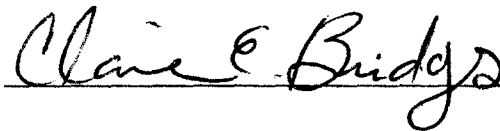


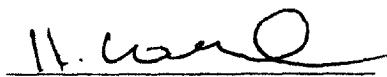
**THE EFFECTS OF MENTAL IMAGERY ON GYMNASTICS BEAM
PERFORMANCES**

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The Effects of Mental Imagery on Gymnastics Beam Performances

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INTRODUCTION

Gymnastics is a technical sport that involves perfectionism, precision, and focus. One fall or one misstep can change the mindset of a gymnast in a matter of seconds in both training and competition. This sport puts high demands on the body physically and mentally. Fear and anxiety will seep into the minds of young gymnasts who may be afraid of an apparatus, skill, injury, or the disappointment of a coach.

In the sport of women's artistic gymnastics, there are four events in which a gymnast competes. The four events include the vault, the uneven bars, the balance beam, and the floor exercise. Studies indicate the two most feared apparatuses by the gymnasts are the bars and beam, but the beam is the most feared (3, 12). When gymnasts perform on the beam, they are performing skills on an apparatus that is 124 centimeter (4 .07 ft.) and ten centimeters (3.9 in) in width. One wrong step and a gymnast could fall off the beam. Fear and anxiety then seep into the mind. These emotions can be overridden with self-confidence,

motivation and mental preparation, such as imagery. Self-confidence and mental preparation help a gymnast succeed and perform at her best when practiced regularly during practice and competition with the help of a coach.

Motivation is another tool in the gymnastics world that helps prepare a gymnast before and during a performance.

The word motivation is used a lot in sports settings to give an athlete a positive mindset to perform better.

Gymnastics like all sports requires motivation from a coach for an athlete to perform well. When performing on a beam blocking out distractions and focusing on the routine can be learned by a gymnast with the use of imagery and the motivation of a coach.

PURPOSE OF STUDY

The purpose of this study was to compare the use of mental imagery training and motivational coaching techniques for gymnastics beam competitors.

HYPOTHESIS

Gymnasts who receive imagery techniques and motivational talks will have improved beam performances.

There will be no difference on improvements between gymnasts improved performances with motivational talks compared to imagery techniques.

CHAPTER 1

REVIEW OF THE LITERATURE

Fears in Gymnastics

In a study completed by Chase, Drake, and Magyar (2005), gymnasts were interviewed on what they considered fearful about the sport of gymnastics, what they used to improve self-efficacy, and other psychological approaches used to help with fear. The gymnasts were ten competitive gymnasts (levels 7-10) between the ages of 12 and 17. Anything beyond level 10 in gymnastics is considered elite. The results from the interviews showed that fear of injury was the most common fear among the gymnasts in the sport of gymnastics at these levels. The gymnasts also had psychological approaches to deal with their fears. These were known as mental preparations in the study. The approaches used by the gymnasts in the study included mental preparation; phrases such as, “just go for it”; positive self-communication; good luck object; peer support; physical preparation; routine of action; past successful performances; and a bribe. These approaches used by the gymnasts helped them with their fears and the ones with higher self-efficacy improved the most. A couple of studies took a closer look at the worries and fears of competitive gymnasts.

Fear of injury was just one aspect of fear in gymnastics, but there were other fears gymnasts had reported in, Worries and Fears Associated with Competitive Gymnastics by Martin and Polster (2008). Based on interviews with seven competitive gymnasts, four

fears were identified. The four fears included fear of a specific skill and events, fear of incompetence, fear of injury, and fear of body shape and changes. The questions formed for the interview were from previous inventory content of sport psychological studies. This study included a larger population of 120 female competitive gymnasts in levels 5-10. The survey formed from the results of interviews as well as other literature. Results showed that the gymnasts who were worried about skills and body changes were at the higher skilled levels. The two most fearful and worrisome events of the gymnasts were the balance beam and bars. Psychological preparation was shown to be important in the sport of gymnastics as well as other sports to enhance confidence and reduce fear of the participants.

Mental Imagery in Gymnastics

One psychological preparation tool that was helpful in gymnastics was motor imagery (Parisi, Raiola, Scassillo, Di'Tore, 2012). Motor imagery in first person happened when the gymnast imagined herself performing a skill along with the emotions when performing that skill. The study included a sample of six gymnasts between the ages of 12 and 15 and who had been training for at least 5 years (Parisi, Raiola, Scassillo, Di'Tore, 2012). The gymnasts trained using motor imagery. The results showed that the psychological tool of motor imagery was beneficial to the athletes and should be used in practice as well as competition. Confidence was important for an athlete to have during practice as well as competition in any sport, and the use of imagery would help enhance that.

