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Overview of Methods Used to Enhance Expectancies – A Systematic Review

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ABSTRACT

Motor learning is an important part of any sport. Various methods have been used to make motor learning more effective and improve it, and one of them is the enhanced expectancies method. The method assumes that if we induce a feeling in an individual that they can succeed in a task, they will perform better than individuals without the intervention. The main aim of the current systematic review was to explore the methods used to induce enhanced expectancies and to gain greater insight into research on the phenomenon. A total of 25 articles were included in the systematic review. Three main areas of methods used to induce enhanced expectancies emerged – feedback, differing criteria or assignments and visual illusions. Feedback appeared in 14 studies, while differing criteria or assignments and visual illusions each appeared in 8 studies. However, different methods fall under these three groups and are discussed in more depth. Another important finding is the effect of enhanced expectancies on self-efficacy, or other psychological components of the individual, which was found in 11 studies. Overall, research on enhanced expectancies is very diverse and the present review study depicts its forms.

Keywords: enhanced expectancies; motor learning; motor performance; sport; OPTIMAL theory

INTRODUCTION

Motor learning is a lifelong complex process that can be influenced by a variety of factors. One of the important components of elite sport is excellent mastery of motor skills related to the sport. It can be throwing a ball, handling a hockey stick or a golf club (Krakauer et al., 2019). Currently, motor learning has received considerable attention in the field of sport psychology because it can have a significant impact on performance. Researchers are investigating the effectiveness of various techniques such as the quiet eye, the OPTIMAL theory (Optimizing performance through intrinsic motivation and attention for learning), enhanced expectancies or the influence of attentional focus. The implementation of these techniques in training has been shown in a number of studies to have a positive effect on motor control and should therefore lead to improved individual performance (Vickers, 2016; Wulf & Lewthwaite, 2016).

Wulf and Lewthwaite (2016) come up with the OPTIMAL theory. They emphasize the importance of motivational and attentional factors on motor learning. Specifically, enhanced expectancies (EE), autonomy support (AS) and external focus of attention (EF) are at the forefront of their theory. Linking these three components in motor skill training, in their view, has the greatest impact on effective motor learning. Lewthwaite et al. (2015) focused their research on autonomy in relation to motor learning. Their results support the assumption of OPTIMAL theory, namely that if we give one group of participants more autonomy – in this case, for example, the ability to choose the colour of the ball - they will demonstrate better motor learning performance - in this case, putt accuracy – as opposed to a group without this ability.

Wulf et al. (2015) added external attentional focus to autonomy and examined the influence of the variables together and separately. The combination of external attentional focus and autonomy had the most significant effect on motor learning, and both variables separately also had a significant effect. In addition, there was also a significant effect of all variables on the self efficacy of the individual. Abdollahipour (2015) examined only the relationship between external or internal attentional focus and improvement in gymnastics skills. The external focus group showed significantly greater improvement than the internal focus group and the control group. External focus had a positive effect on both the final movement (amount of jump) and the quality of that movement (fewer points deducted).

The third component of the OPTIMAL theory is enhanced expectancies. Enhanced expectancies research can be traced back to the beginning of the 21st century, if not earlier. Even today, Suzete Chiviacowski and Gabriele Wulf are among the prominent researchers in the field of motor learning and enhanced expectancies in sport. Already in 2002 they published a paper looking at whether our choice of feedback (when we receive it) has an effect on improved learning. In addition to confirming the hypothesis, i.e., our chosen feedback had a positive effect on learning, an interesting finding of that study was that participants required feedback more often after good trials than after bad ones (Chiwiacowsky & Wulf, 2002). This finding was the basis for further studies (Ong & Hodges, 2018; Stoate et al., 2012; Chiviacowski & Wulf, 2007).

Studies here have shown that feedback can improve the motor learning process and that the expectation of better performance is thought to have a positive effect on motor skill learning. Thus, since feedback after good trials has been found to have a positive effect on motor learning, feedback here operates as a variable creating enhanced expectancies (EE). Researchers have begun to look at ways in which we can increase an individual's expectations. Pascua et al. (2015) used social comparative feedback to influence EE. To raise expectations, participants were told that their performance was above the norm of other participants. Stoate et al. (2012) used verbal feedback to induce EE in which participants were told that they were doing well by using different phrases during testing. Wulf et al. (2012) found that simply telling participants before the experiment began that people similar to them were performing well in a given task had a positive effect on their performance in a balance exercise.

