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Using Video Feedback to Improve Horseback Riding Skills

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by

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ABSTRACT

This study used video feedback to improve the horseback riding skills of advanced beginner riders. The study focused on three skill sets, those used in jumping over obstacles, dressage riding on the flat, and jumping position riding on the flat. Baseline consisted of standard lesson procedures. Intervention consisted of video feedback in which a recorded attempt at the target behaviors was immediately shown to the rider and the instructor. The rider and instructor reviewed the video while the instructor delivered feedback. Target behaviors were scored according to checklists that correspond to each skill. For all participants, video feedback increased their correct riding skills.

INTRODUCTION

Video feedback has been evaluated to improve performance in a variety of contexts. For example, video feedback has been utilized to improve maternal behavior in mothers of children with developmental disabilities (Phaneuf & McIntyre, 2007), to improve peer interactions of boys with severe behavioral and emotional challenges (KernDunlap et al., 1992), and to reduce risk of back-injuries of nurses due to improper patient lifting techniques (Nielsen, Sigurdsson, & Austin, 2009). However, limited research has been conducted in the area of sports. Video feedback consists of showing an athlete (or the performer of a skill) a video clip of his or her own performance of a particular skill (Boyer, Miltenberger, Batsche, & Fogel, 2009). As the athlete views the video of his or her performance, the athlete receives corrective and positive feedback, identifying where and how the performer can improve in future performances. Improving athletic behavior quickly and efficiently is important when complex skills are involved due to the inherent safety risk when skills are performed improperly or with poor form.

Video feedback provides feedback on a completed performance and serves as a model for the correct behavior, which complements traditional training by adding a visual component to verbal feedback and instruction. Many of the sports-related studies that have looked at video feedback study the effects of video feedback within a multi-component intervention. Multi-component interventions can include behavioral coaching, group video review, and modeling (Hazen, Johnstone, Martin, & Srikameswaran, 1990).

Behavioral coaching features a number of training components including verbal instruction, prompting, performance feedback, goal setting, and positive reinforcement (Stokes, Luiselli, Reed, & Fleming, 2010). This type of intervention has been used in a variety of sports, such as swimming (Hazen et al., 1990), ballet (Fitterling & Ayllon, 1983), track (Shapiro & Shapiro, 1985), basketball, tennis, and football (Allison & Ayllon, 1980). Behavioral coaching has been shown to be more effective than traditional coaching (Allison & Ayllon, 1980). Some interventions that utilize behavioral coaching do not include video feedback, but when included, it has resulted in increased performance.

A second type of a multi-component intervention is group video feedback. Hazen et al. (1990) compared a group video feedback intervention to an individual video feedback intervention in improving swimming behavior in young children. Group video feedback had little to no effect on the children's swimming behavior; whereas, the individualized video feedback had dramatic and immediate effects. The results of this study suggest that individualized approaches involving video feedback produce better results than when video feedback is presented in a group format. Studies utilizing video feedback multi-component interventions (including behavioral coaching that has a video feedback phase) have also been shown to increase performance. Furthermore, in social validity measures, participants rate the video feedback phase of the multi-component intervention higher than any other part of the intervention (Stokes et al., 2010). Though the results of video feedback interventions are promising, it is difficult to determine if video feedback is the specific component leading to the effective behavior change independent of the influence of the other components.

Another multi-component intervention method that utilizes video feedback to improve athletic performance is video modeling. Expert modeling consists of video recordings of experts

performing the skills as exemplars for the targeted skills. Expert modeling has the benefit of providing a flawless example of the behavior required to successfully perform the complex skill and motivating the viewer to execute what he or she has learned through the observation of the expert video (Baudry, Leroy, & Chollet, 2006).

Baudry et al. (2006) examined expert modeling to improve performance on the pommel horse. The group that received the video modeling exhibited better body position than those that did not receive any video modeling exposure. Similarly, Boyer et al. (2009) used video modeling and video feedback to improve complex gymnastic skills on the uneven bars. The researchers found that the gymnasts improved their skills after receiving the combination of video feedback and video modeling by experts.

Although video feedback can be an integral component in the above mentioned intervention methods, research has also shown that when video feedback is assessed as the sole intervention, it may be effective in improving correct performance. Rikli and Smith (1980) assessed the effects of video feedback on improving tennis serves. The authors compared those who received video feedback at different points of the training to those who did not receive video feedback. The groups that received video feedback had significantly higher levels of performance than those who did not receive video feedback. The researchers observed high levels of performance regardless of when the video feedback was administered, suggesting that video feedback interventions may beneficial at various points in training (Rikli & Smith, 1980). Video feedback was also used in a study to improve capoeira skills (Brazilian martial arts combining dancing and fighting) (Benitezsantiago & Miltenberger, 2011). This study, unlike other video feedback studies, included a practice phase after the video feedback phase. Video feedback resulted in higher levels of skill completion, and video feedback coupled with extra

practice resulted in even higher levels of skill completion. The results of these two video feedback studies suggest that video feedback alone is effective in improving skill performance, but further investigation is still required.