A detailed use of imagery by NCAA Division I collegiate gymnasts was conducted by Post and Wrisberg (2012). These researchers wanted to understand and experience the way gymnasts used imagery. The participants consisted of 10 collegiate NCAA Division I gymnasts that had to have used imagery throughout the gymnastics career and be able to describe their use of imagery in detail. The participants were between 19-25 years of age and ranged from 13-19 years of having experience in the sport of gymnastics. Interviews were given to all 10 participants either face-to-face, video, or telephone. After the interviews the researchers concluded with five themes that involved the use of imagery among the gymnasts: preparing for the movement; mentally preparing; feeling the skill; controlling perspective/speed/effort; time and place. When preparing for the movement the gymnasts described rehearsing body movements, making it perfect, focusing on critical areas, correcting mistakes, and dealing with injury. Mentally preparing included calming nerves, building confidence, going over the meet. Feeling the skill included body movements and feeling the body movements. Controlling of perspective, speed and effort included imagery perspective, imagery speed, and level of effort. Time and place included in competition and outside of competition- in practice or the night before a competition. Imagery also enhances performance in other sports.

Mental Imagery in Sports

Koehn, Morris, and Watt (2013) conducted a study on the use of mental imagery and sport performance. They performed an intervention on junior athletes to see if the mental imagery techniques would improve their performance. Four male junior tennis athletes (Australian Junior Ranking list) between the ages of 13 and 15 were selected for

the study, and they all had for at least two or three years of experience. The study took place between 4 to 6 weeks and included tournaments using The Sport Imagery Ability Measure (Watt, Morris, & Anderson, 2004) was used to assess the athletes' use of imagery. They were given four scenes and the 12 questions afterwards to answer. The participants filled out a Flow State Scale-2 (Jackson & Eklund, 2002) that consisted of 36 items to measure the intensity of flow state in an event. They also participated in imagery sessions in which they kept a log and documented after each session as well as competed. The sessions consisted of relaxation, imagery of serves, and imagery of groundstroke. The results showed that the imagery sessions improved the athletes' stroke, increased their wins, and gave them a boost in self-confidence. Like tennis, golf is a sport in which imagery can be beneficial to the athletes.

Ramsey, Cumming, and Edwards (2008) conducted a study in which golfers were used to study imagery direction and putting performances. These researchers found that facilitative imagery improved self-efficacy and that debilitating imagery can be detrimental to an athlete but can happen automatically in some athletes, especially the injured. Facilitative imagery was defined by Ramsey, Cumming, and Edwards as a positive effect on one's ability to learn and perform (2008). Debilitating imagery was defined as imagery that is perceived in a way that hinders an individual's ability to achieve the positive results from facilitative imagery. Seventy-five golfers were selected to participate in the study. Thirty-six were male and thirty-nine were female. They varied in golf experience and were all undergraduate university students. Equipment was used in this study in which several putting stations were set up. The Movement Imagery Questionnaire, Revised (Hall & Martin, 1997) was used to measure imagery ability. The

participants made a total of 45 golf putts that were divided into 3 parts. They were divided into three groups, control group, and two different types of imagery, which were facilitative and suppressive. According to Ramsey, Cumming, and Edwards, suppressive imagery is suppressing negative images related to performance (2008). The two groups listened to audio tapes before each set of 15 putts, and the control group did a puzzle. The results showed that the control group's performance was constant and that the facilitative imagery improved the golfers' performance more than the suppressive imagery. Imagery is very important in sports in that athletes need to utilize it for improved performance and should be encouraged by coaches (Ramsey, Cumming, & Edwards, 2008).

Neuman and Gray (2013), baseball players and the use of imagery effected their hitting performances. The study included 24 novice players (never played before) and 24 experienced players that were from recreational baseball leagues for a total of 48 participants. Two types of mental preparations were used imagery and observation. All 48 participants had to complete three directional hitting tasks, which included, opposite-field hit, pull hit and sacrifice fly. Each participant completed the tasks in the same order and were given 15 pitches per task. The participants were divided into a control group, an imagery group, or an observation group. The imagery group listened to an audio recording that led them through an imagery script preparing them for hitting. The observation group watched a video clip of professional baseball players hitting the ball and the clip was muted. The control group had to read an article about baseball before hitting. The results showed that the imagery and observation groups had more successful hits for all three tasks compared to the control group.

