

Title: The Outcome of Sports Vision Training on Collegiate
Softball Players

NCT number: Not assigned.

Protocol ID: 2022-1225-EXP

Date: 04 Aug 2023

Protocol for Softball Study:

Goals to address in vision training: increase eye hand coordination, peripheral awareness, visualization, concentration, depth perception, anticipation, contrast sensitivity, target accuracy, and decrease reaction time.

There are 23 ladies on the softball team. There is an eight week vision training protocol developed, not including the pre-evaluation and post evaluations, wash out and final evaluation. The training will be a required once per week 45 minute training session. They will have signups for 2 per hour so we can ensure high quality training, with strict adherence to the protocol.

There are eight tasks for each session. It was recommended to change the order of the task each week to account for order effects. So I have different training sheets for each week stapled to their others for continuity. The week one training sheets are in the Softball Folder. Please be diligent in keeping track of time, as to not go over time. You must follow the specific order of activities each week. If a conflict arises, then please make a note on which activities were completed out of order.

I have timed the protocol to be 38 minutes when I walked through it so that leaves a few minutes for changing areas etc.

No one is allowed to engage with the study participants unless they have given me their CITI training, this includes the Optometry students. If in doubt do not engage with the participants.

Most of the activity's difficulty can be adjusted to be MORE difficult for progression. They cannot be made easier than the base protocol though, so please do NOT make any activity easier. If you run out of time to complete a task just note it.

General Coaching Guidelines:

1. Always use positive reinforcement. Patients should always be verbally rewarded for good effort. If a patient is unsuccessful at the required task, the therapist should encourage the patient and commend his hard work.
2. Always ask patient how their eyes feel and how they are doing throughout each task. The therapist should try to establish an awareness on the part of the patient of what they are doing to keep the targets clear, single, and visible as they accomplish the task. The therapist should encourage the patient to keep the eyes working together and keep the targets clear throughout each activity.
3. Active, enthusiastic coaching is critical to help the patients maintain motivation and engagement with the activities. If a patient is becoming frustrated, encourage them through the activity, and modify it to ensure it is difficult enough to challenge the patient, but not so difficult as to prohibit them from accomplishing any of the task.
4. Always respect the patient's training time. Avoid overtime in offering the vision therapy.

TASK DESCRIPTIONS AND PROGRESSION

-Brock string 3 minutes timed

- Fixation 1) The patient is comfortably standing. The feet are shoulder width apart, pointing straight ahead. 2) Instruct the patient to hold the string taut at her nose and ask him/her to look at the closer bead (let's say green bead and red beads are placed closer and farther respectively) and describe what he or she sees. Because of physiological diplopia, the patient should report that he/she sees one green bead and two red beads. In addition, the patient should perceive two strings crossing the green bead (or "X" at the green bead), with one string extending from his or her right eye and the other appearing to extend from his or her left eye. 3) Ask the patient to fixate the far bead, and he/she should now report one red bead with the strings crossing at the red bead. The patient will also see two green beads.
- Smooth Vergence 1) Using the same set up instruct the patient to fixate on the closest bead. While he/she is fixating on the closest bead, move it slowly towards the farther bead. The patient should be appreciating accurate fixation without suppression at all times. Once it reaches the farther bead, slowly bring it back to its original position while he/she is fixating on the moving bead. 2) Repeat the procedure until the patient can comfortably perform the task. Change the distance and speed to make the task more challenging.
- Jump Duction 1) Set 3 beads at 1, 2, and 3 feet. Instruct the patient to fixate on the closest bead for a few seconds, and then to fixate on the second and third beads for a few seconds each. Then instruct the patient to fixate on the middle and the closest beads. Repeat the procedure until the patient can comfortably perform the task. 2) Move the closest bead closer to the patient and repeat the procedure.
- Bug on a String 1) Use the two beads set at 1 and 2 feet from the patient. He/she initially fixates on the closest target appreciating the "X" at the bead. Ask the patient to slowly move the "X" from the closest bead to the second bead until the "X" is at the second bead. Once he/she reaches the second bead, instruct him or her to slowly move it back to the first bead. Repeat this a few times. 2) Once it becomes easier, instruct the patient to move the "X" much slower. 3) Also increase the distance between two beads to make the task more difficult.

Fixation only needs to be explained the first week, then you can confirm, are you seeing it correctly? Then move on to smooth vergence, again this could just be done during the first week and then more advanced exercises can be performed at other sessions. After the athlete is comfortable with fixation and smooth vergence, move on to jumps and bug on a string. We can incorporate multiple strings to progress difficulty, or you can also use BOP/BIM (Base-out Plus/ Base-in Minus). Introduce Plus lenses OU when the patient is converging (i.e., fixating at the closest target). Introduce Minus lenses OU when the patient is diverging (i.e., fixating at the farthest bead). Just note any progression details for continuity. Please start with 3-beaded strings and only advance to the 5-beaded strings when looking to increase difficulty.

-Strobe goggles 6 minutes timed

Ask the required screener question, "Do you have history of epilepsy or seizures?" before use. We will be using strobe goggles in setting A (binocular strobing, OD/OS at the same time). This is a timed activity, 6 minutes. Start at level 1 the first week. The strobe goggle level can increase as the participant becomes proficient, which is noted by 6 glove hand catches in a row.