In another evaluation of video feedback, Licht (2009) used the technique to decrease errors in horseback riding behavior. Although the study concluded that video feedback did not have a great effect on decreasing jumping errors, there were a number of limitations in the study. For example, the target behaviors were focused on riding errors rather than components of correct riding. Also, the participants were scored while completing a course of multiple jumps rather than a single jump. Because the targeted performance involved multiple jumps in a row, each lesson only allowed for one opportunity to receive video feedback and no further attempts to practice after receiving the feedback. In some cases, the target behaviors were not attempted again for weeks after the initial recorded attempt. Another limitation was that the participants received video feedback in a delayed manner. The participants viewed their video and received feedback after their lesson, rather than immediately following the recorded jumps. Research on the successful use of video feedback to improve sports performance focuses on immediate feedback after each performance of a skill (Benitezsantiago & Miltenberger, 2011; Boyer et al., 2009). Participants were also encouraged to view the recordings of their rides online after each lesson in hopes that they would review prior to their next lesson. These limitations, as well as technological limitations, could have hindered the effectiveness of the video feedback intervention.

Due to the paucity of research in the area of video feedback and sports generally, the fact that only one unpublished study has evaluated video feedback for improving horseback riding skills (Licht, 2009), and the fact that this study was fraught with limitations, this research

evaluated video feedback as a sole intervention in improving the behaviors associated with horseback riding when compared to traditional methods of teaching horseback riding (verbal instruction and verbal feedback). Video feedback was performed to improve the correct position while either jumping or riding on the flat. In contrast to the Licht (2009) study, the video feedback immediately followed the performance of the target behavior. The immediacy of the feedback and focus on target behaviors to increase rather than decrease address some of the limitations of the Licht (2009) study.

This study is important due to the inherent risk when riding a horse in an incorrect position. Horses can be dangerous animals and the sport of horseback riding can be associated with serious injuries. A correct position while riding serves to protect both the rider and the horse. Having the correct position also enables the rider to be more effective. When the rider is in the correct position, his or her aids (the parts of the riders body that communicate directions to the horse) can accurately and effectively control the horse's pace, position, direction, etc. This is critical especially when the horse is jumping because the rider's correct position will ensure the horse can clear the obstacle without interference from the rider, thus ensuring the safety of both the horse and the rider.

METHOD

Participants and Setting

Four female riders, ages ranging from 11-53, were selected to participate based on their riding experience. Hailey was an 11-year-old girl who had been riding for a year and a half. Though other physical activity was not good for her, due to a heart valve condition, she was able to ride horses without problem. Abby, was a 45-year-old woman diagnosed with a neuromuscular disorder called Charcot-Marie Tooth disorder. In this disease, motor and/or sensory peripheral nerves are affected, leading to muscle weakness and atrophy, especially in the legs and feet ("Charcot-Marie-Tooth Disease Fact Sheet", 2007). Though detrimental, her neuromuscular disorder still allowed her to ride and compete; yet some riding remained more difficult for her than for someone without the disorder. Abby had been riding for three years, with the first year and a half starting at a very low level with physical guidance from a instructor on the ground. She had been competing as a para-dressage rider for the past year. Though other major physical activities were not recommended for her, she was able to ride horses without issue. Gwen was a 52-year-old woman who had been riding since childhood. She had recently purchased a new horse, and was working on developing her riding while becoming familiar with him. Megan was a 55-year-old woman who had been riding since childhood. Despite having ridden for most of her life, she had started taking lessons again over the past two years.

Each of these participants had at least four months of experience in which they were taught the basics of riding, including guiding the horse independently from physical guidance with only verbal instruction from the instructor. Three of the four participants were taking

regular, weekly lessons during the course of the study. Only Gwen was not taking regular lessons, though she rode regularly. The lessons and feedback were provided by a dressage and jumper riding instructor with over 40 years of experience in both riding and training. The instructor also had experience as a judge at dressage shows and as a provider of training clinics.

The study took place at a privately owned riding facility in Ocala, Florida. The farm had a large competition sized, uncovered riding space (33.5 m x 64.6 m) surrounded by a low fence, which allowed ample room for riding maneuvers. The ring had multiple jumping obstacles that could be arranged and adjusted to fit the experience of the rider and horse combination. The researcher whom recorded the video stood in such a way that she did not interfere with the action of the horse and rider. The riding space could be set up for jumping or flat work, in both dressage style and jump style. Jumping without going over obstacles, also known as "jump seat" or "hunt seat" riding, involves guiding the horse through the three gaits (walk, trot, and canter) while maintaining a more forward position. This style of riding is how a horse and rider get from jump to jump. Jumping over obstacles involves the horse and rider pair jumping over various obstacles without knocking any part of the obstacle down. Dressage riding involves precise movements of the horse, controlled by cues from the rider (Merriam-Webster's online dictionary, n.d.).

