Life Span and Disability XXIV, 2 (2021), 221-235

Effects of self-controlled feedback on learning a sports skill in children with ADHD: Performance under pressure

Ali Pashabadi[1], *Yalda Salehi*[2] *& Faraz Pakzamir*[2]

Abstract

Learning a sports skill is an important research topic considering the participation of children with ADHD in comprehensive sports activities. The aim of the present study was to investigate the effects of self-controlled feedback on the learning of a football chip pass skill in children with ADHD and to evaluate the resilience of the possible improvement in performance under competitive pressure. The participants were 30 children, aged 8-10 years old, who were assigned to one of two research groups, namely the self-controlled and the yoked group. After the pre-test, the groups participated in 5 acquisition sessions and were exposed to the specific treatment of each experimental group. Forty-eight hours after the acquisition test, the retention test and transfer under pressure were conducted. The results of the mixed ANOVA showed that the self-controlled group had a significantly higher performance in the learning task than the yoked group. This advantage was persistent in retention, but faded out in pressure conditions for both groups. The findings of this study show that children with ADHD experience a severe decline in performance under pressure due to their cognitive and processing characteristics.

Received: December 12, 2020; *Revised:* July 27, 2021; *Accepted:* October 26, 2021

[1] Faculty of Sport Sciences, Kharazmi University, Tehran, Iran.
[2] Faculty of Sport Sciences, University of Tehran, Tehran, Iran.

Correspondence to: Ali Pashabadi, Faculty of sport sciences, Kharazmi University Hesari Street, Mirdamad, Tehran, Iran. Phone: +982280001; Mobile Phone: +989124620386; E-mail: pashabadi@ut.ac.ir.

Conflict of Interest: The authors report no conflicts of interest.

Keywords: ADHD; Performance under pressure; Self-controlled feedback.

1. Introduction

Learning is one of the most important aspects of children's lives, which is a need for their all-round development and refers to changes that occur in behavior. Learning motor and sports skills can affect the other dimensions of children's optimal development in different ways. Although practicing is the main factor of motor learning, the quality of training plays a key role, which has been enhanced by many factors, such as instructions and feedback. Feedback refers to information that is provided to the performer in various ways during or after performing a task (Schmidt & Wrisberg, 2008). A great number of works has been done in providing feedback, illustrating its significance. How to provide feedback has been studied in different ways according to time, to the performance situation, and to the learner's capabilities (Wulf, Shea, & Lewthwaite, 2010).

Salmoni and colleagues (Salmoni, Schmidt, & Walter, 1984) proposed the guidance hypothesis to explain the effects of the knowledge of results (KR) on the learning of motor skills in which the high frequency of the KR during practice can lead to the dependence of the learner on its guiding effect (Bruechert, Lai, & Shea, 2003). Many studies have long-established guidance hypotheses (Schmidt, Young, Swinnen, & Shapiro, 1989; Young & Schmidt, 1992) and various techniques have been used to avoid these negative effects of the KR by reducing the relative frequency of augmented feedback, such as bandwidth KR, summary KR, average KR, self-controlled KR, and feedback to good and poor trials. Therefore, different empirical approaches have emerged from new research on how and when to provide feedback, such as when to present the KR to the individual (Wulf & Toole, 1999). In a particular pattern, learners complete the task and receive feedback whenever they want, which is called self-controlled feedback (Chiviacowsky & Wulf, 2002; 2005). Authorizing the learners to receive feedback when they wish would be advantageous because the requests of feedback occur according to his/her personality traits and inner needs (Fan, Bo, & Chang-zhi, 2018; Jimenez-Diaz, Chaves-Castro, & Morera-Castro, 2020). Its effectiveness has been supported in various motor and sports tasks, including throwing (Chiviacowsky, de Medeiros, Kaefer, Wally, & Wulf, 2008), linear orientation (Chiviacowsky, Wulf, & Lewthwaite, 2012), serial tasks (Lim, Ali, Kim, Kim, Choi, & Radlo, 2015), dart-throwing (Post, Fairbrother, & Barros, 2011) and even tactical skills (Van Maarseveen, Oudejans, & Savelsbergh, 2018). In this way of providing feedback, the KR is provided when the learner requests it, leading to the learner’s participation