Record the level of strobe and what task ended on. Tasks are included below:

1. Catching
 - a. Pair the subject with another person.
 - b. Instruct the subject to catch tennis balls as they are tossed in their direction
 - i. Option Level 1: bounce pass to athlete, using either both hands or glove hand but athlete cannot advance to next strobe goggle level until successfully catching 6 with glove hand only
 - ii. Option Level 2: balls tossed from the air at chest height, using either both hands or glove hand but athlete cannot advance to next strobe goggle level until successfully catching 6 with glove hand only
 - iii. Option Level 3: two different color balls used, subject catches the ball based on the pre-announced catching style for each color. Balls tossed from the air or bounced from the ground, athlete must try to catch the red ball in a high-hand way and the green ball in a low-hand way (colors may vary, just choose two different color balls that athlete must distinguish for either a high- or low- catch). Cannot advance to next strobe goggle level until successfully catching 6 with glove hand only
 - iv. Option Level 4: duplicate levels 1-3, with two balls and catching with both hands simultaneously. Cannot advance to next strobe goggle level until successfully catching 6 consecutive balls

-Eye Metrix Double Eye speed scanning timed 3 minutes

I will be re-arranging the eye metrix board weekly.

Be mindful of head movement, use just your eyes. Give them a laser pointer to follow along and ensure accuracy. They should use scanning techniques and grouping. Use the two number boards, this will be timed so they will start for example at 50 and work their way down, finding as many numbers as possible while alternating boards for the even and odd numbers, or every other number switch to the other board. Record what number they make it down to. If they are able to find all 50 numbers before 3:00 is done, then instruct them to start over at 50 and work their way back down and then record the total number of numbers found (50-1, 50-42)

-Synchrony

Using the synchrony light rail and the cell phone. There will be four tasks, they will do each task twice. They are titled "SB Research Inbound", "SB Research Outbound", "SB Research SLOW Inbound", "SB Research Go/ No go". The participants will "step in" and "step out" of the "batting box" for each task trial, this is to simulate their batting procedures. Have the participant stand in their batting stance in

orientation to the light rail. Use the hand held trigger. Record the Average Error and the Smallest Error of the best of the two trials.

Inbound: This is a timing task, the red/green flashing light will travel towards you at a high rate of speed (10-20mph variable) while green. You will anticipate when the green light is going to reach the white light target that is close to you, and respond with the trigger when the light is aligned with the target.

Outbound: This is another timing task, the red/green flashing light will travel away from you at a high rate of speed (10-20mph variable) while green. You will anticipate when the green light is going to reach the white light target that is at the far end of the light rail, and respond with the trigger when the light is aligned with the target.

SLOW Inbound: This is a timing task, the red/green flashing light will travel towards you at a slow rate of speed (8-12mph variable) while green. This is to mimic a slow pitch. You will anticipate when the green light is going to reach the white light target that is close to you, and respond with the trigger when the light is aligned with the target.

Go/ No go: You will see a white light as your target close to you. At the far end of the light rail you will see a flashing green/red light that will move towards you at a high rate of speed (10-20mph variable), it may turn red or it may turn green. If it stays green you will react, as green is "go" and try to hit your mark, aligning the green light with the white target. If the moving light turns red, you will not react, as red is "no go".

-Near Far Shift on Senaptec

Use setting "SB Research". Perform this three times and record their best score; the higher score is the better score. Have the participant stand at the 10 foot sticker, hand them the cell phone. Explain they want to go as fast as possible. Starting on the large screen three letters will appear, then on the phone at near, alternating back and forth. Two of the letters will point in the same direction, you must swipe on the cell phone in the direction that the two letters are with the similar orientation. Then switch your focus to near, to the phone and complete the same task. Cycle back to the large screen etc. Hold the phone up high to make the switch easier. You are penalized for wrong answers so maintain accuracy.

-Spatial Memory on Senaptec

Use setting "Softball 8". Perform this three times and record their best score; the best score is closest to zero since it's calculating distance error. Have the participant stand 2 feet from the large screen. Explain this is not for speed. There will be 8 baseballs that will be the targets, they will appear all at once, across the screen in various locations. The participant will have to remember where they were displayed and once they disappear tap the screen in the location the 8 targets were.

-Dynavision

Use "Proactive 60 seconds, 4 digit" and "Reactive 60 seconds, 4 digit settings". Perform each setting twice and record the best score and average reaction time. Adjust the height of the board for the athlete to touch the top and bottom buttons comfortably. Explain they are hitting as many of the red

lights, as quickly as possible once they light up, use GLOVE HAND ONLY. Use your peripheral vision to detect the lights, there will be a central stimulus of 4 digits you must verbally call out as they appear.

Explain the two modes; Reactive the lights will disappear if you are not quick enough. Proactive the lights will stay lit until you tap and deactivate it.

-SVT Go No Go

Use the setting “Research Softball Go-No go”. Repeat it twice, record their best score. Adjust the height of the board if needed. The participants must touch/deactivate the lights as quickly and accurately as possible using BOTH HANDS. They must recognize and decide to react or not react based on the colors given to them for Go, and No Go. Go will be yellow, like a softball. Brown will be No Go. The stimulus interval can be decreased by 50um intervals if the participants are achieving over 75% accuracy of Go. The interval cannot be increased to make it easier. Record % Go, % No Go and Time Interval.