The three riders took regular lessons trained from 1to 4 hr per week. The only participant that did not take lessons trained for 1 hr per week for most weeks. The intervention took place during a normal lesson (or training ride for the participant that did not take lessons), after the horse and rider sufficiently warmed up but prior to instruction on any target behaviors. Participants either rode their own horses (as was the case for Abby and Gwen), or a horse provided by the farm during their lessons (as was the case for Hailey and Megan). Each lesson,

in baseline and intervention, involved one rider-horse pair receiving instruction from the instructor at the farm. Lessons typically lasted 20 to 45 min.

Materials

The materials for the study included a Kodak Zi10 PlayTouch HD Video Camera (6 cm by 11 cm in size) to record the riding behavior, and an Apple MacBook Pro (with a 38.1 cm matte screen) on which the participants viewed the recorded video.

Target Behaviors and Data Collection

The behaviors that make up three correct riding positions were targeted in this study. The three different position styles were, jumping position over a jump (obstacle), the dressage seat on the flat (without any obstacles to jump over), and the jumping seat on the flat (also without obstacles to jump over). The components of the three target behaviors are listed in the task analyses in Appendices A, B, and C. If the rider was working on improving her jumping skills, the targeted behavior was a correct position while jumping an obstacle (see appendix A). The task list that makes up the correct position while doing flat work in a dressage style is listed in Appendix B. Lastly, the task list that makes up the correct position on the flat while riding in a forward/jumping style is shown in Appendix C.

Once the horse and rider completed their warm up, target behaviors were attempted and video-recorded. Multiple attempts per lesson were conducted, as time and energy level of the horse and rider permitted. Data were collected using task analyses developed by consulting an expert instructor as well as comparing many photos of expert riders considered to have good position. Participants were scored using stills, or screenshots, taken from each video recording session. The jumping position over fences still was taken when the horse's front legs were positioned up and over the fence. Stills for each of the flat riding positions were taken from

within 2 s of the midpoint of the recordings. Midpoints were calculated by taking the total amount of time in which riding was recorded and dividing it in half and if the view of the rider was obstructed for any reason, the still was taken from 2 s before or after the midpoint for most stills. Some stills were taken from further from the midpoint if the video was not clear (mostly due to sun glare in the camera recording) during the midpoint window. Each component of the task analysis that was present during the collection period received a score of 1. Target behaviors that were not present or not correct received a score of 0. If the target behavior was, for whatever reason, not visible or clear when the video was reviewed, the target behavior was scored as "not clear." Each time "not clear" was marked, the video was reviewed and subsequent recording positions were altered so that all behaviors were consistently visible.

Interobserver Agreement

Interobserver agreement (IOA) percentages were obtained during 33% of sessions in each phase. A trained scorer evaluated each session independently from the main scorer. The separate ratings were compared to determine the percentage of agreement between the scorers. The percentage of agreement was determined by dividing the number of agreements for the items on the task analysis for each skill, by the number of agreements plus disagreements. Agreements are defined as both independent scorers having marked a 1 or a 0 for each component of the task analysis. For Hailey, IOA was 90.6% (range 72.2%-100%) for jumping position while doing flat work and 92.1% (range 83.3%-100%) for jumping position over fences. For Abby, IOA was 91.7% (range 72.2%-100%). For Gwen, IOA was 94.1% (range 83.3%-100%). For Megan, IOA was 93.2% (range 88.9%-100%).

Design and Procedure

The effects of video feedback were evaluated in a multiple baseline across participants design with each participant being scored on the task analysis that corresponds to her style of riding. A multiple baseline across behaviors was also conducted with Hailey for jumping position on the flat, as well as over fences.

Baseline. Baseline was conducted during typical lessons or training rides for each of the participants. Typical lessons included verbal instruction to engage in the targeted riding behavior and the riders receiving verbal feedback about their performance throughout the lesson. The riders did not see their videos and no video feedback was provided during the baseline phase.

Video feedback. Video feedback was provided in the same context as the baseline phase with verbal instruction and feedback from the instructor throughout. After the horse and rider warmed up, the participant performed the target behavior while being video recorded. Immediately following the execution of the target behavior the participant, while still on the horse, viewed the video with the instructor and received feedback from the instructor. The instructor and participant viewed the video together, utilizing the play, pause, and replay features of the video playing software. The video was played through, and then paused in such a way that the instructor could provide feedback on the rider's position more easily. The instructor gave positive and corrective feedback on each part of the rider's body and corresponding position during the review of the video and paused video frame. After each attempt to perform the target behaviors, the video was reviewed and feedback was given as previously described. Two to ten attempts were recorded per lesson, and following each attempt, the participant received feedback while the video was being reviewed.