In addition to feedback, deliberate manipulation of task success criteria or visual illusions can also be used to induce EE (Chauvel et al., 2015; Ziv et al., 2021). The results of the studies come with the suggestion that perceived hole size has an effect on motor learning similar to the increase in success rate. Chauvel et al. (2015) induced enhanced expectancies using visual illusions. Small circles were projected around the hole to induce the illusion that the hole is larger than it appears, or large circles were projected around the hole to induce the illusion that the hole is smaller than it really is. So the Ebbinghaus illusion was created. A positive effect on motor learning, similar to performance, was produced by the subjectively perceived larger hole. Enhanced expectancies were thus induced by the subjectively perceived confidence that in the case of the larger hole illusion they had a greater chance of getting the ball into the hole, whereas in the case of the small hole illusion it decreased their confidence (Bahmani et al., 2017; Chauvel et al., 2015, Witt et al., 2012).

As mentioned earlier, EE can be affected by deliberately changing the success criteria in a test task. In a study by Palmer et al. (2016), participants were randomly divided into two groups. Both groups had to perform several blocks of practice putts, with one group having a 7 cm circle around the target (a 2x2 cm square) and the other group had a 14 cm circle. Participants were told that a stroke that finished within a given circle distance from the target was considered good. The next day, they had to make several putts again without the presence of the circle. The results of the study demonstrate that participants whose expectations were enhanced (enhanced expectancies), not diminished (diminished expectancies), performed significantly better when tested without the circle. The study was replicated by Ziv et al. (2019) and subsequently by Ziv et al. (2021). They added a control group to the original design and changed the re-test to 48h after testing to examine transfer and retention. In contrast to Palmer et al. (2016) and Ziv et al. (2019), Ziv et al. (2021) added a golf hole to the experimental design. Thus, participants no longer putted in a square and the authors were able to increase the ecological validity of the experiment due to the more realistic setting. However, both Ziv et al. (2019) and Ziv et al. (2021) yielded the same results, namely that the group that had a larger square around the hole or square demonstrated significantly better performance in the training and retest. Thus, the results of the present studies suggest that inducing an individual's EE in training may lead to improved putting performance.

The studies presented in the previous paragraphs confirm that *enhanced expectancies* (EE) have been shown to be an effective technique for improving motor learning and performance. Confirming the positive effect of EE on motor learning and performance is a very important finding for application in coaching practice. The use of EE, especially with novice athletes, could significantly improve the learning process. However, its use is also very important in more advanced players, as the influence of EE on self-efficacy and psychological aspects of sport such as playing anxiety or stress can significantly affect players' success and consistency. The studies differ in the methods used to induce EE, but produce similar, if not identical, results. The aim of this systematic review study will be to explore the methods used to induce EE and gain further insight into current research on the phenomenon.