in determining the characteristics of the training actively, as a result of which the implementation of skills becomes less boring and more pleasurable (Chiviacowsky, Wulf, & Lewthwaite, 2012). In motor skills learning, completely fading out the KR, makes the learning procedure generally more difficult. In order to guide the skill learning process properly, feedback is essential and it provides information about errors and deviations from the optimal pattern (Schmidt & Wrisberg, 2008). Self-controlled feedback increases the learning's effectiveness by reducing the frequency of feedback and providing it in line with the needs and control of the learner. Considering that one of the important roles of feedback is its motivational role, it is emphasized that learners have a desirable motivation to use feedback and a sufficient need of it to correct their errors through self-controlled feedback, which, in turn, accelerates the learning process by delegating the decision to receive feedback to the learner (Chiviacowsky & Wulf, 2002; 2005; Schmidt & Wrisberg, 2008).

The characteristics of the learners play a decisive role in the effectiveness of feedback on motor learning (Fairbrother, Laughlin, & Nguyen, 2012; Kaefer, Chiviacowsky, Meira Jr, & Tani, 2014). Attributable to individual differences, it is probable that individuals have different needs in receiving feedback that may be consistent with their internal goals (Ferreira, Malloy-Diniz, Parma, Nogueira, Apolinário-Souza, Ugrinowitsch *et al.*, 2018).

The effects of feedback on children's learning abilities have only partially been examined. Moreover, the effectiveness of self-controlled feedback has been neglected in the Attention Deficit Hyperactivity Disorder (ADHD) group of children who comprise a significant percentage of the child population. Several studies have shown the effectiveness of the self-controlled KR on the learning abilities in children with cerebral palsy (Hemayattalab, Arabameri, Pourazar, Ardakani, & Kashefi, 2013; Hemayattalab, 2014) and with Down syndrome (Chiviacowsky, Wulf, Machado, & Rydberg, 2012). Children with ADHD, who comprise from 3 to 7% of school-age children, need special attention in the training of sports and motor skills due to specific features characterizing them, such as hyperactivity, attention deficit, seclusion, inability of a long-term concentration, high impulsivity, etc. (Barkley, 2014; Samiei, Daneshmand, Keramatfar, Khooshabi, Amiri, Farhadi *et al.*, 2015). The typical effects of feedback on the motor learning skills in children with ADHD have been studied. For instance, Bishop and co-workers (Bishop, Kelly, & Hull, 2018) examined the effects of knowledge of performance (KP) feedback on the motor performance of ADHD children. ADHD children have a sufficient

competence to participate in group movement activities relative to their peers. Therefore, it makes sense to consider a task related to a more popular activity/sport. Given the preference for children with ADHD to participate in inclusive sports programs, it seems that evaluating the effectiveness of learning interventions on sports performance would have special benefits (Barkley, 2014). On the other hand, the success in a sports performance and in functional tasks depends on the environmental conditions; the successful performance then requires enduring under stressful and pressure conditions. A shortcoming in previous research that should be underlined is that generalizable motor tasks, which may help the child to better participate in the environment, have not been selected and even in tasks that have a satisfactory aspect of generalizability, such as the underhand toss in the study of Bishop and colleagues (Bishop *et al.*, 2018), the effectiveness of intervention was not evaluated under conditions of pressure. This may be explained by the fact that being in a sports set would naturally be competitive for children and consequently stressful. It has been reported that individuals with ADHD experience stress and pressure conditions differently than normal people (Samiei *et al.*, 2015; Öster, Ramklint, Meyer, & Isaksson, 2020). Consequently, it is expected that the response of ADHD children to anxiety while performing a sports skill could be different as well. Therefore, the aim of the present study was to investigate the effect of self-controlled feedback on the learning of a field sports task and to evaluate the resilience of potential changes in children with ADHD under pressure.

2. Methods: sample, instruments, procedure

2.1. Participants

The participants, who voluntarily took part in this research study, were 30 children, aged 8 to 10, diagnosed with the ADHD disorder coming from elementary schools of Tehran city (District 5, Tehran, Iran). Children's parents were aware of the study and signed a written informed consent to make their child participate in the study. Inclusion criteria comprised the following: a clear physical and mental health, no comorbidities, the willingness in performing and cooperating in a sports activity, no history of exposure to organized football training and no previous experience in participating in similar research with feedback intervention.

