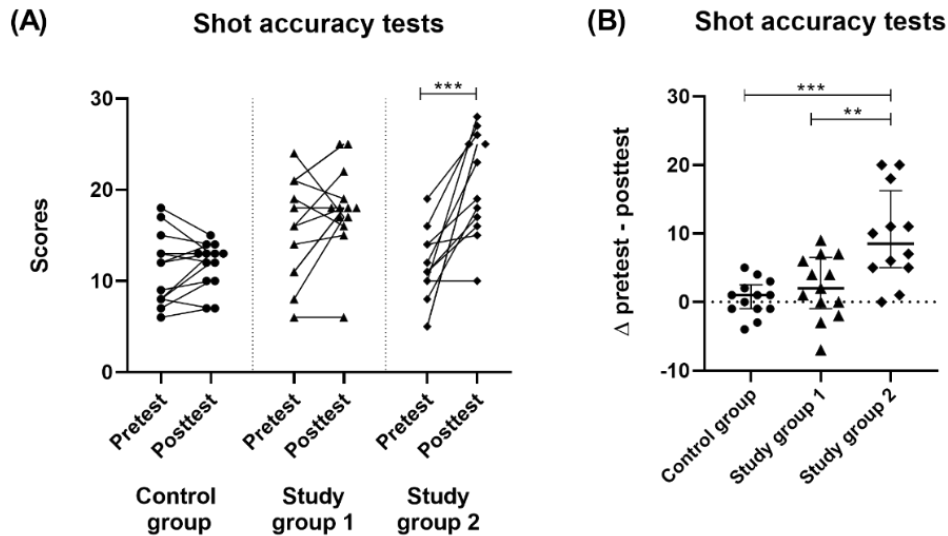


Figure 3. Shot accuracy pretest and post-test results of the handball teams. (A) Each handball team's pretests and post-tests were performed using the Wilcoxon signed-rank test, and the paired values are shown in the graph. (B) The difference among the teams in terms of shooting post-test, calculated by the deduction of the shooting pretest, was performed using the Kruskal Wallis test, and the individual values are shown in the graph. Statistical significance is shown as * $P<0.05$, ** $P<0.01$, and *** $P<0.001$.