METHOD

Sources and criteria for selecting articles

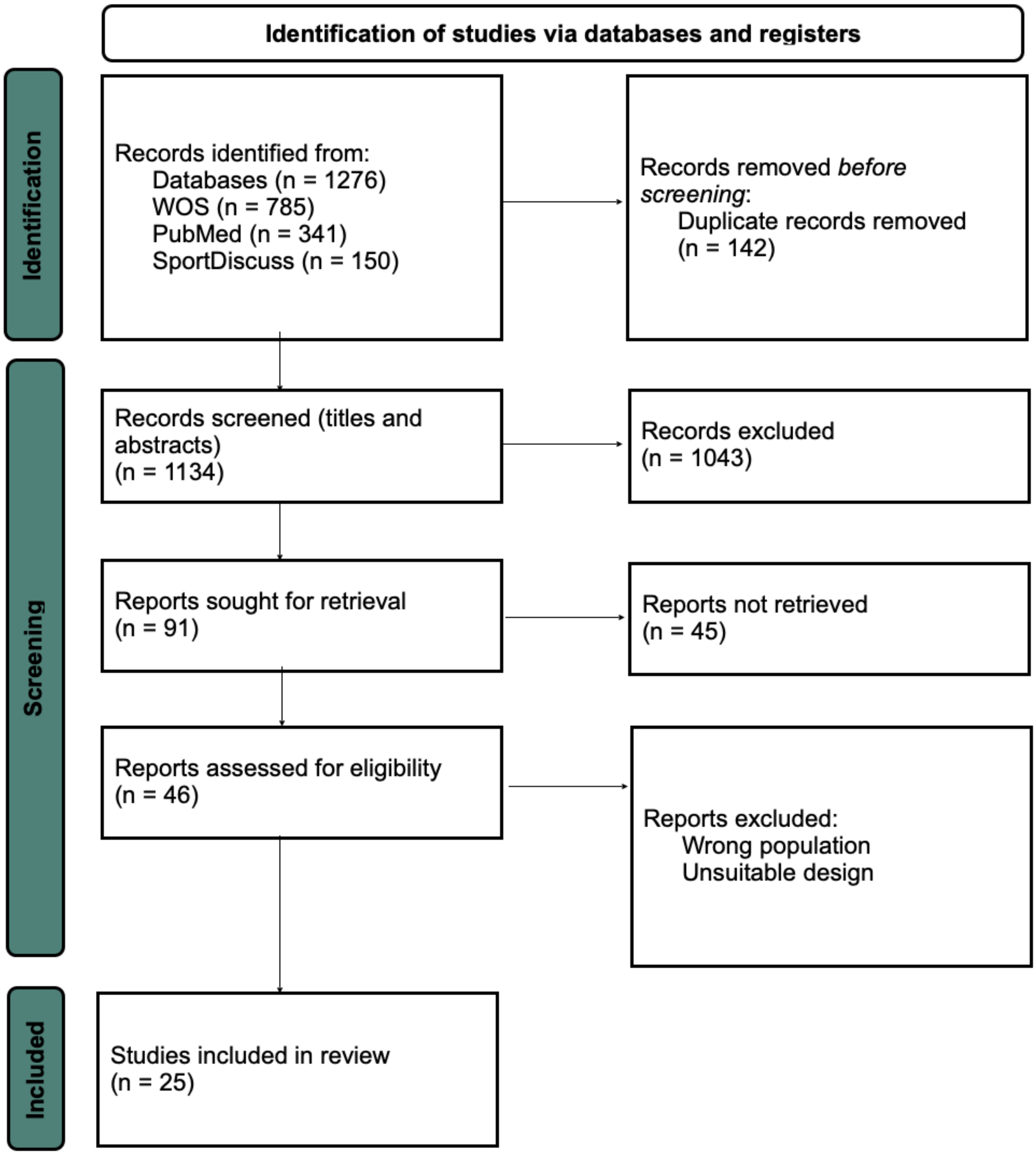
A systematic review of articles on the set topic was chosen to explore the stated objectives. The entire systematic review was compiled according to the PRISMA manual (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Page et al., 2021). The databases from which studies were extracted were as follows: Web of Science, PubMed and SportDiscus. The keywords used to search for studies were *enhanced expectancies*, *enhancing expectancies*, *motor performance*, *motor learning*, and *sport*. The selection of studies took place in February 2023.

Studies from the databases were included if they met the following criteria: manipulation of the enhanced expectations of the individual, experimental study design, the article was written in English, sports activity was measured, adult, healthy population, the article was peer-reviewed and was searchable in full text. The specified time range was 10 years, i.e. articles from 2013 to February 2023 were included.

Selection process

The selection process followed the rules of the PRISMA manual. The total number of articles extracted from all databases was 1276. The articles were entered into Rayyan software and the article sorting was done in Rayyan software. First, duplicate items were discarded, and then articles were sorted by abstract. Articles that did not meet the criteria set for article selection (see previous section) were discarded. Full texts were retrieved for 91 articles, of which 25 studies were subsequently included in the systematic review. The whole selection process is shown in Figure 1.

Figure 1. PRISMA flow chart



RESULTS

General information

From the initial 1276 articles, 46 were selected for inclusion in the systematic review. Of these, 21 articles were subsequently excluded due to inappropriate design and population selected. A total of 25 articles[1] were included in the systematic review. Articles were published between 2013 and 2022. 15 articles were published up to year 2020 and 10 studies were published from the year 2020 onwards (inclusive). Most studies were published in the years 2018, 2019 and 2020.

1 Two studies have multiple experiments included, therefore, if relevant, the experiments might be used separately going onwards, making the number of studies 28 and not 25

In total, the studies included 10 different types of measured motor activity. The specific breakdown is as follows: running, bowling, boxing, bag toss, and high jump individually appeared in 1 study. Ball throwing, accuracy task, and darts were each in 2 studies. The balance exercise occurred in 3 articles and the golf putt was the most frequent, specifically in 11 studies.