Observational learning and imagery were used in a study by Hall, Munroe-Chandler, Cumming, Law, Ramsey, and Murphy (2009) with a population of 345 athletes representing thirty-two sports using the Sport Imagery Questionnaire (Hall, Mack, Paivio, and Hausenblas, 1998). Results showed that athletes used mental skills, such as imagery, more in competition than in practice. Using the Sport Imagery Questionnaire, which it consisted of the five functions of imagery and thirty questions using a rating scale. The five functions of imagery included cognitive specific, cognitive general, motivational specific, motivational general-arousal, and motivational general-mastery. The results showed that competitive athletes used more cognitive and motivational imagery than recreational athletes. It was also shown that observational learning was not used in competition by the athletes, but used more during practice. During practice and competition mental imagery was used to help gain an edge on an athlete's competition when used correctly.

Samuel and Symonds (2010) conducted a study using the Test of Performance Strategy (TOPS), (Thomas, Murphy, & Lewis, 1999) to determine if there were a differences between mental preparation tools that athletes use during competition or practice. The answers on the questionnaire were based on a rating scale. The questionnaire was given to the coaches to give to the athletes before a practice and a competition. The sample for the study included athletes from an NCAA Division II school including male and female athletes. The results of the study showed that athletes used competition as a place for using imagery, self-talk, activation, and negative-thinking, instead of in practice. Coaches during competition played a role in an athlete's confidence and mentality. Gymnastics is a sport in which trust plays a factor between

coach and athlete, especially when learning a new skill. The analogy of mental toughness was said by many coaches to be an important feature for an athlete to have in making a perfect performance.

Mental Toughness, Motivation from the Coach, and Performance Anxiety

Butt, Culp, Weinberg (2011) examined Coaches' views of mental toughness and how it is built, the sample included ten coaches in the NCAA Division I, half were female and the other half were male. Each coach was contacted prior to the interview through phone. All interviews were face-to-face and was given by one individual. Throughout the interview several traits came into play that the coaches felt were important in an athlete, which included psychological skills, motivation to succeed, and resilience. In the study mental toughness is defined as the ability to be tough and hang in there (Goldberg, 1998; Gould, Hodge, Peterson, & Petlichkiff, 1987), an ability to cope and handle pressure and adversity (Goldberg, 1998), an ability to rebound from failures (Goldberg, 1998), and the possession of superior mental skills (Loehr, 1995). Mental toughness is important for an athlete to have in any sport. An athlete needs to be in a positive environment in order for mental toughness to be part of an athlete's psychological thinking in practice or competition. Many psychologists and coaches agreed that the sport of gymnastics is a place that mental toughness belonged. In the sport of gymnastics, an athlete does not need fear to consume her; an athlete needs confidence, mental techniques, and mental toughness to help push back the fears settling into her mind.

A few researchers studied the mental toughness of athletes in different levels and age ranges by evaluating the characteristics of mental toughness that make up an athlete.

Gill, Hamill, and Madrigal (2013) administered the Mental Toughness Scale developed based on the work of Jones, Hanton, & Connaughton's on mental toughness, 2007. Two studies were performed. The first study was done to prepare for the second study and to develop the Mental Toughness Scale (MTS). The second study consisted of a population of 74 basketball players. The eleven item Mental Toughness Scale was used as well as the Sports Orientation Scale (Gill & Deeter, 1988). The Sports Orientation Scale measured competitiveness, goal orientation, and win orientation among the athletes. The results showed that having high self-esteem and confidence correlated with mental toughness no matter the level of the athlete and that athletes who were seen as spectacular in the eyes of their coaches had a higher score on the Mental Toughness Scale.

Fear released from an athlete's mind, high self-efficacy, and an increase in confidence could not be done without the guidance and support from the coach. But could it be more than fear when a gymnast did not execute a skill on the beam or jumps off when she knew she could have fought for it? A study done by Batatinha, et. al (2013) looked for answers to why gymnasts may fall off the beam. Their hypothesis was to question whether these falls were a result of fatigue. The sample consisted of 15 female gymnasts who had at least two years of training experience on the training team. They were between the ages of 11 and 14 years of age. The gymnasts practiced at least five days a week and at least four hours a day. The gymnasts were put under a fatigue test in which they did drills for twenty minutes and given just water. After the test they performed on the balance beam. The second day the gymnasts performed the same fatigue test but were given a carbohydrate drink that was sugar-free and flavored. The gymnasts then performed on the balance beam. The results showed that there were less

falls from the gymnasts on the balance beam when they consumed the carbohydrate drink instead of drinking water. The balance beam is considered one of the hardest apparatuses in gymnastics. It is not an event on which a gymnast needed to be fatigued nor have anxiety.