2.2. Measurements

2.2.1. Task and apparatus

In the current research study the task children were asked to perform was to chip a stationary ball with their dominant foot over a barrier towards a circular target. The distance from where the ball was initially placed to the target was 8 meters and the barrier (50 cm height and 2 meters length) was located at the midpoint of the pass's path (4 meters from the ball's kicking place). The target was marked on the floor with a white-colored tape and consisted of an 80 cm diameter circle. A 320 cm diameter zone was marked around the target to facilitate computing performance outcomes. Two cross lines were drawn using white tape from the center of the target to divide the target zone into four quadrants (Uehara, Button, & Davids, 2008). A measuring tape was used to record the vertical and horizontal location of the ball's landing position (x and y coordinates) relative to the center of the target. These coordinates were used to calculate the dependent variables (pass accuracy) in centimeters. The tests were conducted on a small size football pitch with artificial turf and using a FIFA standard ball size 4.

2.3. Dependent variables

2.3.1. Performance outcome

The accuracy of the chip pass was computed by Radial Error ($RE = \sqrt{x^2 + y^2}$). To prevent missing values from biasing the data analysis, the maximum values of 400 cm (for both x and y coordinates) were attributed to missed shots, according to the experiment of Uehara and colleagues (Uehara *et al.*, 2008).

2.3.2. Performance procedure (Qualitative Assessment)

The performance quality of the chip pass in all trials was evaluated based on the criteria, as reported by previous findings (Davids, Lees, & Burwitz, 2000; Uehara *et al.*, 2008). Two independent qualified football coaches (AFC coaching license) qualitatively assessed the performance quality of the chip pass and assigned a score between 0 and 15. Interrater correlation in each measurement phase and reliability was calculated by Cronbach's alpha.

2.4. Procedure

Prior to the beginning of the experiments, participants were instructed on how to perform a chip pass so that the ball was lifted over the barrier and landed down to the target. Participants performed five familiarization trials in which they chipped the ball, without the barrier, to a target located 6 m away. Once they had succeeded in familiarizing to the task, they further took part in the pre-test of a 6-trial block and were assigned to either the self-controlled (SC) or yoked (Y) group, based on the scores obtained during their pre-test in order to match the assignment. Participants were asked to warm up for 10 minutes by jogging and performing light exercises and stretching before the beginning of each test.

The acquisition period consisted of 5 sessions comprised of two blocks of 6 trials each. The acquisition sessions took place on 6 consecutive days and all from 4:00 to 6:00 pm. The first block (first 6 trials) of the 1st secession counted as the pre-test. The self-controlled group had the choice to request feedback whenever they wished after completing their trials. The yoked group had no control over the time and frequency in receiving feedback and the receiving KR was determined according to the self-controlled counterparts. The last block of the 5th session was considered as the acquisition test. Forty-eight hours after the last training session, the retention test was performed and, immediately after that, the transfer under pressure was done in the same physical context. Pressure conditions were created with false comparative feedback and award for the best performance. Participants were also told that the coaches of the youth teams of the Tehran youth League would observe their last 10 trials to select them for their teams (Smith, Smoll, Cumming, & Grossbard, 2006; Öster *et al.*, 2020).

3. Data analysis

As a first step, the data was analyzed, checking the normality of the data, which confirmed the assumptions of parametric statistical analysis. Then a 2×6 (group × phase) mixed ANOVA with repeated measurements on the intervention factor for the blocks of the acquisition period was conducted for the performance outcome (RE). A qualitative assessment of the performance was analyzed through a 2×4 (group × phase) mixed ANOVA. In case of significant interactions between the group and measurement phase, the Bonferroni post hoc test was carried out to compare the phase scores in the

experimental groups. Finally, the groups were compared in the phases of retention and transfer under pressure by using an independent *t*-test.