Table 1 Overview of articles included in the systematic review

Author	Task	Sample	Method	Measurements	Methods of inducing EE	Results
Goudini et al. (2018)	Accuracy task	N = 22 Mean age = 24.66 (Sd = 1.35)	2 experimental groups	Performance	Knowledge of good or bad results.	The group receiving information about their good results showed greater improvement than the group receiving information about their bad results.
Cañal-Bruland et al. (2016)	Accuracy task	N = 33 Mean age = 30.4	1 control group 2 experimental groups	Performance	Optical illusions affecting the perception of object size.	Results showed that training with objects that made the target look smaller resulted in better accuracy and precision in aiming. Training in the absence of optical illusions also had a positive effect on learning. Conversely, training with objects that made the target appear larger did not improve the individual's performance.
Chua et al. (2020)	Balance exercise	N = 36 Mean age = 24.3 (Sd = 5.07)	1 control group 1 experimental group with several levels of testing	Performance	Feedback evoking a sense of ability.	The positive influence of motivational factors (EE, AS) on the performance of the individual has been proven. However, the variables were not tested separately, so an independent effect of EE cannot be inferred.
Williams et al. (2022)	Balance exercise	N = 45	1 control group 2 experimental groups	Performance	Biofeedback in the form of green lights on the avatar in VR.	EE in the form of biofeedback had a positive effect on the motor learning.
Wulf et al. (2013)	Balance exercise on stabiliometer	N = 56 Mean age = 22.3 (Sd = 2.25)	4 experimental groups	Success rate	Different task description and knowledge of good or bad results.	The performance of the participants receiving the good-performing feedback was shown to be better than that reported by the poor-performing feedback group. Differences in the assignment of outcomes also had a significant effect on the performance of individuals.
Pascua et al. (2015)	Ball throw	N = 52 Mean age = 21.5 (Sd = 1.22)	1 control group 3 experimental groups	Performance Self-efficacy	False positive social comparative feedback. Scores were 20% higher than average.	Self efficacy increased in the false positive feedback group. EE had a positive effect on individual performance, however, it had the most significant effect when combined with all components of OPTIMAL theory (AS, EF).

García et al. (2019)	Ball throw	N = 35 Mean age = 20.26 (Sd = 2.16)	1 control group 2 experimental groups	Performance Psychological aspects	False positive, negative or no feedback.	The group that received a positive feedback showed increased values of competence and motivation. Similarly, the group had improved success in throws, i.e. participant performance was also significantly affected. Thus, it significantly outperformed the groups with negative or no feedback.
Ghorbani & Bund (2020)	Beanbag throw	N = 60 Mean age = 21.35 (Sd = 1.86)	4 experimental groups	Performance Self-efficacy	Knowledge of good or bad results.	The good performance feedback showed significantly greater improvement than the poor performance feedback. The motivational effect of awareness of good outcomes on individuals' SE was also demonstrated. For individuals with low SE before testing, SE increased during testing and remained the same for individuals with high SE before testing. Thus, they indicate the importance of motivational factors on learning and performance.
Abdollahipour et al. (2020)	Bowling	N = 36 Mean age = 21.4 (Sd = 1.6)	1 control group 1 experimental group with several levels of testing	Performance	Positive social comparative feedback (false).	Increased success rate of the EE group compared to the control group.
Halperin et al. (2018)	Boxing	N = 15 Mean age = 21	3 experimental groups	Performance	False positive, negative or neutral feedback.	No significant differences were found between groups with positive, negative or neutral feedback. This may have influenced the selection of participants. Elite athletes may not be as susceptible to positive or negative feedback.
Ghorbani (2019)	Darts	N = 36 Mean age = 18-24	1 control group 2 experimental groups	Performance Self-efficacy	Positive, negative or no feedback.	Significantly better results were shown by the group with positive feedback, thus confirming the positive effect of EE on motor learning. The effect of EE on
Wehlmann & Wulf (2021)	Darts	N = 30 Mean age = 26.1 (Sd = 8.28)	1 control group 1 experimental group	Performance Self-efficacy	Relatively easy criteria for success.	The positive influence of motivational factors (EE, AS) on the performance of the individual has been demonstrated. SE was increased in participants in the experimental group during the training phase, however, not before the retention test. The variables were not tested separately, so the separate influence of EE cannot be concluded.
Chua et al. (2018)	High jump	N = 36 Mean age = 24.9 (Sd = 6.41)	1 control group 1 experimental group with several levels of testing	Performance	False positive social comparative feedback (participant's performance is labeled as better than the average performance of others).	Participant performance was positively affected by the implementation of the EE eliciting task.