Gymnasts may have anxiety when performing on the balance beam during training and during competition. Cottyn, et. al. (2006) conducted a study on a group of gymnasts to measure competitive anxiety when performing on the balance beam. Participants included 8 gymnasts who volunteered and who were from two different teams. They ranged in age from 11-15 and all had experience in gymnastics from 3-10 years. Three tests were performed on the gymnasts, and all were on the balance beam, but at different occasions. The first test was in their own training facility, the second one was in their training facility but during competition season, and the third test was performed during a competition. A self-report scale was used among the gymnasts to rate their anxiety. They were to rate the responses from each question on a scale from 1 (not nervous at all) to 7 (very nervous). The same responses to the questions were rated with the anxiety thermometer scale (Pijpers, Oudejans, Holsheimer, & Bakker, 2003). The gymnasts rated their nervousness on a scale from 0 (not nervous at all) to 10 (extremely nervous). The gymnasts' heart rate was measured as well. The results showed that during competition the gymnasts' heart rates were more elevated than during the other two tests. The researchers hypothesized that gymnasts would have no anxiety when performing on the balance beam, but the self-report scale of the gymnasts proved otherwise.

Dallas and Skordilis (2011) conducted a study on competitive anxiety and self-confidence among 86 rhythmic gymnasts between the ages of 11 and 12 years old. They

hypothesized that if physiological arousal is low, then cognitive anxiety among the gymnasts affected their performance positively, but if physiological arousal is high, then the performance may be affected negatively by cognitive anxiety. The participants completed the CSAI-2 scale (Martens, et al., 1990). The scale consists of three subscales, cognitive anxiety, somatic anxiety, and self-confidence, with a rating of questions from 1 to 4. The results showed that cognitive and somatic anxiety had no relation to performance among the gymnasts, but self-confidence had a high positive relationship to a gymnast's performance. Self-Confidence is an important factor in the sport of gymnastics. Most gymnasts who have a higher self-confidence overrode their fears with the belief in themselves and being in a positive environment with the support of a coach.

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CHAPTER 2

The Effects of Mental Imagery on Beam Performances

ABSTRACT

Purpose: The purpose of this study was to compare the use of mental imagery training and motivational coaching techniques for gymnastics beam competitors.

Subjects: Participants included 10 female team gymnasts competing in levels 4-9 and between the ages of 9-14 years ($n= 11$) that are enrolled in a privately owned gymnastics club.

Methods: The Sports Imagery Questionnaire (Hall, 1998) was used to measure imagery use among gymnasts. This questionnaire was taken twice to measure the difference between beam performances before and after the imagery techniques and motivational talks. Imagery techniques were completed using a CD featuring Dr. Alison Arnold. Motivational talks were given by the head coach. The study took place over a 6 week period during the gymnasts' non-competitive season. **Results:** The data of the study was analyzed using a split 2 x 2 plot ANOVA. The research findings indicated that there was no significant difference ($p > .589$) in beam scores between the gymnasts who used imagery or who were given motivational talks. There was a significant difference in pre- and -post beam scores ($p < .001$) that the gymnasts showed improvement after the 6 week sessions. **Conclusion:** The use of imagery and the importance of motivation from coaches were consistent with previous studies. The small significant difference found

between the pre- and post-beam scores indicated that imagery sessions over a period of time and consistent motivation from a coach can improve performances. The pre- and post- scores from the Sports Imagery Questionnaire suggested there was a greater use and understanding of imagery by the gymnasts after the 6-week sessions.

KEY WORDS

Imagery, Beam, Sports Imagery Questionnaire

PURPOSE

The purpose of this study was to compare the use of mental imagery training and motivational coaching techniques for gymnastics beam competitors.

SUBJECTS

Participants included 10 female team gymnasts competing in levels 4-9 and between the ages of 9-14 years (n = 11) that are enrolled in a privately owned gymnastics club.

METHODS

All participants were given an assent form to sign as well as a consent form to their parents before beginning the study. The consent form explained the purpose of the study and the procedures that would be used in study. Before the 6-week study began the participants filled out the Sports Imagery Questionnaire and performed one beam routine. The girls were then randomly selected to either the imagery or motivational group.