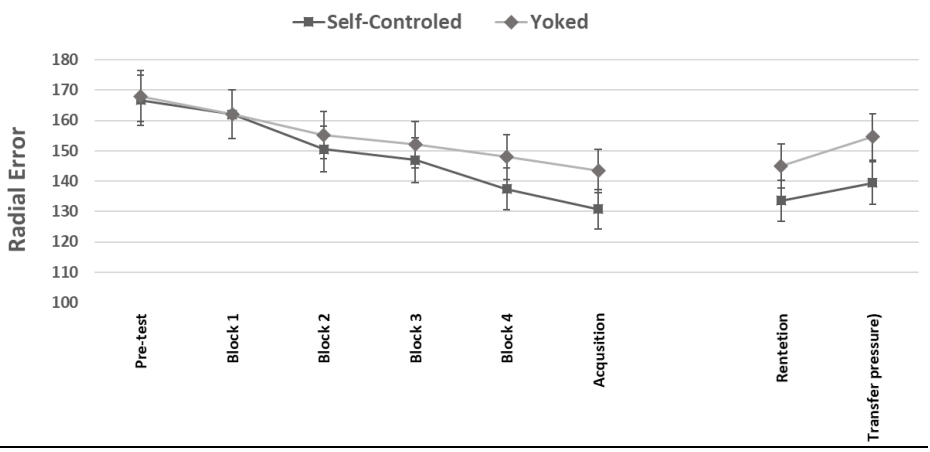
4. Results

The results of the independent *t*-test in the pre-test showed that the two groups were not significantly different in performance outcome (RE) *(*$t_{(28)}$ = .33, p = .71*)* and quality of performance ($t_{(28)}$ = .209, p = .83).

4.1. Acquisition period

The results of the 2×6 (2 groups: yoked & self-controlled × measurement phases: pre-test, sessions 1 to 4, acquisition) mixed ANOVA with repeated measurements on the measurement factor showed that the main effect of the measurement phase for the RE was significant in the acquisition period ($F_{(5, 140)}$ = 58.91, p = .001, η^2 = .68). Moreover, the main effect of the group ($F_{(1, 28)}$ = 4.70, p = .03, η^2 = .14) and the interactional effect of the group with the measurement phase was significant ($F_{(5, 140)}$ = 2.37, p = .04, η^2 = .17) as well. As is depicted in Figure 1, the RE significantly decreased during the measurement phases, passing from the pre-test to the acquisition phase. To more accurately examine the differences, the Bonferroni post hoc test was performed for both groups, which showed that there was a significant difference between the pre-test and the acquisition phase (self-controlled: p < .001, yoked: p = .01; refer to Fig. 1 for more details).

Figure 1 – *The RE in the measurement phases for the SC and Y groups*



The results of the 2×4 (2 groups: yoked & self-controlled × measurement phases: pre-test, acquisition, retention, transfer) mixed ANOVA for quality of the performance showed a significant main effect of measurement from the pre-test to the transfer test *($F_{(3, 84)}$ = 97.57, p = .001, η^2 = .77*) and the interaction of the group and the measurement phase ($F_{(3, 84)}$ = 3.53, p = .02, η^2 = .12) but the effect between groups was non-significant ($F_{(1, 28)}$ = 3.566, p = .06, η^2 = .11). The split analysis of Bonferroni post hoc test showed that the improvement from the pre-test phase was significant in both groups (self-controlled: p < .05; yoked: p < .05; refer to Tab. 1 for more details).

Table 1 – *Mean (M) and Standard Deviation (SD) of quality of performance assessment during the measurement phases for the self-controlled (SC) and yoked (Y) groups (n = 15)*

Group \ Phase	Pre-test	Acquisition	Retention	Transfer
SC (*M* ± *SD*)	4.93 ± 1.79	9.60 ± 1.88	9.27 ± 1.62	6.80 ± 1.78
Y (*M* ± *SD*)	4.80 ± 1.70	8.33 ± 1.45	7.47 ± 1.46	6.07 ± 1.49

4.2. Retention and transfer

The results of the independent *t*-test when comparing the RE of the self-controlled and yoked groups showed that there was a significant difference between the two groups in both the retention ($t_{(28)}$ = 2.88, p = .008) and transfer under pressure ($t_{(28)}$ = 3.63, p = .001). The analysis of the within-group effect, although, showed a significant main effect of treatment (self-controlled: $F_{(3, 42)}$ = 131.09, p = .01, η^2 = .89; yoked: $F_{(3, 42)}$ = 20.88, p = .02, η^2 = .59). However, according to the result of the Bonferroni test for inter-phase comparison, the decreased RE in the acquisition period was persistent for both groups up to the retention phase (p > .05), but not in the transfer test (p < .05). In other words, the scores of both groups significantly regressed in the transfer under pressure compared to the phases of acquisition and retention (Fig. 1).