Marchant et al. (2018)	Putting	N = 26 Mean age = 23.85 (Sd = 7.24)	1 experimental group with several levels of testing	Performance Perception	Optical illusions affecting the perception of object size.	The hole surrounded by smaller circles appeared larger than the hole surrounded by larger circles. This fact affected the performance of the individuals and the group that putted on the perceptually larger hole showed better results.
Arexis & Maquestiaux (2022) (Experiment 1)	Putting	N = 60	2 experimental groups	Performance Perception Type of learning	Optical illusions affecting the perception of object size, different learning criteria.	The illusion created around the hole influenced the participants' perception and performance. Participants putting into a hole that appeared larger due to the illusion showed better results. Individuals in the procedural group also demonstrated better performance on the learning task.
Arexis & Maquestiaux (2022) (Experiment 2)	Putting	N = 60	2 experimental groups	Performance Perception Type of learning	Optical illusions affecting the perception of object size, different learning criteria.	Ebbinghaus' illusion affected perception, with the target surrounded by small objects appearing larger. This had an effect on the individual's performance - performance improved. The results are consistent with Experiment 1 in the procedural and declarative groups.
Maquestiaux et al. (2020) (Experiment 1b)	Putting	N = 40	1 experimental group with several levels of testing	Performance Perception	Optical illusions affecting the perception of object size.	Ebbinghaus' illusion did not manifest itself in the experiment. Participants did not observe differences in the size of the target according to the circles that surrounded them. Thus, it was not possible to determine the effect of the illusion on the participants' success rates.
Maquestiaux et al. (2020) (Experiment 2)	Putting	N = 40	1 experimental group with several levels of testing	Performance Perception	Optical illusions affecting the perception of object size.	The presence of both conditions (perceptually larger and smaller target) affected the individual's perception. Almost 90% of individuals agreed that the target looked larger if it was surrounded by smaller circles. Thus, the Ebbinghaus illusion was present but did not affect performance.
Maquestiaux et al. (2020) (Experiment 3)	Putting	N = 43	1 experimental group with several levels of testing	Performance Perception	Optical illusions affecting the perception of object size.	Due to the floor effect in the previous experiment, the success criteria were changed in Experiment 3 and thus participants should have a greater chance of success. The results of the perception of the target are similar to Experiment 2. However, despite the modification of the method, no effect of the Ebbinghaus illusion on the performance of the individual was found.

Chauvel et al. (2014)	Putting	N = 36 Mean age = 21.7 (Sd = 1.25)	2 experimental groups	Performance Self-efficacy	Optical illusions affecting the perception of object size.	The objects surrounding the target influenced the perception of the participants. The group with the preceptually larger target showed better results in training and in the retention test. Similarly, SE during training was higher in the group with the perceptually larger target.
An et al. (2020)	Putting	N = 36 Mean age = 23.1 (Sd = 2.01)	1 control group 1 experimental group with several levels of testing	Performance Self-esteem	False positive social comparative feedback ("you are doing well, better than average").	No separate effect of EE on individual performance was measured, only the overall effect of the components of OPTIMAL theory (EE, AS, EF). Implementation of all these components in training resulted in increased confidence and significantly better performance than that of the control group.
Ziv et al. (2019)	Putting	N = 45 Mean age = 23.9 (Sd = 2.7)	1 control group 2 experimental groups	Performance	Different task criteria.	Relatively easier task criteria may serve to induce EE and lead to better performance than setting harder or no criteria would. Participants in the easy criteria group were more accurate than both the control group and the harder criteria group in the acquisition phase and more accurate than the control group in the transfer test.
Palmer et al. (2016)	Putting	N = 34 Mean age = 24.6 (Sd = 5.20)	2 experimental groups	Performance	Different task criteria.	Different criterion criteria during training affected performance in both the training phase and the retention and transfer test. Participants in the group with relatively easy success criteria demonstrated significantly better performance in all phases of testing compared to the group with relatively more difficult success criteria. Thus, EEs were confirmed as a positive influence on motor learning.
Ziv et al. (2019)	Putting	N = 45	1 control group 2 experimental groups	Performance	Different task criteria.	Putting with a larger circle around the hole (the easier criterion) led to better results in the transfer test than putting with a smaller circle around the hole (the harder criterion) or putting without a circle.
Ziv & Lidor (2021)	Putting	N = 29 Mean age = 22.8 (Sd = 2.4)	1 control group 2 experimental groups	Performance Expectations of future performance	Different task criteria.	There was no positive or negative effect of EE on an individual's performance; however, expectations of future performance were influenced by different types of criteria.