Treatment Fidelity

Treatment fidelity was assessed during 47.1% of intervention sessions for the feedback given by the instructor. The checklist was separated by parts of the rider's body and her corresponding positions that should be addressed in feedback, such as the head, torso, arms, hands, seat, legs, and feet. As the instructor gave advice on each part of the rider's body, it was marked off on the checklist as either, "yes" the part was covered, or "no" the part was not covered in feedback (see appendix D).

Social Validity Measures

Social validity was measured using a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*), similar to the social validity questionnaire used in Boyer et al. (2009). The scale and a set of questions (different, depending on their role in the study) were given to the participants and the instructor to rate how beneficial the procedure was and how much the procedure was liked (see appendices E and F).

Another measure of social validity was conducted using baseline and intervention videos. Two expert riders and instructors were randomly shown three selected videos from the end of the baseline phase, and three selected videos from the end of the intervention phase of each participant; the raters were blind to the phase of the video he or she viewed. The raters evaluated each video using a statement and a Likert scale (1 = *strongly disagree*, 9 = *strongly agree*). These statements for each style of riding are listed in appendix G. The exception to this being Hailey's jumping position over fences position footage. Due to the very short nature of the jumping recordings and the fact that they include the approach and landing, it was decided that using stills for this social validity would result in the expert being able to focus on the part of the jumping sequence that was targeted in this study. The same type of Likert scale used for the

other participants was used for rating Hailey's jumping photos as well (the scale is listed in appendix G).

RESULTS

Results are shown in figure 1. The video feedback intervention was successful in increasing the correct behaviors substantially from baseline levels for all participants. Two types of means are reported for the intervention phase, whole phase means as well as end of phase means. The end of phase means were determined by averaging the last seven data points for the phase.

Hailey's correct riding behavior for her jumping position on the flat increased from a baseline mean of 52% to an intervention mean of 90.7%. Her end of intervention mean was a 97.6%. During intervention, Hailey rode multiple different horses and reached 100% correct position on each horse. For Hailey's riding behavior of jumping position over fences, correct riding behavior increased from 44.9% in baseline to 88.1% in intervention. Her end of intervention mean was 92%.

Abby's correct riding behaviors in dressage increased from a baseline mean of 53.4% to a mean of 83.6% throughout intervention. Her end of intervention mean was an 88.9% (this corresponds to missing only two items on the task analysis for this skill set). Abby's data also include scores from two competitions in which she competed with her horse. Her scores from two competitions were both at 88.9%. In the two competitions, she received a first and a second place ribbon.

Gwen had a baseline mean of 51.7% and increased her correct riding behaviors in dressage to an intervention mean of 87.2%. Her end of intervention mean was similar at 88.1%.

Unfortunately, due to Gwen's horse sustaining an injury requiring surgery and time off, we were unable to collect more data.

Megan's correct riding behaviors in jumping position on the flat increased from a baseline mean of 47.6% to an intervention mean of 87.4%. Her end of intervention mean was 93.6%, with multiple data points at 100%.

Treatment fidelity was assessed as the percentage of items the instructor covered during feedback according to the checklist in Appendix D during 47.1% of all intervention trials. The average of treatment fidelity for all participants was 96.5%. Individual treatment fidelity averages for Hailey, Abby, Gwen, and Megan were 99% (for both of her behaviors combined), 94.1%, 100%, and 94.7%, respectively.

The results of the social validity questionnaires are displayed in Table 1 for participants and Table 2 for the instructor. Each number in the table represents the number of times that response was selected by a participant or instructor. Social validity for participants was only obtained from Megan, Abby, and Hailey. Results of the social validity for experts are as follows: For Hailey's jumping position while doing flat work end of baseline videos, the average score was 5. For her end of intervention videos in jumping position while doing flat work, the average score was 7.5. For Hailey's jumping over fences photos, the baseline photos received an average score of 3.5. The end of intervention photos received an average score of 7.5. For Abby, her end of baseline videos were scored as an average of 5.5. Her end of intervention videos were scored as an average of 7. For Gwen, baseline videos were scored as an average of 4 and her intervention videos were scored as 7.2. Megan's baseline videos were scored as an average of 5.5 and her intervention videos were scored as 7.2.

DISCUSSION

The goal of this study was to investigate the effects of video feedback on enhancing horseback riding skills. The results show that the video feedback intervention substantially increased the correct position skills of the participants. By adding video feedback to a typical lesson format, participants improved their correct position skills more so than with the traditional lessons alone. In addition, based on the social validity results, participants perceived a marked increase in their correct riding position skills. These results show video feedback is an effective intervention for increasing horseback riding skills in advanced beginners. Some improvements were more gradually than others (as with Abby and Megan), and some were almost immediate (as with Hailey and Gwen). All four participants reached levels of 100% correct steps on the task analysis in some trials by the end of the study. Abby reached 100% correct only once on her task analysis, which can be explained partially due to her neuromuscular disorder. Her condition is characterized by an inability to keep her heel level with or lower than her toes, due to lower muscle ability in the lower leg. She exhibited these steps on the task analysis intermittently throughout the study, so it is believed that she has the ability to complete these steps but that they were more difficult due to her limited physicality.