The comparison of group's performance quality in retention and transfer was relatively similar to the RE. In terms of quality of performance, the results of the independent *t*-test showed a significant group difference in retention ($t_{(28)}$ = 3.19, p = .003) but not in transfer ($t_{(28)}$ = 1.224, p = .23). This means that the autonomy of feedback in the self-controlled group was persistent in the retention phase but faded out in conditions under pressure. The analysis of the within-group effect, although, showed again a significant

main effect of treatment (self-controlled: ($F_{(3, 42)}$ = 57.02, p = .001, η^2 = .89); yoked: ($F_{(3, 42)}$ = 50.72, p = .001, η^2 = .78). However, according to the result of the Bonferroni test for inter-phase comparison, the decreased quality of performance in the acquisition period was persistent for both groups up to the retention phase (p > .05), but not in the transfer test (p < .05). Also for this parameter the scores of the groups significantly regressed in the transfer under pressure compared to the phases of acquisition and retention (Fig. 1).

5. Discussion

In the literature on motor learning and augmented feedback there is strong evidence concerning the benefits of the self-controlled KR in improving motor skills learning, although there are still dark points in the effectiveness of this type of feedback in individuals with behavioral disorders and efforts to shed light in this direction are still underway. Studies can provide a helpful scientific documentation for specialists who work with children with special needs and for sports educators and physical education instructors who work on teaching motor and sports skills to children with special disorders, especially children with ADHD. The aim of the present study was to investigate the effect of self-controlled feedback compared to examiner-controlled feedback on learning a sports skill in children with ADHD. The findings showed the positive effect of providing feedback on the request and needs of the participants, so the individuals who received feedback whenever they wished performed significantly better compared to the yoked group during the acquisition period. They also maintained this higher performance in the delayed retention test. Previous findings in this research area have confirmed the effectiveness of this type of feedback in children with cerebral palsy (Hemayattalab *et al.*, 2013; Hemayattalab, 2014) and with Down syndrome (Chiviacowsky, Wulf, Machado *et al*., 2012). According to researchers, the primary explanation for the effectiveness of this type of feedback lies in the learner's active involvement in the learning procedure of the skill (Chiviacowsky & Wulf, 2002; 2005). Theoretical foundations have mentioned the informational role of feedback as the most important (Schmidt & Wrisberg, 2008) and recent research has emphasized that self-controlled feedback is in line with the learner's need to provide timely appropriate information, which may be the main reason explaining the better performance of the self-controlled group compared to the examiner-controlled group (Chiviacowsky & Wulf, 2002; 2005; Chiviacowsky, Wulf, Machado *et al.*, 2012). The learners who receive

feedback on their request are more confident in their performance and are likely to request feedback based on their needs and plans to improve performance. Previous findings have mostly shown that better learning is associated with a high frequency of appropriate self-controlled feedback, which is in line to what was demonstrated in the present study. Given that children with ADHD are likely to have a lower information processing capacity than adults or others normal children, they tend to compensate by receiving more external information. However, despite this, children with ADHD disorder were able to gain the benefits of instructing under self-controlled feedback and even to maintain positive changes (a decrease in RE) in the retention test.