Chiviacowsky et al. (2019)	Putting	N = 28 Mean age = 23.2 (Sd = 6.71)	1 control group 1 experimental group	Performance Psychological aspects	False positive feedback.	EE in the form of false positive feedback had an effect on the motor learning of the individual, i.e. they showed better results in the retention test. The questionnaire also showed that participants in the experimental group experienced greater feelings of satisfaction with their own performance than participants in the control group.
Bianchi et al. (2022)	Putting	N = 36 Mean age = M = 21.67 (Sd = 1.11), F = 20.75 (Sd = 1.23)	3 experimental groups	Perception	Different task criteria.	The results of the experiment did not support the hypothesis that participants in the , "success early" group would perceive the hole as larger than participants in the , "success later" group or participants in the group with self-control over the choice of distance from the hole. The results showed that the latter two groups, on the other hand, perceived the hole to be larger than the 'success early' group.
Montes et al. (2018)	Running	N = 24	1 control group 1 experimental group	Aerobic capacity	False positive feedback.	The group of participants whose EE were induced had significantly increased aerobic capacity compared to the control group.

Notes: SE = self-efficacy; EE = enhanced expectancies; AS = autonomy support; EF = external focus.

RESEARCH DESIGN

One of the criteria for study selection for the systematic review was experimental research design. However, studies differed in the specific form of the number and type of groups within the experiment. Eight different forms of experiments emerged from the systematic review: (a) 1 control group and 1 experimental group with multiple levels of testing (n = 4), (b) 1 control group and 2 experimental groups(n = 7), (c) 4 experimental groups (n = 2), (d) 1 control and 1 experimental group (n = 3), (e) 3 experimental groups (n = 2), (f) 1 control and 3 experimental groups (n = 1), (g) 2 experimental groups (n = 4), and (h) 1 experimental group with multiple levels of testing (n = 2).

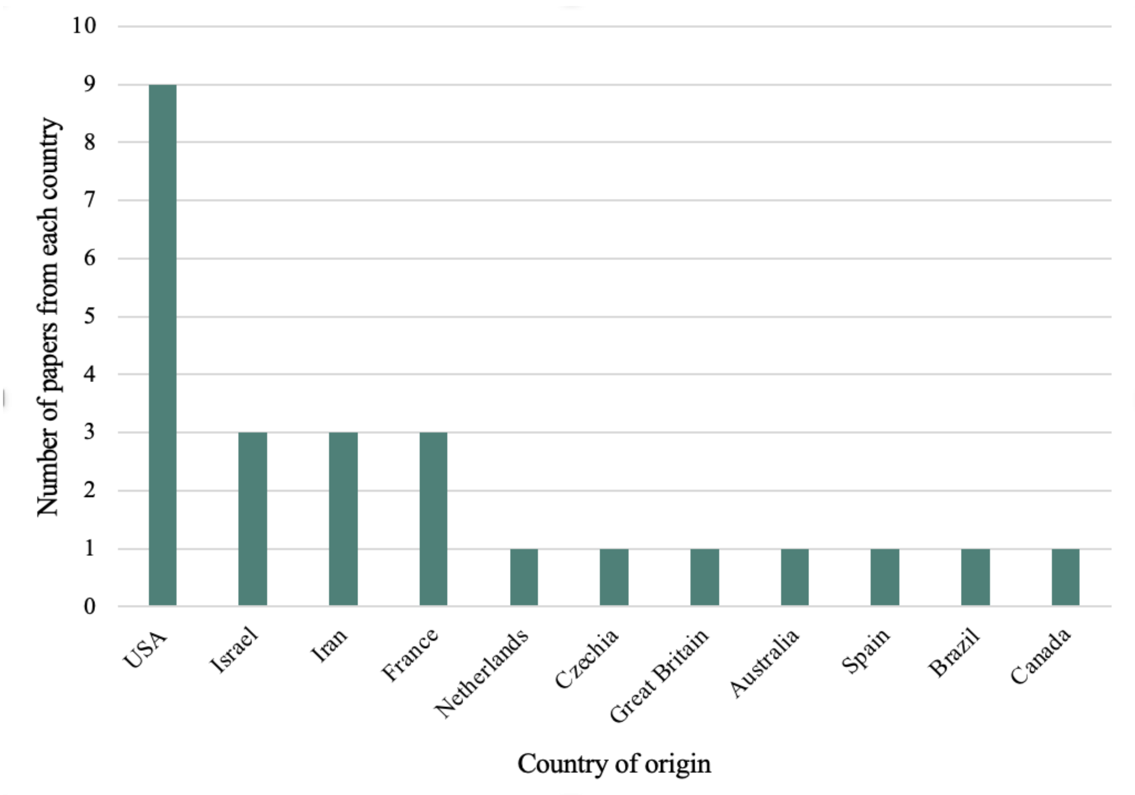
Experimental research design alone was used in 17 studies, experimental design in combination with a scale or questionnaire survey (focusing mainly on self-efficacy, motivation, psychological components) was used in 11 studies.