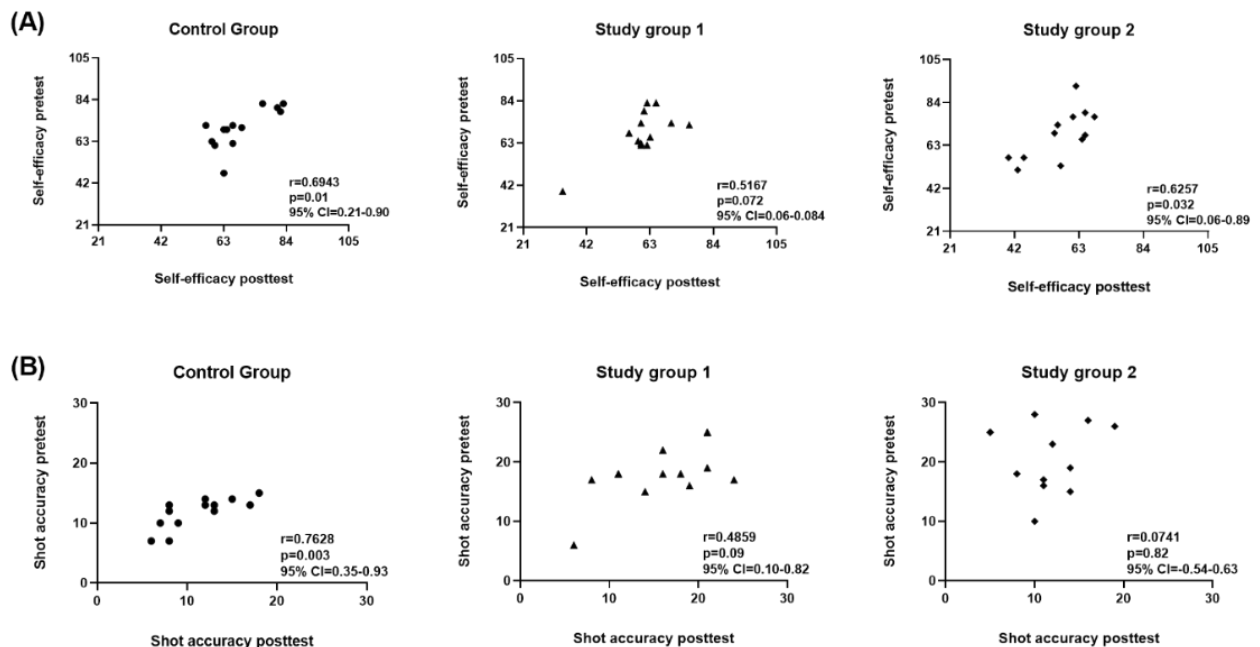


Figure 4. Self-efficacy and shot accuracy pretest and post-test correlations of the three handball teams. The self-efficacy (A) and shooting (B) pretests and post-tests of the handball teams were evaluated with Spearman's correlation test. The correlations, r and p values, and the 95% confidence intervals (CI) are shown in the graphs.

Shot Accuracy Test Results of the Handball Teams. In addition to their self-efficacy, we also analyzed the shot accuracy capacities of the handball teams before the psychological skills training and positive feedback and ten weeks later after the training. When the handball teams' shot accuracy, pretest and post-test results were analyzed separately for each team. No difference was seen between the pretest and the post-test in the control group ($P>0.05$). However, some athletes in the first study group, which received psychological skills training, increased without statistical significance. There was a significant increase between the pretest and post-test results of shot accuracy in the second study group, receiving psychological skills training and positive feedback ($P<0.001$) (Figure 3A).

We also analyzed the difference between the Gökürk, Maltepe and Silivri teams in their shot accuracy pretest results. The medians of the shots were determined as 11, 16 and 12, respectively. There was no significant difference among the teams regarding shooting pretests, suggesting that the teams were similar in shooting at the beginning of the study ($P<0.05$). Thus, we also evaluate the changes between the pretest and the post-test results of shot accuracy between the teams. We observed that the second study group, receiving psychological skills training and positive feedback, showed a significantly different increase from both the control group and the first study group ($P<0.001$ and $P<0.01$, respectively) (Figure 3B).

Correlations Between the Pretests and the Post-tests Scores. In order to see the relation between the evolution of self-efficacy and shot accuracy with their levels at the beginning of the study, we also performed the correlation analysis for the pretest and post-test scores. We observed a strong correlation between the self-efficacy test's pretest and post-test scores in the control group ($r=0.6943$, $P<0.05$). Regarding the self-efficacy test results, we also found a correlation between their pretest and post-test scores for the first and second study groups ($r=0.5167$, $P=0.52$; $r=0.6943$, $P<0.05$, respectively) (Figure 4A). These results suggested that the handball players' self-efficacy increase was related to their psychological skills at the beginning. Similarly, the control group showed a strong correlation between the shooting pretest and the post-test scores ($r=0.7628$, $P<0.05$). In contrast, this correlation was not seen in the second

study group, which received both psychological skills training and positive feedback ($r=0.0741$, $P>0.05$), suggesting that the positive increase after training was not associated with the skills of the athletes at the beginning of the study (Figure 4B).

DISCUSSION

Psychological skills training and positive feedback practice improve the psychological skills of athletes at different levels (7-24). This study aimed to determine the effects of psychological skills training and positive feedback on female handball players' self-efficacy and shot accuracy development in a small and young cohort. The research sample was determined based on the convenience sampling method, and a design with two study groups and one control group was used for comparisons.