The Sports Imagery Questionnaire consisted of 30 questions, and each question was rated on a 1-7 scale (1 = rarely; 7 = often). This questionnaire was developed by Hall, Stevens, and Paivio, (2005). The questionnaire measured the cognitive and motivational aspects of imagery. It was broken down into five groups: cognitive specific, cognitive general, motivational specific, motivational general-arousal, and motivational general-mastery. The questions pertaining to general motivational measures the athlete's self-confidence, mental toughness, and arousal control. The general cognitive measures the athlete's ability to rehearse strategies. The questions pertaining to cognitive specific measures the athlete's ability to rehearse skills, and motivational specific measures the athlete's goals and attaining those goals. The questionnaire was used to measure the use of imagery by the gymnasts before and after the six week sessions. The Sports Imagery Questionnaire scores were also used to reflect the gymnasts' pre- and post-beam scores. The participants answered the questionnaire as a pre-test and post-test. The pre-test was completed before the 6-week sessions and the post-test was completed after the sessions. The questionnaire required between 10 – 20 minutes depending on the age of the participants.

The Sports Imagery Questionnaire (SIQ) pre-test and post-test was scored each time it was completed by the participants. Scoring was calculated by using The Sport Imagery Questionnaire: Test Manual by Craig R. Hall, Diane E. Stevens, and Allan Paivio, (2005). The pre- and post-test scores of the questionnaire for each individual were compared. The pre- and post-test scores of the questionnaire and beam performance was evaluated to determine performance change from pre to post within each group using a split 2 x 2 plot ANOVA.

When calculating the SIQ scores each question was placed in one of the five categories. The scores for each question ranged from 1 to 7. Each category score was calculated by averaging the answers of the questions. The higher the score the stronger use of imagery for the individual. The mean and standard deviation were calculated for pre-and post-test scores as a group.

The 10 gymnasts met twice a week, Monday and Friday, in their randomly assigned groups. Five gymnasts were assigned to the imagery group, and five were assigned to the motivational group. The sessions were at the beginning of every practice and each lasted approximately 8-10 minutes in length. The gymnasts were encouraged to use what they learned in the sessions throughout their practices. The mental imagery group listened to a visualization CD called Train Your Mind by Dr. Alison Arnold, a well-known sports psychologist that works with athletes at all levels, including the Olympic level.

The participants in the motivational group were given motivational talks by the girls' head coach. The head coach had the experience to lead the discussions and also used Creating an Unshakable Mind: 12-week Mental Toughness Training Workbook

Optional Gymnasts by Dr. Alison Arnold. The head coach spoke with the girls about letting go of negative thoughts when performing on the beam. She also spoke on the importance of not being distracted by their surroundings, to not be frustrated, but instead focus on corrections. She encouraged her gymnasts to focus on breathing, have positive thoughts, believe in themselves, and to perform the best that they can. When the 6 weeks were completed, the gymnasts filled out the Sports Imagery Questionnaire and were judged on beam performance.

The beam performances were judged by a coach in the gymnasts' home gym. The coach judging the gymnasts is a certified judge by USA Gymnastics. The judge was unaware of the groups the gymnasts were assigned. The gymnasts were able to warm up and run through skills before performing as if they were competing at a gymnastics meet. The head coach supervised all performances. The routines completed by the gymnasts were the ones they would be competing in the upcoming season.

RESULTS

The means and standard deviations (SD) were calculated for the pre- and post-beam performances for both imagery and motivational groups (Table 1). The mean for the imagery group, 8.83, was lower than the motivational groups mean score of a 9.05 for pre-beam performances. The SD for pre-beam performances was higher for the imagery group, 0.47, than the motivational SD score, 0.24. Both of the groups' mean score improved for post beam performances with motivational group having the higher mean score. Imagery group mean increased by 0.40 (9.23) and motivational mean increased by 0.3 (9.36). The motivational group had a higher SD for post beam scores as well with a .30 compared to imagery group's SD of a .26. Both groups increased their beam performance scores after the 6-week sessions (Fig. 1). A small positive significant increase $p < .001$ was shown among multivariate tests using split plot ANOVA (Table 2) for increases in beam scores over time for both imagery and motivational groups.

The five categories in the sports imagery questionnaire, cognitive specific (CS), cognitive general (CG), motivational specific (MS), motivational general-arousal (MGA), and motivational general-mastery (MGM) were measured in a Wilk's Lambda statistical analysis between the imagery and motivational groups. The results showed that there was no significant difference, $p = .589$ (Table 2) between the imagery and motivational groups scores. The mean and standard deviation were calculated for each category.