Sample characteristics

The systematic review included a total of 1074 participants from all 25 studies. The lowest number of participants was 15, while the highest number was 60 participants. The mean number of participants was 43. In 6 studies, the number of participants was less than 30. There were 17 studies in the range of 30 - 49 and 5 studies had more than 50 participants.

In the majority of articles, participants were both male and female (n = 18); however, in 4 articles participants were only male and in 5 articles the gender of participants was not specified. The samples were mostly student participants (n = 16), with 4 studies having participants who were sports students and 2 studies working with athletes. The country of origin of the articles is shown in Figure 2.

Figure 2 Distribution of articles by country of origin



Methods used to enhance expectancies

The main objective of this work was to investigate the sub-methods used to induce EE. Across the 25 articles included in the systematic review, 3 main areas of methods were detected – *feedback*, *differing criteria or assignments*, and *visual illusions*. The detailed distribution of methods according to the studies in which they were used is shown in Table 1. We can note in the table that some authors used multiple methods of different kinds to induce (Arexis & Maquestiaux, 2022; Wulf et al. 2013).

The *feedback* group includes the largest number of articles (n = 14) and includes various forms of method use. It includes social comparative feedback (positive, negative, or neutral), false positive, negative, or neutral feedback, the phenomenon of knowledge of results (KR), i.e. feedback in the form of knowledge of results, or biofeedback. We have a balanced distribution of the remaining experiments into groups of *different criteria or assignments* (n = 8) and *visual illusions* (n = 8).

Several similar types of EE induction fall into the group of *different criteria or assignments*. For example, there are inductions in the form of different assignments for groups of participants, whereby for one group the assignment promotes belief in one's own competence and induces a sense of possible achievement, whereas for the other group the assignment is neutral (Wulf et al., 2013). Another type may be different criteria for a task, or in the learning of a task, i.e. one group may seemingly find it easier to complete the assignment than the other group.

The last group is *visual illusions*. The Ebbinghaus illusion is most often used to induce EE in this form. All the articles in the systematic review use the Ebbinghaus illusion, the principle of which is to project circles around the target (hole, circle, etc.), with large circles projected around the target in the first case (the target appears smaller) and small circles projected around the target in the second case (the target appears larger). The assumption is that small circles around the target and our biased perception of the target as larger should lead to better performance on the tasks.

Across articles we could also find differences in the chosen methodology. In 13 articles, EE were examined only in the testing phase. In some cases, this phase was divided into multiple measurements, however, the phenomenon was not investigated using a retention or transfer test. Both retention and transfer tests were included in 9 articles and only the retention test was included in 6 articles. The time intervals between the testing phase and the transfer and retention tests were also different. In 10 articles, retesting was performed after 24 hours, whereas in 5 articles retesting was performed after 48 hours.

DISCUSSION

The main aim of the systematic review was to explore the different methods used to induce enhanced expectancie, while gaining further insight into current research on the phenomenon.

After establishing the selection criteria and sorting the articles, twenty-five were selected for the systematic review. All articles used an experimental research design that took different forms (see Table 1). Enhanced expectancies were investigated either alone or as part of the OPTIMAL theory. EE were always investigated as part of a motor activity, specifically 10 types of motor tasks were recorded in the studies.

As mentioned in the previous paragraphs, the main aim of the systematic review was to map the different types of EE induction. The methods that emerged from the systematic review were divided into 3 categories. The first category is *feedback*, under which fall the various ways of using feedback. The second category is *differing criteria or assignments*, under which multiple methods are also included. The last category is *visual illusions.* Only one visual illusion was used in the review study and that is the Ebbinghaus illusion.

Out of 25 studies (28 experiments in total), the effect of EE on performance or other factors was not demonstrated in 4. Ziv & Lidor (2021) found that although EE were induced, they did not have a significant effect on an individual's performance. In their experiment they used induction using different task criteria. Interesting differences are shown by experiments by Arexis & Maquestiaux (2022) and experiments by Maquestiaux et al. (2020). In none of the experiments did Maquestiaux et al. (2020) support the hypothesis that the Ebbinghaus effect should affect an individual's performance. Interestingly, however, their initial effort was to replicate the experiment of Witt et al. (2012), which produced results confirming the effect of the Ebbinghaus illusion on both performance and perception of the individual. Maquestiaux et al. (2020) subsequently attempted to manipulate variables (distance from the hole, projection of the illusion), but still failed to confirm the hypothesis. Arexis & Maquestiaux (2022) came up with a change in the form of the original experiment and divided the experiment into 3 phases - learning, perceptual evaluation and performance, with participants divided into a procedural or declarative group in the first phase. Their experiment confirmed the effect of the Ebbinghaus illusion on both perception and performance of the participants. Interesting results came from an experiment by Cañal-Bruland et al. (2016), who in turn found that training on perceptually smaller objects resulted in better performance of the individual. They argue that relatively heavier criteria force individuals to be more focused than lighter criteria. Their results are completely opposite to the hypotheses in this area and raise questions and opportunities for further research in the area of inducing EE using optical illusions.