The distinguishing idea of the present study compared to previous studies was the transfer test under pressure. Most previous studies have applied the transfer test with changes in the test context (physical change in the test or increased test difficulty). In sports skills (i.e. the task examined in the present experiment), the most important issue is the transfer of the acquired skills to competition and stress settings and to the context of real situations. As it is often observed, the novice performer has mastered the performance of the skill to some extent, but regresses under pressure conditions to the extent that the level of a certain skill's performance returns to a lower level (Weiss & Raedeke, 2004). Therefore, it was necessary to examine the changes under pressure conditions, which showed that in children with ADHD, the advantage produced by the practice in self-controlled feedback conditions did not persist compared to the yoked feedback and, despite the superiority of the self-controlled group in the acquisition and even retention test, the difference between the two groups leveled out under conditions of pressure. The decline in performance was observed in both groups; in other words, the learners of both groups could not maintain their improvement under pressure conditions. This finding was in contrast to the conclusions of other studies in this field. Although studies that have exactly examined the effect of anxiety conditions of this feedback method in children with ADHD are not compared with the current findings, the reason for the lack of progress resilience may be specific to the characteristics of these children. Individual traits, such as distraction, lack of concentration and withdrawal, high impulsivity, etc. prevent the optimal information processing in stress conditions and drop the individuals' performance (Barkley, 2014). The result was a loss of the optimum performance gained during the acquisition period. More in general, by summarizing the present findings compared to previous findings, the effectiveness of self-controlled feedback in learning

new skills for ADHD children can still be relied on as a way to improve the process of learning a sports skill. A limitation of the current study that should be highlighted is that children with ADHD may be over-responsive to pressure conditions. They may have thus responded with an extreme response, which could be attributable to their cognitive characteristics in responding to various stimuli, including the present psychological stimulus for increasing anxiety. However, more caution should be implemented in order to trust such interventions in this group of children and then apply them to real or competitive contexts. How children with ADHD respond to stressfull conditions should be considered more wisely in future research. The external validity of the effectiveness of the interventions needs further investigation and future research should examine the effect of the pressure conditions in ADHD children by a double transfer experiment design and by a comparison of the responses of this group of children to typically developing children.

References

Barkley, R. A. (2014). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment*. New York: The Guilford Publications.

Bishop, J. C., Kelly, L. E., & Hull, M. (2018). Knowledge of performance feedback among boys with ADHD. *Research in Developmental Disabilities, 74*, 31-40.

Bruechert, L., Lai, Q., & Shea, C. H. (2003). Reduced knowledge of results frequency enhances error detection. *Research Quarterly for Exercise and Sport, 74* (4), 467-472.

Chiviacowsky, S., de Medeiros, F. L., Kaefer, A., Wally, R., & Wulf, G. (2008). Self-controlled feedback in 10-year-old children: higher feedback frequencies enhance learning. *Research Quarterly for Exercise and Sport, 79* (1), 122-127.

Chiviacowsky, S., & Wulf, G. (2002). Self-controlled feedback: Does it enhance learning because performers get feedback when they need it? *Research Quarterly for Exercise and Sport, 73* (4), 408-415.

Chiviacowsky, S., & Wulf, G. (2005). Self-controlled feedback is effective if it is based on the learner's performance. *Research Quarterly for Exercise and Sport, 76* (1), 42-48.

Chiviacowsky, S., Wulf, G., & Lewthwaite, R. (2012). Self-controlled learning: the importance of protecting perceptions of competence. *Frontiers in Psychology, 3*: 458.

Chiviacowsky, S., Wulf, G., Machado, C., & Rydberg, N. (2012). Self-controlled feedback enhances learning in adults with Down syndrome. *Brazilian Journal of Physical Therapy, 16* (3), 191-196.

Davids, K., Lees, A., & Burwitz, L. (2000). Understanding and measuring coordination and control in soccer skills: Implications for talent identification and skill acquisition. Journal of Sports Sciences, 18, 703-714.

Fairbrother, J. T., Laughlin, D. D., & Nguyen, T. V. (2012). Self-controlled feedback facilitates motor learning in both high and low activity individuals. *Frontiers in Psychology, 3*: 323.

Fan, Z., Bo, Z., & Chang-zhi, J. (2018). *Effect of Intervening Bandwidth Feedback on Motor Skill Learning in Self-Controlled Feedback Context.* Paper presented at the 1st International Conference on Contemporary Education and Economic Development (CEED 2018).

Ferreira, B. P., Malloy-Diniz, L. F., Parma, J. O., Nogueira, N. G., Apolinário-Souza, T., Ugrinowitsch, H., & Lage, G. M. (2018). Self-controlled feedback and learner impulsivity in sequential motor learning. *Perceptual and Motor Skills, 126* (1), 157-179.