Our study found that psychological skills training, with or without positive feedback, improved the self-efficacy beliefs of young handball players. In parallel with our results, it has been shown that psychological skills training could also improve different psychological parameters of the athletes, like controlling mental attention and managing stress (2-25). In addition to the psychological skills training, we also showed that the improvement of the self-efficacy beliefs was even greater after receiving positive feedback, suggesting that positive feedback positively affects sporting performance and psychological well-being and improves the effects of the psychological skills training. Considering the different parts of the self-efficacy test, we also noticed that after psychological training and positive feedback, the self-efficacy skills improved for the academic and emotional part of the scale. Similarly, it has been mentioned that positive competence feedback motivates young athletes and increases their well-being and self-efficacy (26-28). The effect of positive feedback on the youngest has also been demonstrated in the learning environment. Koka et al. investigated students' perceptions of the teacher's feedback on their level of intrinsic motivation, and they found that the learning environment with positive feedback was a significant determinant of intrinsic motivation (12).

Self-efficacy has been described as an essential factor in developing new skills (29). So, after psychological skills development, we further analyzed the improvement of the physiological

skills of the young handball players. We did not observe an improvement in the shot accuracy of the handball players after psychological skills training without positive feedback, suggesting that the psychological skills training alone was not enough to strengthen the physiological skills of the athletes. The findings regarding physiological skill development in the literature are contradictory. In parallel with our results, some experiments showed no improvement in the shot accuracy points of young football players after psychological skills training (30).

On the contrary, Botwina et al. showed that young footballers who performed penalty training and mental training had significantly more accurate penalty shots than those who only did penalty training (31). Another study found that after the video-supported mental training program for young football players, their shot accuracy increased significantly compared to the group to which this program was not applied (32). However, these studies also included technical training, which was different from our study design.

Unlike the studies mentioned above, in our study, we also analyzed the effect of positive feedback and psychological skills training on the shot accuracy of handball players. The positive feedback receiving group showed greater improvement in shot accuracy, suggesting that positive feedback positively affects sporting performance and improves the effects of the psychological skills training program. Similarly, coach-based feedback perceived in the sports environment was related to efficacy and sporting performance (27-33). Also, it becomes easier for young athletes to gain new sporting skills after positive feedback (12).

Finally, the duration of psychological skills training is also thought to be an essential factor in the effectiveness of the psychological training program (34). While six-week training did not affect the psychological skills of the athletes (35), in this study, a ten-week program was performed on the study groups for psychological skills training. This period was considered necessary for behavioral change and development. The significant increase in self-efficacy after ten-week psychological skills training showed that the training duration was long enough to see the positive effect of strengthening the psychological

skills of the handball players, similar to other research with military pilots (36), swimmers (18) and female volleyball players (37). However, as a limitation, we did not analyze the changes during this period.

CONCLUSION

This study described the effects of “psychological skills training” and “positive feedback” on young female handball players’ self-efficacy and sporting performance improvements. The results showed that a well-structured and well-timed psychological skills training program could improve the psychological skills of young athletes, which can be further strengthened by regular positive feedback from their coaches. Moreover, the improvement of sporting performance needs psychological skills training and positive feedback together. Thus, we suggested that positive feedback is more effective in developing psychophysiological performance. This study’s findings can help rethink the role of positive feedback in a sportive environment.

APPLICABLE REMARKS

- Psychological skills training increased the self-efficacy beliefs and sporting performance of young handball players.
- Positive feedback strengthened the effect of the psychological skills training even more on self-efficacy beliefs and shot accuracy.
- Mainly, the self-efficacy test's academic and emotional part of the self-efficacy test increased after the psychological skills training accompanied by positive feedback.

AUTHORS’ CONTRIBUTION

Study concept and design: H.M. Acquisition of data: H.M. Analysis and interpretation of data: H.M. Drafting of the manuscript: H.M. Critical revision of the manuscript for important intellectual content: H.M. Statistical analysis: H.M. Administrative, technical, and material support: H.M. & V.K. Study supervision: V.K.

CONFLICT OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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