Halperin et al. (2018) also present results that do not support the influence of EE. However, the study is one of two from this systematic review working with elite athletes. Montes et al. (2018) focused on aerobic capacity in runners and found a positive effect of EE on aerobic capacity, however they only question for future research whether EE would also affect athletes' performance. Stoate et al. (2012) also directed their attention to aerobic capacity, however they considered an effect of EE on performance and this effect was confirmed. Due to the small number of studies investigating the phenomenon on athletes (elite, professional...), it is not possible to assess whether EE have an effect on performance in this group. We encounter mostly simple tasks and participants who have no experience with them. Thus, the variability in performance is significant. While the differences between elite athletes may be quite small and we can even speculate whether the task has such an effect on them. The movements or sporting activity may be more automated and they may not be as sensitive to the researcher's instructions. Halperin et al. (2018) justify not confirming the hypothesis precisely by the learned ability of elite athletes to withstand pressures and stressors from the environment. Athletes do not let themselves be influenced and distracted by environmental factors and performance therefore remains constant.

The current systematic review focused on the adult population. However, research on EE also focuses on children and we can see some differences. The use of visual illusions in children has produced controversial results. Doherty et al. (2010) point out that children are not sensitive to contrast recognition in the Ebbinghaus illusion and thus are not affected by the illusion. They therefore do not recommend its use until at least 10 years of age. Bahmani et al. (2017) confirmed the presence and influence of the Ebbinghaus illusion in 10 year old children. There is also a great emphasis on not using the opposite of enhanced expectancies, i.e., for example, the use of negative feedback and similar methods in children. Positive feedback or positive social comparative feedback has been shown to be a very effective method of creating EE (Simpson et al., 2020).

One of the other important findings that emerged from the review study is the effect of EE on participants' self-efficacy. In 11 studies, the researchers used questionnaires to investigate the effect of EE on self-efficacy, with participants reporting significantly higher levels of SE following the EE intervention. This raises the question of whether this finding could be applied to practice and whether EE could help in real-life situations where the athlete is under severe stress or in tense game situations. McKay et al. (2012) confirm this hypothesis and come up with the idea that EE can have an impact on improving performance under stress.

A large number of researchers have been researching the area of enhanced expectancies, yielding interesting findings. However, we consider it important to point out a limitation that emerged from the systematic review. The number of participants in the 25 studies (i.e., 28 experiments) ranges from 15 to 60. In future research, it would be important to focus on obtaining a significantly larger sample. This change is important to better explore the effect of the phenomenon and possible generalization or application to practice. It would also be interesting to redirect focus of the EE research to different sports. Given the large increase of studies in the field in recent years, we can probably expect new studies and with them new findings.

CONCLUSION

The current systematic review examined the methods used to induce enhanced expectancies, summarized the overall research in the field, but also highlighted the limitations of current research. The current study provides unique information about the enhanced expectancies method itself, as research in this area has focused primarily on all components of OPTIMAL theory.

Three main areas of methods used to induce EE emerged – *feedback, differing criteria or assignments* and *visual illusions.* Feedback has emerged as the most widely used method, with several different forms of feedback (negative, positive, socially comparative) falling under this category. A very important finding is the positive influence of EE on self-efficacy and other psychological aspects related to sport, which can have a significant potential for use in applied practice.

A large body of research confirms the positive impact of EE. Trainers can already incorporate training with induced EE into their training, especially in indoor training areas. To apply EE in natural environments, it is necessary to transfer research in the field to the natural environment as well. If the positive effect of EE is confirmed even in natural environments, training with the method can serve as a prevention against playing anxiety, stress and maintaining high self-efficacy, as well as a significant positive factor in the development of motor learning and performance. Athletes are constantly improving their movements, technique, and mental resilience, and the EE method, through its simplicity and practical application, could significantly impact athletic training. The great advantage of using the method in practice is its easy applicability and versatile use. The method is not limited for a certain type of sports, it can be used in almost any sport. The current research is focused on a narrow range of sports disciplines, we should also focus on research in other sports and observe possible differences in the use of the method within individual and team sports and possible links to age or gender specificities.

Article can serve as a source of important information for subsequent research on enhanced expectancies and can help guide further research in this area.

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