When calculating the Sports Imagery Questionnaire the mean scores were higher for the cognitive specific category in the pre-test individually as well as a group. The participants were relying more on the rehearsal of skills for performing before the 6-week

sessions began. The means for each category in the post-test show the cognitive specific category had the highest mean and average scores as well (Table 3). The mean for the cognitive specific category pre-test was 5.27 and post-test 5.63.

Motivational General Mastery represents how the athlete feels controlled and focused when imagining herself performing. This category showed the most improvement in scores from pre-test to post-test in the imagery group compared to the motivational group (Table 3). Pre-test mean for imagery was 4.500; pre-test mean for motivational was 4.800. Post-test mean for imagery was 4.920; post-test mean for motivational was 4.760 (Fig. 2).

DISCUSSION

The results of this study showed mental imagery and motivational talks from a coach have a positive impact on gymnasts to improve beam performances. The mean and individual scores of pre- and post- beam performances for both groups show a significant difference $p < .001$ from the beginning of the six week sessions to the end of the six week sessions (Table 2). The participants had no imagery training or motivational talks in length prior to this study. The results showed that it did not depend upon which group the gymnasts were assigned. Both the imagery group and the motivational group, each gymnast improved her beam score from the first performance. The findings of this study were positively associated with other findings that show mental imagery does improve sport performances (7, 18, 21, 23, 24, & 25).

The Sports Imagery Questionnaire (SIQ) has been used in several research studies to test the use of mental imagery among athletes (5). In this study the SIQ was used as a pre-test and post-test for the participants. The questionnaire was used to determine which category was used most often by the participants, if there were any change in the use of imagery depending upon which group they were randomly assigned, and if it affected the beam scores over a 6-week period. There was no significant difference $p > .589$ between the groups' test scores over time (Table 2). For future research a larger population size and longer duration of sessions may result in a greater significance in beam and questionnaire scores between the two groups. It is also suggested that gymnasts can use mental imagery on other events, such as the floor exercise and uneven bars. Being taught

the correct techniques of mental imagery over a couple of months could also make a difference in future research studies.

The mean scores for each category changed very little from pre-test to post-test (Table 3). The category most used by the gymnasts of this study was cognitive specific for the pre-test and post-test. Therefore the gymnasts used cognitive specific imagery before the sessions and increased slightly in mean after the sessions.

The second most used category by the gymnasts was MG-M. MG-M relates to self-confidence and mental toughness. After the six week sessions of imagery and motivational talks, the gymnasts increased their MG-M for imagery by .20 not depending on the group they were assigned. The imagery group improved the most compared to the motivational group. The questionnaire reflects the participants' improvement in motivational and cognitive use of imagery for their beam performances. The findings from this questionnaire positive associate with studies in the importance of mental toughness in sports and the importance of motivation from a coach (2, 8).

In conclusion, the use of imagery and the importance of motivation from coaches among athletes were consistent with previous studies. The difference in pre- and post-beam scores indicated that imagery sessions and the consistency of motivation from a coach can improve performances. The scores from the SIQ suggested there was a greater use and understanding of imagery by the gymnasts after the 6-week sessions.

TABLES

Table 1. Means and Standard Deviations for Pre-and Post-Beam Performances

Subjects	Age	Level	Group	Pre-Beam	Post-Beam
1	11	4	1	9.2	9.45
2	11	4	1	8.95	9.4
3	11	4	2	9.3	9.7
4	10	4	2	9.15	9.475
5	9	4	1	8	8.9
6	11	4	2	8.9	9.25
7	12	5	2	8.7	8.9
8	11	5	1	9	9.4
9	10	7	2	9.2	9.5
10	14	9	1	9	9
Mean				8.94	9.2975
SD				0.374017	0.275996

Table 2. Pre-and Post- Beam Performances for Group 1 and Group 2

Group 1	Imagery	Group	Pre-Beam	Post-Beam
Group 2	Motivational			
		1	9.2	9.45
		1	8.95	9.4
		1	8	8.9
		1	9	9.4
		1	9	9
Mean			8.83	9.23
SD			0.473814	0.258844
		2	9.3	9.7
		2	9.15	9.475
		2	8.9	9.25
		2	8.7	8.9
		2	9.2	9.5
Mean			9.05	9.365
SD			0.244949	0.304959