Contrary to the findings of the Licht (2009) study, video feedback in this study was effective in improving horse back riding behaviors. The immediacy of the video feedback procedure, as well as the brevity of the recorded footage that was reviewed during video feedback, are believed to be the reason the procedure was so effective. In the Licht (2009) study, the feedback was given up to a week later instead of immediately as it was in this case. Also, the

videos in the Licht (2009) procedure were taken of a full course of jumps, which could make for long videos that are not practical to watch or receive immediate feedback. Some of the videos in the present study were only 10 s long, which made them easier to view immediately. While watching the brief videos, the riders viewed their performance easily and almost immediately and discussed possible methods of improvement in near real-time.

One important component of this study is the professionally developed task analyses. The task analyses were created by using expert photos and recommendations, as well as input from the instructor, that provided the feedback in this study. The input from the instructor was important so that the task analyses were consistent with is the skills being taught in the typical lesson format. If the task analyses did not correspond to the skills being taught in the lessons, the riders' position may not have improved.

Another important component of the study was the social validity. Both the participants and the instructor rated the intervention very highly. Throughout the study, the participants commented on how much they enjoyed seeing themselves on video and receiving feedback on their performance in such a unique way. Megan commented that sometimes, while she is riding, it is difficult to hear the instructor. She stated that when she watched the videos, she was able to receive the visual feedback and clearly hear the original comments from the instructor. All participants reported that the intervention was a positive experience that benefitted them. Though viewing oneself on a video was a challenge for some at first, the participants benefitted from the video feedback and improved their skills on the whole.

The procedures in the present study allowed for a form of immediate feedback, which was a potential problem in past research (Licht, 2009). In the present study, feedback was given within a min of the participant completing the target behaviors and results are similar to studies

that also involved immediate video feedback (Benitezsantiago & Miltenberger, 2011; Boyer et al., 2009). Because the recordings were viewed immediately after the target behaviors were attempted, the participants analyzed their position while the experience was still fresh; allowing them to remember the way they just performed the skills, how the performance felt, and upon reviewing the video, how it appeared while they were riding.

The nature of riding lessons involves improving the rider's skills while riding different horses, and testing the rider's skill set in competitions (for most riders, some do not compete). The results show that the skills generalized to riding different horses and generalized to riding in competition. In this study, both Megan and Hailey rode multiple horses during the study. This is an important result because for riders to be considered adequate at riding, it is important to be able to ride any trained horse with similar levels of skill (barring any extraneous situation that may make the horse more difficult to ride). Along with testing skills on different horses, competition is an aid in benchmarking riding skills; Abby was able to test her skills in a dressage competition during the course of the study, which further helped to show the feedback's effectiveness. During dressage competitions, the judge scores the rider's ability to navigate a series of movements (e.g., circles at certain sizes, riding down the center of the ring, different gaits at different times) as well as riding positions. During competition, Abby received a first and a second place ribbon for two different dressage tests (competition rounds). The participants' target behaviors persisted at high levels while riding different horses (in some cases, higher than when riding their typical lesson horses) and while being tested at a competition level after the intervention was in place.

Due to the nature of the target behaviors (they persist throughout walk, trot, and canter), the participants were able to pinpoint specific gaits they needed to work on, specifically their

positioning, and then receive video feedback on the behaviors requiring additional attention. Coincidentally, this allowed for the participants to work on parts of their riding in which they wanted to gain skill, and practice for their more important shows or other trainings. For example, Abby often requested video feedback on her sitting trot, and because the screen shots were taken while the riders were in the saddle during the trot, this request was easily honored. Likewise, Hailey had been working on improving her canter position and requested video feedback on that gait, thus lending more beneficial feedback for the rider to improve. Because the position is the same for all gaits, the participants can choose a gait that they have been working on or know is weaker than their other gaits. In typical lessons, each gait is practiced in a way that one is comfortable, and in correct position at said gait before moving on to the next gait level. First you master the walk, followed by the trot, and then finish with the canter. As the participants in this study began making progress on their trot gaits, they eventually progressed to canter (as was the case with Hailey and Megan). Although, Gwen worked on her canter more often and Abby exclusively worked on the trot throughout the whole study.

One issue with the results for Abby was that the jump from baseline to intervention was not as pronounced as some of the other participants. This could be due to one of two issues. One, it is possible that due to the lower muscle level in her lower leg she needed more practice to be able to hold the correct position; or two, Abby's treatment fidelity started off around 80% for four sessions of intervention before suddenly reaching 100%. Once treatment fidelity was finally stable at 100%, Abby's intervention data followed suit and quickly increased.

One limitation of this study was the lack of follow up data. Because of Gwen's horse's injury, Abby's physical injuries, and a lack of time, it was not possible to collect follow up data. In future studies, it would be beneficial to see how the participants performed when video

feedback was no longer provided. If this study were to be replicated, examining the effect of the removal of video feedback would provide further information on the effectiveness of video feedback.