Hemayattalab, R. (2014). Effects of self-control and instructor-control feedback on motor learning in individuals with cerebral palsy. *Research in Developmental Disabilities, 35* (11), 2766-2772.

Hemayattalab, R., Arabameri, E., Pourazar, M., Ardakani, M. D., & Kashefi, M. (2013). Effects of self-controlled feedback on learning of a throwing task in children with spastic hemiplegic cerebral palsy. *Research in Developmental Disabilities, 34* (9), 2884-2889.

Jimenez-Diaz, J., Chaves-Castro, K., & Morera-Castro, M. (2020). Effect of Self-Controlled and Regulated Feedback on Motor Skill Performance and Learning: A Meta-Analytic Study. *Journal of Motor Behavior*, *53* (3), 385-398.

Kaefer, A., Chiviacowsky, S., Meira Jr., C. d. M., & Tani, G. (2014). Self-controlled practice enhances motor learning in introverts and extroverts. *Research Quarterly for Exercise and Sport, 85* (2), 226-233.

Lim, S., Ali, A., Kim, W., Kim, J., Choi, S., & Radlo, S. J. (2015). Influence of self-controlled feedback on learning a serial motor skill. *Perceptual and Motor Skills, 120* (2), 462-474.

Öster, C., Ramklint, M., Meyer, J., & Isaksson, J. (2020). How do adolescents with ADHD perceive and experience stress? An interview study. *Nordic Journal of Psychiatry*, *74* (2), 123-130.

Post, P. G., Fairbrother, J. T., & Barros, J. A. (2011). Self-controlled amount of practice benefits learning of a motor skill. *Research Quarterly for Exercise and Sport, 82* (3), 474-481.

Salmoni, A. W., Schmidt, R. A., & Walter, C. B. (1984). Knowledge of results and motor learning: a review and critical reappraisal. *Psychological Bulletin, 95* (3), 355-386.

Samiei, M., Daneshmand, R., Keramatfar, R., Khooshabi, K., Amiri, N., Farhadi, Y., Farzadfard, S. Z., Kachooi, H., & Samadi, R. (2015). Attention Deficit Hyper Activity Disorder (ADHD) and stress: A mutual relationship between children and mothers. *Basic and Clinical Neuroscience, 6* (2), 113-121.

Schmidt, R. A., & Wrisberg, C. A. (2008). *Motor learning and performance: A situation-based learning approach*. Unite States: Human kinetics.

Schmidt, R. A., Young, D. E., Swinnen, S., & Shapiro, D. C. (1989). Summary knowledge of results for skill acquisition: Support for the guidance hypothesis. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 15* (2), 352-359.

Smith, R. E., Smoll, F. L., Cumming, S. P., & Grossbard, J. R. (2006). Measurement of multidimensional sport performance anxiety in children and adults: The Sport Anxiety Scale-2. *Journal of Sport and Exercise Psychology, 28* (4), 479-501.

Uehara, L. A., Button, C., & Davids, K. (2008). The effects of focus of attention instructions on novices learning soccer chip. *Brazilian Journal of Biomotricity, 2* (1), 63-77.

Van Maarseveen, M. J., Oudejans, R. R., & Savelsbergh, G. J. (2018). Self-controlled video feedback on tactical skills for soccer teams results in more active involvement of players. *Human Movement Science, 57*, 194-204.

Weiss, M. R., & Raedeke, T. D. (2004). Developmental Sport and Exercise Psychology: Research Status on Youth and Directions Toward a Lifespan perspective. In M. R. Weiss (Ed.), *Developmental sport and exercise psychology: A lifespan perspective* (pp. 1-26). Morgantown, USA: Fitness Information Technology.

Wulf, G., & Toole, T. (1999). Physical assistance devices in complex motor skill learning: Benefits of a self-controlled practice schedule. *Research Quarterly for Exercise and Sport, 70* (3), 265-272.

Wulf, G., Shea, C., & Lewthwaite, R. (2010). Motor skill learning and performance: a review of influential factors. *Medical Education, 44* (1), 75-84.

Young, D. E., & Schmidt, R. A. (1992). Augmented kinematic feedback for motor learning. *Journal of Motor Behavior, 24* (3), 261-273.