Table 3. Split Plot ANOVA for Determining Significance in Pre-Post Beam and Questionnaire Scores for Both Groups after 6-Weeks

	Effect	Value	F	Hypothesis df	Error df	Sig.
Time	Wilks' Lambda	0.263	22.373	1.000	8.000	0.001
Time * Group	Wilks' Lambda	0.962	0.316	1.000	8.000	0.589

Table 4. Mean and SD Scores for Imagery group

Group	N	Minimum	Maximum	Mean	St. Deviation
Imagery					
Beam PRE	5	8.00	9.20	8.83	0.47381
Level	5	4.00	9.00	5.20	2.168
CS PRE	5	3.40	6.80	5.22	4.4567
MS PRE	5	2.20	5.00	3.82	1.0616
CG PRE	5	2.70	5.00	3.90	1.0344
MGA PRE	5	3.20	7.00	4.66	1.5143
MGM PRE	5	1.50	5.50	4.50	1.6837
Beam POST	5	8.90	9.45	9.23	0.2588
CS POST	5	4.00	6.70	5.64	1.0213
CG POST	5	3.10	5.80	4.12	1.0474
MS POST	5	2.80	5.00	4.06	0.8591
MGA POST	5	2.20	6.00	4.10	1.3675
MGM POST	5	3.70	5.70	4.92	0.7759
Age	5	9.00	14.00	11.20	1.789

Table 5. Mean and SD Scores for Motivational Group

Group	N	Minimum	Maximum	Mean	St. Deviation
Motivational					
Beam PRE	5	8.70	9.30	9.05	0.24495
Level	5	4.00	7.00	4.80	1.304
CS PRE	5	4.00	6.70	5.32	1.2478
MS PRE	5	3.40	5.00	4.04	0.6025
CG PRE	5	3.40	5.20	4.34	0.7861
MGA PRE	5	3.20	6.00	4.62	1.1323
MGM PRE	5	2.80	5.80	4.80	1.1747
Beam Post	5	8.90	9.70	9.365	0.304959
CS POST	5	4.40	6.50	5.62	0.7791
CG POST	5	1.80	5.40	3.960	1.3202
MS POST	5	3.70	4.10	3.88	0.1643
MGA POST	5	3.20	5.00	4.30	0.6856
MGM POST	5	2.10	5.70	4.76	1.5027
Age	5	10.00	12.00	10.80	0.837

APPENDIX

Appendix A- Assent Form

Appendix B – Informed Consent Form

Appendix C – Sports Imagery Questionnaire

Appendix A

**ASSENT FORM (AGES 9-15)
GYMNASTICS LEVELS 5-9**

Auburn University at Montgomery

Name of Research Project: Correlational Studies between Mental Imagery and Beam Performances

Name of Person Conducting Research: Claire Bridges, Graduate Student at Auburn University at Montgomery

Purpose of this Project:

We are doing a study about how mental imagery techniques can benefit a gymnast and her beam performance. We hope to learn more about how the benefits of learning and using mental imagery techniques that will help improve beam performances in the upcoming competitive season. We hope that this study will help benefit you on all of your events in the 2015 competitive season.

The Process:

If it's okay with you, we will ask you to take part in a few things. The study will take place at the gym. You will be asked first to fill out a questionnaire about mental imagery. The questions should only take a few minutes to answer. You will not have to tell anyone the answers and answer each question to the best of your ability. Each gymnast will then perform on the beam and will be judged. There will be a few sessions on mental imagery technique for you to practice using it. Lastly, each gymnast will perform her beam routine one last time after completing a couple mental imagery sessions and will be judged as well.

Discomfort or Benefit:

There is a minor (small) chance that other people may find out about this study and there is a chance that some of the children may feel that they have to participate in this study. You can stop at any time. No one will be mad at you if you stop.

We will not tell anyone that you took part in this study. Your name will not be on the answer sheet. We will give you a copy of this paper to keep. You might enjoy this project and you might learn more about mental imagery and its benefits for you.

Signature of researcher

Date

Subject's statement:
This research study has been explained to me. I agree to take part in this study. I have had a chance to ask questions. If I have more questions, I can ask the researcher.