The implications of this study are that sports using video feedback should do so with more immediacy than is typically found. When athletes receive video feedback, it can be days or weeks after the performance. In this study, the feedback was provided within a min of the target behaviors being completed and proved to show the desired results.

In the future, immediate video feedback, like the video feedback used in this study as well as in others (Benitezsantiago & Miltenberger, 2011; Boyer et al., 2009), should be assessed over a variety of sports. If immediate video feedback is as effective for other sports as it is with horseback riding, it could greatly improve training results. Because correct position is an important component in many sports, this intervention can be applied in other situations and be beneficial in making training effective as well as time efficient.

Another potential direction for future studies involving video feedback and sports would be to determine what component of the video feedback procedure is the most effective.

In the future, it would be interesting to see how expert video modeling would have affected the results. The addition of expert video modeling could provide an example of flawless performance that might have an additive effect when combined with video feedback. A future study could compare the rate of acquisition among video feedback alone, video modeling alone, or the combination of video feedback and expert video modeling.

This video feedback procedure allowed for normal lessons to occur mostly uninhibited, while having the added benefit for riders to work on what they needed to improve on and guiding their default positions towards correctness. The video feedback sessions allowed for breaks in the

lesson to be functional, making excellent use of time management for improvements. In traditional training, breaks are given to have athletes catch their breath, let their muscles rest, or take a drink; here, all of these were accomplished while adding the benefit of additional corrective feedback and reinforcement. The video feedback sessions fit within those breaks and do not add on unnecessary time to the lessons, thus making it efficient to implement.

The present study examined the effects of using video feedback to improve correct horseback riding positions in three different styles of riding. This study showed that riders improved their correct position skills when they were exposed to video feedback after showing no improvement with standard instruction in baseline. The results of this study suggest that video feedback would be effective in the training of other athletes in many different sports. Researchers should continue to evaluate its effectiveness in a variety of sports.

Table 1

Social Validity Data for Hailey, Abby, and Megan

The numbers indicate how many participants selected the corresponding answer.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I like the video feedback procedure (the process of riding, viewing the videos, and receiving on those videos).					3
2	The video feedback procedure took too long.	3				
3	I felt the procedure helped change my position in a positive way.					3
4	I liked using video feedback to help change my position.					3
5	I feel comfortable and safe in my riding position.				1	2
6	My position improved over the course of the intervention.				2	1

Table 2

Social Validity Data for Instructor

The numbers represent the answer choices made by the instructor.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I like the procedure.					1
2	The procedure took too much time out of my lesson.	1				
3	I would use video feedback in my lessons in the future.					1
4	I feel that my students benefited from using video feedback.					1*
5	I feel comfortable using video feedback with my students.					1

*For question 4, the instructor circled the "5" corresponding to "Strongly Agree" and added two plus signs to indicate that if there were a higher choice, she would have selected it.

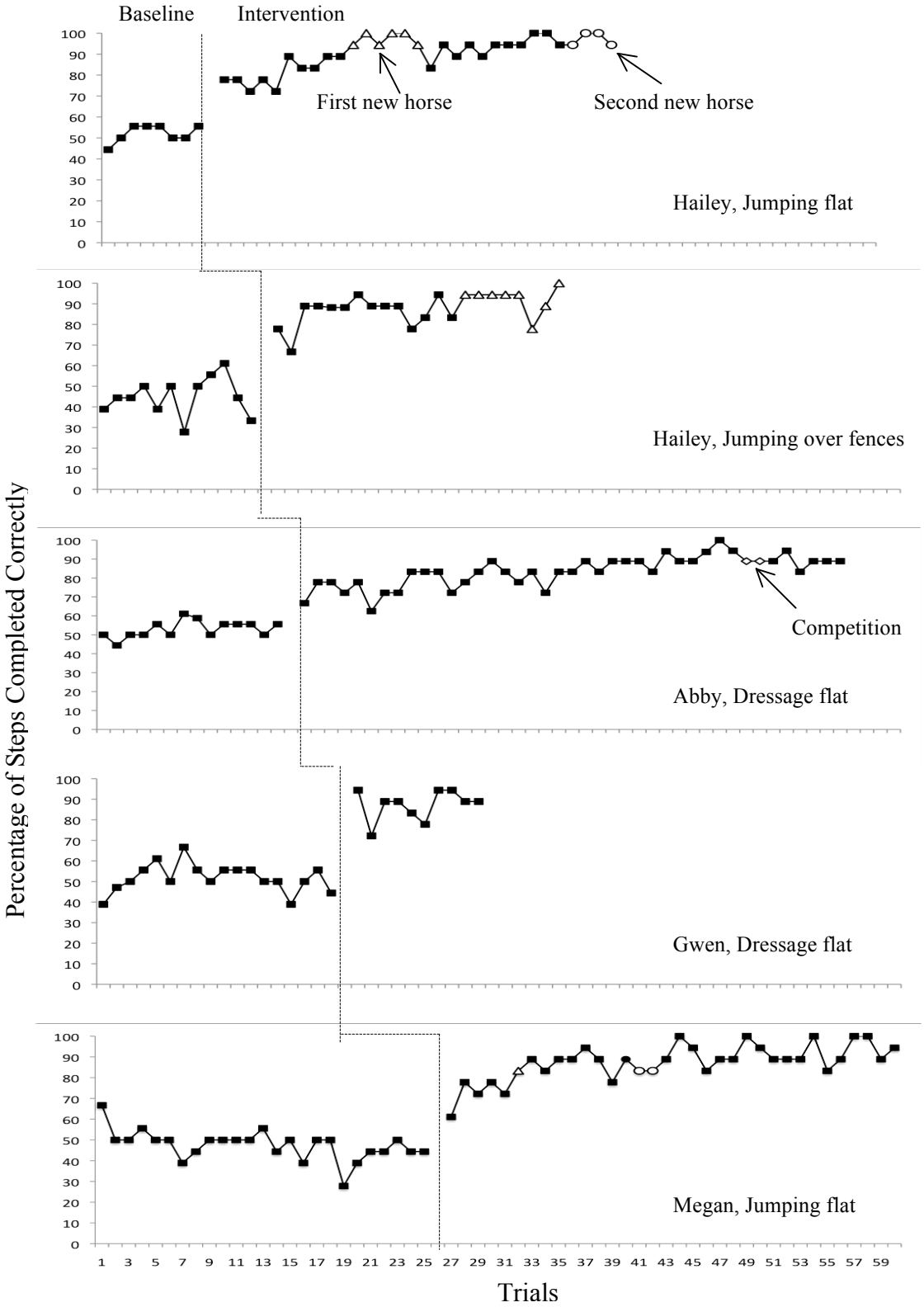

Figure 1. Results for all participants. Shows the percentage of steps completed in baseline and video feedback phases across sessions.

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APPENDICES

Appendix A

Jumping Position Over Fences

Task	**Score**		
Eyes forward	**0**	**1**	**Not clear**
Fingers closed	**0**	**1**	**Not clear**
Head up/chin up	**0**	**1**	**Not clear**
Elbows bent and close to the riders sides (no more than 5 inches from the rider's side in all directions), elbows pointing back and down, not pointing to the side	**0**	**1**	**Not clear**
Toes turned out between 15 and 45 degrees	**0**	**1**	**Not clear**
Rider's back not rounded or arched	**0**	**1**	**Not clear**
Shoulders back	**0**	**1**	**Not clear**
Chest open	**0**	**1**	**Not clear**
Rider's back parallel to the horse's back	**0**	**1**	**Not clear**
Weight evenly distributed on each side of the horse	**0**	**1**	**Not clear**
Seat out of the saddle and behind the line of the ankle (hips slightly back from the neutral/centerline position)	**0**	**1**	**Not clear**
Seat between 3-6 inches above the saddle	**0**	**1**	**Not clear**
Hips lower than the shoulders	**0**	**1**	**Not clear**
Straight line formed from the bit to the elbow	**0**	**1**	**Not clear**
Angle behind the knee between 100 and 140 degrees	**0**	**1**	**Not clear**
Back of calf pressed against the horse	**0**	**1**	**Not clear**
Lower leg behind the girth (no more than 4 inches behind the girth)	**0**	**1**	**Not clear**
Heels lower than the toes	**0**	**1**	**Not clear**

Appendix B

Dressage Position on the Flat

Task	**Score**		
Eyes forward	**0**	**1**	**Not clear**
Fingers closed around the reins	**0**	**1**	**Not clear**
Head up/chin up	**0**	**1**	**Not clear**
Elbows bent and close to the riders sides (no more than 5 inches from the rider's side in all directions), elbows pointing back and down, not to the side	**0**	**1**	**Not clear**
Toes pointing forward	**0**	**1**	**Not clear**
Rider's back not rounded or arched	**0**	**1**	**Not clear**
Shoulders back	**0**	**1**	**Not clear**
Thumbs on top of fist, with top of fist facing up	**0**	**1**	**Not clear**
Chest open	**0**	**1**	**Not clear**
Hands no higher than the rider's belly button and no lower than the horse's withers, hands level with each other	**0**	**1**	**Not clear**
Weight evenly distributed on each side of the horse	**0**	**1**	**Not clear**
Seat bones should be in full contact with the saddle, "butt tucked in/under"	**0**	**1**	**Not clear**
Rider's back in line with the vertical (perpendicular to the ground)	**0**	**1**	**Not clear**
A straight line from the bit to the elbow	**0**	**1**	**Not clear**
Inner calf pressed against the horse	**0**	**1**	**Not clear**
Knee and ball of foot should be aligned	**0**	**1**	**Not clear**
Lower leg behind the girth (no more than 4 inches behind the girth)	**0**	**1**	**Not clear**
Heels lower than or level with the toes	**0**	**1**	**Not clear**