Signature of subject

Date

Appendix B

Informed Parental Consent
For Research Project Entitled: **The Correlational Study of Imagery Techniques and Beam Performances.**
Auburn University at Montgomery

Date September 15, 2014

Dear Parents,

Your child has been invited to participate in a study of **The Correlational Study of Imagery Techniques and Beam Performances.**

Research Purpose & Procedures:

We hope to learn that mental imagery techniques taught to the gymnast and used will help improve their beam performances and help them in the upcoming competition season. Your child has been selected as a possible participant because of their beam performances as a group this last season. If you decide to allow your child to participate, I, Claire Bridges, will ask your child to fill out a questionnaire, participate in a couple of imagery technique sessions, and performing routines on the beam. This will not take place all in one day. This will take a couple of days and at most two to three weeks depending on practice schedules. The study will take place at the gym where your child practices.

The entire study will be over a couple of days span. Dates will be given in advanced notice to when the study will be conducted. The questionnaire will require a few minutes and the imagery technique used will be done in a couple of sessions. The beam routines will require more time so that each gymnast performs twice, once before the sessions and again after the imagery technique sessions have been completed.

Risks and Benefits: there is a risk of breach confidentiality. However, we will take appropriate steps to assure privacy of these records. To reduce the possibility of a breach of confidentiality of information when I turn my work into AUM I will change all of the gymnasts' names to protect their privacy.

- I will be happy to share the results of our project with you when the study is complete. We may try to get our project published in the Sport, Exercise, and Performance Psychology journal. Also, I may also get to present my work at a conference such as the American Psychological Association Convention. But, even if I do, I will still keep all names changed in any journal or presentation.
- Your or your child will not receive any money for participating. There will be no cost for your child to participate in this project.

Participation is voluntary:

- If you first give me permission to include your child in our projects and later change your mind that is fine. Just let me know and we will remove the information.
- If your child does not wish to participate, there will be no pressure to continue.
- Your relationship with the gym will not be affected now or in the future by your decision.

Contact Information: If you have any questions please let me know at, cbridge1@aum.edu or 334-549-2614. If you have any questions about your child's rights as a participant you may contact Debra Tomblin (Research Compliance Manager) at AUM 33.244-3250 or dtomblin@aum.edu.

Appendix C

Sports Imagery Questionnaire

This questionnaire was designed to assess the extent to which you incorporate imagery into your sport. Any statement depicting a function of imagery that you rarely use should be given a **low rating**. In contrast, any statement describing a function of imagery which you use frequently should be given a **high rating**. Your ratings will be made on a seven-point scale, where *one* is the **rarely** or never engage in that kind of imagery end of the scale and *seven* is the **often** engage in that kind of imagery end of the scale.

Statements that fall within these two extremes should be rated accordingly along the rest of the scale. Read each statement below and write in the blank the appropriate number from the scale provided to indicate the degree to which the statement applies to you when you are practicing or competing in your sport. Don't be concerned about using the same numbers repeatedly if you feel they represent your true feelings. Remember, there are no right or wrong answers, so please answer accurately as possible.

	1	2	3	4	5	6	7
1. I make up new plans/strategies in my head.							
2. I imagine the atmosphere of winning a championship (e.g., the excitement that follows winning a championship).							
3. I imagine giving 100%.							
4. I can consistently control the image of a physical skill.							
5. I imagine the emotions I feel while doing my sport.							
6. I imagine my skills improving.							
7. I imagine alternative strategies in case my event/game plan fails.							
8. I imagine myself handling the arousal and excitement associated with my sport.							
9. I imagine myself appearing self-confident in front of my opponents.							
10. I imagine other athletes congratulating me on a good performance.							
11. I imagine each section of an event/game (e.g., offense vs. defense, fast, slow).							

12. I imagine myself being in control in difficult situations.							
13. I can easily change an image of a skill.							
14. I imagine others applauding my performance.							
15. When imagining a particular skill, I consistently perform it perfectly in my mind.							
16. I imagine myself winning a medal.							
17. I imagine the stress and anxiety associated with my sport.							
18. I imagine myself continuing with my game/event plan, even when performing poorly.							
19. When I imagine myself performing, I feel myself getting psyched up.							
20. I can mentally make corrections to physical skills.							
21. I imagine executing entire plays/programs/sections just the way I want them to happen in an event/game.							
22. Before attempting a particular skill, I imagine myself performing it perfectly.							
23. I imagine myself being mentally tough.							
24. When I imagine myself participating in my sport, I feel anxious.							
25. I imagine the excitement associated with performing.							
26. I imagine myself being interviewed as a champion.							
27. I imagine myself being focused during a challenging situation.							

28. When learning a new skill, I imagine myself performing it perfectly.							
29. I imagine myself successfully following my game/event plan.							
30. I imagine myself working successfully through tough situations (e.g., a player short, sore ankle, etc.).							