Appendix C

Jumping Position on the Flat

Task	**Score**		
Eyes forward	**0**	**1**	**Not clear**
Fingers closed around the reins	**0**	**1**	**Not clear**
Head up/chin up	**0**	**1**	**Not clear**
Elbows bent and close to the riders sides (no more than 5 inches from the rider's side in all directions), elbows pointing back and down, not pointing to the side	**0**	**1**	**Not clear**
Toes turned out between 15-45 degrees	**0**	**1**	**Not clear**
Rider's back not rounded or arched	**0**	**1**	**Not clear**
Hands no higher than the rider's belly button and no lower than the horse's withers, hands level with each other	**0**	**1**	**Not clear**
Shoulders back	**0**	**1**	**Not clear**
Chest open	**0**	**1**	**Not clear**
Upper body slightly forward, between 10-25 degrees in front of the vertical	**0**	**1**	**Not clear**
Thumbs on top of fist, with top of fist facing up	**0**	**1**	**Not clear**
Weight evenly distributed on each side of the horse	**0**	**1**	**Not clear**
Front of the seat bones should be contacting the saddle	**0**	**1**	**Not clear**
A straight line from the bit to the elbow	**0**	**1**	**Not clear**
Back of calf pressed against the horse	**0**	**1**	**Not clear**
Lower leg close, behind the girth (no more than 4 inches behind the girth)	**0**	**1**	**Not clear**
Knee and ball of foot should be aligned	**0**	**1**	**Not clear**
Heels lower than the toes	**0**	**1**	**Not clear**

Appendix D

Treatment Fidelity Checklist

Body Part	Was the body part discussed?	
Head	**Yes**	**No**
Torso	**Yes**	**No**
Arms	**Yes**	**No**
Hands	**Yes**	**No**
Seat	**Yes**	**No**
Legs	**Yes**	**No**
Feet	**Yes**	**No**

Appendix E

Social Validity for Participants

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I like the video feedback procedure (the process of riding, viewing the videos, and receiving on those videos).	1	2	3	4	5
2	The video feedback procedure took too long.	1	2	3	4	5
3	I felt the procedure helped change my position in a positive way.	1	2	3	4	5
4	I liked using video feedback to help change my position.	1	2	3	4	5
5	I feel comfortable and safe in my riding position.	1	2	3	4	5
6	My position improved over the course of the intervention.	1	2	3	4	5

Appendix F

Social Validity for Instructors

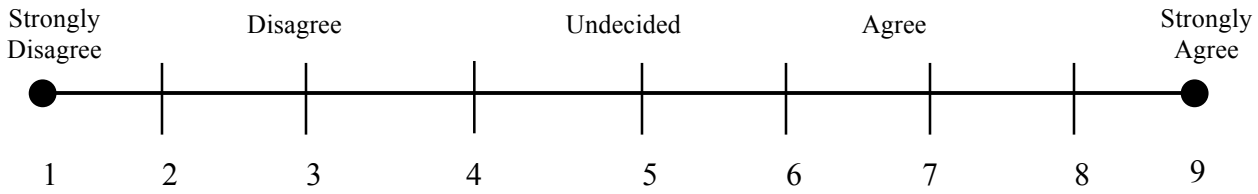
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I like the procedure.	1	2	3	4	5
2	The procedure took too much time out of my lesson.	1	2	3	4	5
3	I would use video feedback in my lessons in the future.	1	2	3	4	5
4	I feel that my students benefited from using video feedback.	1	2	3	4	5
5	I feel comfortable using video feedback with my students.	1	2	3	4	5

Appendix G

Social Validity for Expert Raters

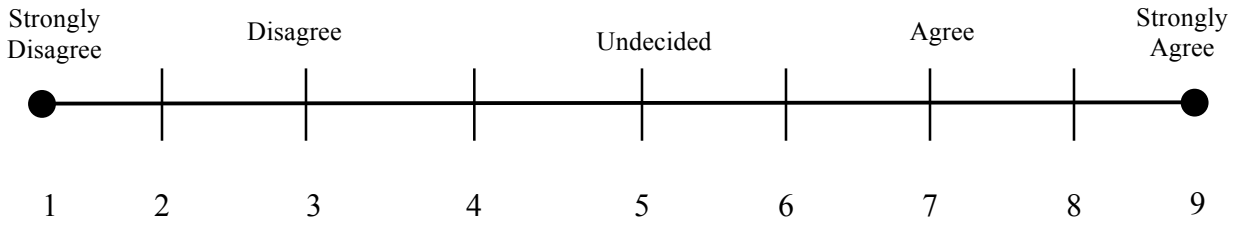
Dressage (on the flat)

The rider is in the correct position for dressage riding.



Jumping position (on the flat)

The rider is in the correct position for jumping riding on the flat.



Jumping position (over fences)

The rider is in the correct position for jumping over fences.